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C O N T E N T S

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APPLICATION OF MOBILE PHONES IN THE MARKETING OF BANANA IN ONDO STATE, NIGERIA

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Abstract

This paper studied the application of mobile phones in the marketing of banana in Ondo State, Nigeria. Banana is a major tropical fruit, consumed widely for its taste, texture, energy, digestibility and cost-effectiveness across major towns and rural communities in Ondo State, Nigeria. Given the high perishability of the crop, mostly when ripe, banana marketers who are mostly women employ mobile phones in banana marketing. The data collected from one hundred and eighty (180) banana marketers across three (3) Local Government Areas (LGAs) were analysed using descriptive statistics, marketing margin and multiple regression model. The study revealed high use of mobile phones among banana marketers with majority using more than one GSM service providers. Retailer and wholesaler marketing margins were high with retailer margin (64%) greater than wholesaler margin (36%). The regression results indicated that only education and amount of banana sales positively influenced the marketers' use of mobile phones.

Key words**:** *GSM service providers***,** *marketing margin, mobile phones, Nigeria, regression model*

INTRODUCTION

The banana (*Musa sapientum,* known as true banana) has its origin in southwest Asia. Banana is one of the most widely grown tropical fruits, cultivated over 130 countries, along the tropics and sub tropic of Capricorn [12]. Banana is the second largest produced fruit after citrus, containing about 16% of the world's total fruit production [12]. Banana is the fourth on the developing world's list of food crops and a major staple food for millions of people throughout the tropics [8]. It can be processed in many ways such as cooking, boiling, steaming, frying, roasting, or can be dried and milled into flour [8]. In Nigeria, banana is often grated and cooked into porridge [9].

With increasing population, urbanisation, and persistent increases in food prices, banana can play pivotal roles in fighting against increasing rate of poverty [2]. This is because banana is one of the cheapest food crops to produce. It is also commonly available in many public places in southwest Nigeria including markets, motor parks, stores and afforded by low-income earners. The characteristics intrinsic in banana afore-mentioned are increasingly putting banana in the limelight as household consumption fruit in southwest Nigeria.

The nutritional importance of banana

Digestibility

Banana is highly nutritious and easily digestible than many other fruits [12]. According to [18], the digestion time of banana fruit is 105 minutes which is less than that of apple with 210 minutes. Banana is popular for aroma, texture and easy to peel and eat. Besides, its richness in potassium and calcium is well-known with low sodium content [9]. These characteristics, make bananas often the first solid food fed to infants [9]

Moisture content

Moisture content in pulp increases during ripening process due to respiratory breakdown of starches into sugar and migration of moisture from peel to pulp [11]. However, in AAB variety, moisture content could be up to

68% due to presence of starchier balbisiana genome and incomplete conversion of starch into sugar [12]. Even when fully ripe, still some starch is left in pulp tissue [19] cited in [12].

Carbohydrates

During ripening process, starch is converted into sugar, through enzymatic breakdown process [12]. In AAB group (the group *M. sapientum* belongs to), starch content declines from 20-30% to 1-2%, but starch amount could be as high as 11% depending on variety [12]. Sugar content of fully mature banana is quite high and thus makes it an ideal substrate for wine making [12]. Carbohydrate type in banana is resistant starch and non-starch polysaccharides, which have low glycemic index or low digestibility [12]. This property makes it an excellent ingredient for different functional and convenience foods like cookies and chips [12].

Marketing of agricultural commodities

An agricultural market is a medium in which exchange of ownership of farm produce and allied agricultural commodities takes place. A market is an arena that provides the much needed interaction of the forces of demand and supply, irrespective of the physical location of buyers and sellers [13]. It aims at organising and facilitating business activities and answering the basic questions of what to produce, for whom to produce it for, and how to produce and distribute it [13].

Marketing margins

Marketing margins represent the difference in price paid to the first seller and that paid by the final buyer [1]. Marketing margin is also the difference between the purchase price and the price received on sale [13]. Every category of middleman earns a sort of margin for the duties performed in the marketing channel [1]. The difference is usually made up of the margins taken by wholesalers and retailers, plus transport and other charges [1]. Marketing margins can be measured using different approaches but [13] identified three approaches of measuring marketing margin in monetary terms. The first approach identified by [13] is taking a representative supply of a product from a given rural market and tracing what happens to it through the marketing system. Price changes are noted at each stage and the average is derived. The second approach identified by [13] is the number of units handled divided by the gross receipts and outflows along a marketing channel. Margins from each intermediate stage can then be added to obtain the overall margin [13]. The third approach by [13] is by comparing prices at the different levels of marketing; this, however, depends on the availability of representative and comparable series of prices at each level [13].

Use of mobile phones in agricultural marketing

The application of mobile phones in agriculture and in particular agricultural marketing is re-defining the concept of agricultural marketing. Mobile phone use in agricultural marketing has provided impetus, speed, reduced chains of middlemen to traditional marketing and reduced post-harvest losses characteristic of the traditional marketing of farm produce. Small, medium and large scale marketing businesses, as well as farmers, who many a times are involved in the direct distribution and marketing of their farm produce are tremendously shifting their focus to use of mobile phones and associated services in areas of transportation and distribution, sales, purchases and networking. A report by Vodafone and Accenture, for instance, noted that mobile phone-enabled solutions for food and agriculture could assist producers to access financial services, obtain agricultural information, improve data visibility for supply chain efficiency and enhance access to markets [7] and [20].

Mobile phones and banana marketing

Banana comes in different sizes as it is distributed and marketed from the farmer to the consumer, through the activities of wholesalers and retailers. Banana is often sold in measures of bunches. However, the term bunch (Photo 1) applies to the large hanging cluster, which is made up of different tiers with up 20 fruits in a tier. Depending on varieties and other factors, the bunch may comprise from 3 to 20 tiers. It is this the bunch that is commonly referred to commercially as “banana stem”. Average weight of the bunch ranges from 30 to 50kg.

According to Research and Statistics Department of the Ministry of Economic Planning and Budget, Ondo State's report for 2011, the average size of banana bunch in the study area is 32 kg [16].

The tiers (Photo 2) also called "hands" (because of its characteristic human hand appearance) make up the bunch or the banana stem. The hands comprise of pieces of banana also called a banana or also a "finger". Retailers often sell ripe banana in the study area in tiers or hands. The tiers have also been erroneously referred to as banana bunch.

Photo 1. Unripe banana bunch also commercially known as banana stem
Source: retrieved from http://www.123rf.com/stock-photo/bunch_of_bananas.html

Photo 2. Ripe banana tier also known as banana hand
Source: retrieved from http://www.123rf.com/photo_8738987_bunch-of-bananas-isolated-on-white-background.html

Mobile phones and banana marketing

The very high perishability of banana, particularly when ripe, makes the use of mobile phone marketing almost indispensable. As it will rapidly connect marketers with established buyers with a view to obtaining their choice quantities and prices. Effective use of mobile phones in the marketing of banana has the capacity to rapidly connect marketers with buyers thus preventing deterioration or spoilage of ripe banana. It is against this background, that the study is aimed at evaluating the application of mobile phones in the marketing of banana in Ondo State, Nigeria taking bearing around the following objectives which include to:

i. examine the socio-economic characteristics of banana marketers in the study area
ii. investigate the use and number of GSM service providers used by banana marketers in the study area
iii. investigate the marketing margins of banana in the study area
iv. examine the factors influencing the use of mobile phones in banana marketing in the study area

MATERIALS AND METHODS

The study area

The study was carried out in Ondo State in southwest region of Nigeria. Three (3) Local Government Areas (LGAs) prominent for banana production and marketing were purposively selected for this study.

Sampling technique and size

Multistage sampling technique was used in the selection of the respondents for this study. In the first stage, three (3) Local Government Areas (LGAs) prominent for banana production and marketing were purposively selected for this study. The LGAs are Akure South, Akure North and Ifedore. In the second stage, two (2) major markets were randomly selected in each of the LGAs to give six (6) markets. The third stage involved the random sampling of thirty (30) banana marketers in each of the markets. In all, a total of one hundred and eighty (180) banana marketers were selected for the study.

Data and method of data collection

The primary data used for this study were collected by means of a well-structured questionnaire. The questionnaire was earlier tested in order to make sure the data were

reliable. One hundred and eighty (180) copies of the questionnaire were administered. They were also all returned completed. Collection of field data was carried out between February and April, 2015.

Data analysis

The study made use of descriptive statistics, marketing margins and multiple regression model in the analysis. Marketing margins can be expressed in cash or as a percentage of the retail cost and indicate the relative of marketing at a particular time [1]. The formula adopted for measuring marketing margin in this study was adapted from [15] and [13]. Marketing margin of banana in the study was therefore computed by the equation

$$MMb = \frac{SPb-PPb}{SPb} * 100 \quad 1$$

Where:
MMb is the marketing margin of banana
SPb is the selling price of banana (often ripe)
PPb is the purchase price of banana (often unripe)

To analyse factors influencing mobile phone use, multiple regression model was used. The implicit form of the regression model is presented as:

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, \text{and } X_7, e)$

Where, Y= Use of mobile phone (measured in monthly cost)

X_1= Age of banana marketer
X_2= Sex of banana marketer (male or female)
X_3= Educational level of banana marketer (measured in years of formal schooling)
X_4 = Experience of banana marketer (in years)
X_5= Cost of mobile phone
X_6= Availability of power supply (average hours of available power per month)
X_7= Amount of banana sales (in Naira)
e = Error term

Three functional forms of the regression model were fitted to the data collected and the best fit was selected based on established criteria. The *a priori* expectation was that the coefficients of the independent variables should be greater than zero [3] and [4].

RESULTS AND DISCUSSIONS

Socio-economic characteristics of banana marketers in the study area

The socio-economic characteristics of banana marketers in the study area as reflected in Table 1 reveals the distribution of the marketers by age, sex, educational level, and years of marketing experience in banana.

Table 1. Socio-economic characteristics of banana marketers in the study area

Socio-economic characteristics of banana marketers	Frequency (N=180)	Percentage (%)
Age of respondents (in years)		
Less than 30	12	06.67
31-40	45	25.00
41-50	58	32.22
51-60	57	31.67
Greater than 60	08	04.44
Total	180	100
Sex of respondents		
Male	11	06.11
Female	169	93.89
Total	180	100.00
Highest level of education of respondents		
No formal education	17	09.44
Primary school education	81	45.00
Secondary school education	55	30.56
Tertiary school education	12	06.67
Other forms of education	15	08.33
Total	180	100.00
Experience in banana marketing (in years)		
less than or equal to 5	45	25.00
6 to 10	75	41.67
11 to 15	32	17.77
16 to 20	14	07.78
Greater than 20	14	07.78
Total	180	100.00

Source: Computed from field survey, 2015

Most (95.66%) of the marketers were aged 60 years and below. This formed the economically active age groups. A closer analysis further reveals that many (63.89%) of the respondents were still aged 50 years and

below. Many researches have established that age is a critical factor in businesses, marketing, adoption of technologies, innovation uptake and use of information and communication technology (ICT) in such areas as mobile phones, social media and e-marketing [3] and [4]. Banana marketing in the study area could best be described as a female-affair. This is because women accounted for 93.89% of the total sample.

GSM service providers used by banana marketers in the study area

Figure 1 shows the different GSM service providers/ networks used by banana marketers in the study area. The marketers had very good spread of their choices of GSM service providers in Nigeria. Meanwhile MTN, Nigeria's foremost GSM service provider was the marketers' number one choice, followed by Glo, Etisalat and Airtel.

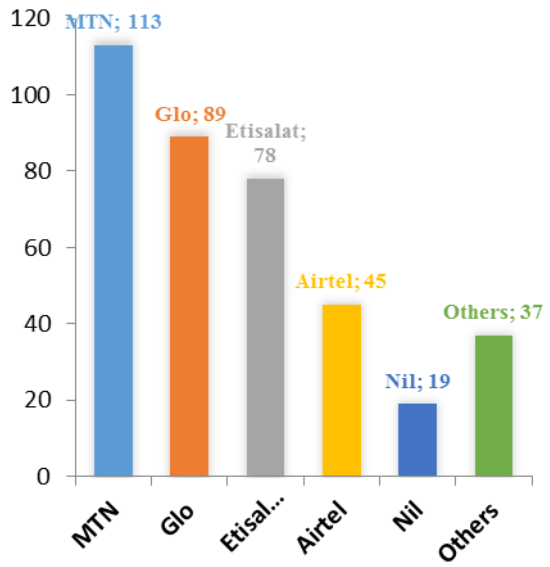

Fig. 1. GSM service providers used by banana marketers in the study area
Source: Computed from field survey, 2015

The number of GSM service providers/ networks used by banana marketers in the study area

Figure 2 reflects banana marketers' number of GSM service providers/networks used. Almost half (47%) of the marketers used two GSM networks, while almost a quarter (23%) used more than two GSM networks, only few (19%) used only one network. In all, majority (70%) of the marketers used more than one GSM networks. The marketers had indicated that the use of multiple networks was necessitated by poor service delivery, different tariffs, availability or non-availability of service network in a particular location or market.

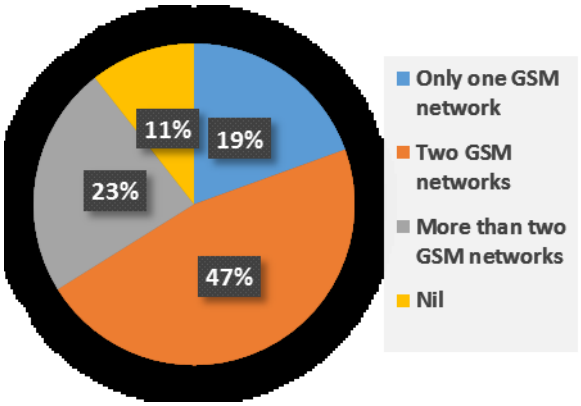

Fig. 2. Number of GSM networks used by banana marketers in the study area
Source: Source: Computed from field survey, 2015

Marketing margins of banana in the study area

Table 2 reveals the marketing margins of banana in the study area. The retailer marketing margin which was for ripe banana was 64% while the wholesaler marketing margin which was for unripe banana was 36%. These margins were largely in discordance with [14], who observed a higher gross marketing margin for the wholesalers than the retailers in rice marketing in Abia State of Nigeria. Also, [10] revealed a higher gross and net marketing margins for the wholesalers in Abia State, Nigeria. However, the margins were similar to those of [13] for banana marketing. The higher retailer marketing margin than wholesaler marketing margin might be justified by the fact that, banana is a highly perishable fruit particularly when ripe. Since retailer sell ripe banana often, they incur more costs on quickly getting the ripe banana to final consumer before the shelve life of banana begins to deteriorate and eventual wastage. However, [17] opined that for storable and perishable goods, 5% and 10% marketing margins respectively are acceptable. The implication of this, is that, the margins received by both retailers and wholesalers in the study area were too large, indicating that banana

marketers made excessive profits. Meanwhile, higher retailer marketing margin indicated higher profit than the wholesalers. However, the indicated higher retailer profit might not be real, if retailers had more transactional costs on storage, ripening, distribution, spoilage and losses than the wholesalers.

Table 2. Marketing margin of banana marketers in the study area

Marketers	Average PPb (₦)	Average SPb (₦)	Marketing Margin (%)
Retailer (often ripe)	450	1,250	64
Wholesaler (often unripe)	330	520	36

Source: Computed from field survey, 2015

Factors influencing the use of mobile phones by banana marketers in the study area.

Table 3 shows the results of the regression analysis to examine the determinants of use of mobile phones by banana marketers in the study area. After running three functional forms, the double-log functional form provided the best fit as shown in the regression table 3. Five of the independent variables; X_1, X_3, X_5, X_6 and X_7 were significant at 5% level. These variables were age, education, experience, availability of power supply and amount of banana sales. While the parameter estimates of each of these variables also carried signs, which conformed to a priori expectations [3] and [4]. However, only education and amount of banana sales positively influenced the use of mobile phones for banana marketing in the study area. The positive influence of education and amount of banana sales was an indication that more education for the marketers would increase their use of mobile phones for banana marketing and ditto for amount of banana sales. Meanwhile, the explanatory variables together explained 73% of the variations observed in the factors influencing mobile phone use in banana marketing in the study area. While 73% value of R^2 is a good one, a higher value of R^2 in the range of 80-90% as in [3] and [4] with a R^2 of 89% and 91% respectively, would mean that less error was accommodated in fitting the regression model and or that more deterministic factors of use of mobile phones by the marketers were fitted into the regression model.

Table 3. Regression results of factors influencing use of mobile phones in banana marketing

Variables	Simple Log		Semi-Log		Double Log	
	Coefficients	T-value	Coefficients	T-value	Coefficients	T-value
X_1	-0.031 (0.021)	-1.476	-0,203 (0,182)	-1.115	-0.479 (0.216)	-2.218*
X_2	-0.518 (0..215)	-2.409*	-0.181 (0.1421)	-1.275	-0.218 (0.122)	-1.786
X_3	0.467 (0.211)	2.213*	0.421 (0.092)	4.576*	0.453 (0.121)	3.743*
X_4	0.119 (0.157)	0.759	-0.123 (0.087)	-1.414	0.0942 (0.073)	1.290
X_5	0.5678 (0.356)	1.595	-0.696 (0.342)	2.035*	0.048 (0.019)	2.526*
X_6	0.412 (0.506)	0.814	0.011 (0.009)	1.222	2.877 (0.934)	3.080*
X_7	0.312 (0.212)	1.472	5.454 (2.361)	2.310*	7.094 (1.985)	3.574*

Note: *means significant at 5% level,
Source: Computed from field survey, 2015

CONCLUSIONS

The study has been able to reveal that the use of mobile phones for marketing banana in Ondo State, Nigeria is relatively high with majority of the marketers who were mostly women using more than one GSM service providers. The reasons advanced for this, included poor service delivery, varying tariffs and availability or non-availability of service networks in a particular market or location. Meanwhile, banana marketing in the study area indicated more profit for the retailers than for the wholesalers since retailer marketing margin was greater than wholesaler marketing margin. However, both retailers and wholesaler could be described as having excessive profits owing to their large margins. On the contrary, high transactional costs could have raised the margins indicating that price mechanism in the study area requires adequate monitoring. Furthermore, only education and amount of banana sales positively influenced banana marketers' use of mobile phones. Therefore, what should be done to enhance application of mobile phones in the marketing of banana in Ondo State of Nigeria is for banana marketers to be more

educated and engage in larger volume of sales of banana.

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HOUSEHOLDS' PERCEIVED CAUSES OF POVERTY IN SOUTHWEST NIGERIA

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Abstract

The Southwest geo-political zone of Nigeria is a blend of both educational advancement and abundant natural resource endowment. The region is rich in petroleum, bitumen, agricultural and forest resources. Despite the revenues from oil and other resources, poverty is very common among the citizens. The study was conducted to evaluate households' perception of the causes of poverty in southwest Nigeria. The study made use of a multi-stage sampling technique to select two hundred and forty (240) respondents, who were household heads across two (2) southwest States of Ekiti and Ondo. Data for the study were collected with the aid of well-structured questionnaires administered on the household heads. Data collected were analysed using descriptive statistics. The analysis of households' perception of the causes of poverty in southwest Nigeria indicated that corruption, weak institutions and poor governance was perceived "very high" cause of poverty in the study area with 51% of responses.

Key words: *cause of poverty, households, perception, Southwest Nigeria*

INTRODUCTION

Nigeria has unjustifiable increasing rate of poverty [5]. The economy is still characterised by high unemployment rate, high inequitable distribution of wealth, low quality human resources and high out migration. [5]. Poverty strives very well in Nigeria even in the face of several billions of dollars in revenue from oil, plenty of natural resources and a dynamically growing population estimated at 178.52 million people in 2014 [5, 31] which ordinarily should have engendered vast human capital development and market for indigenous industrial production. Similarly, the World Bank in 2011 opined that Nigeria retains a high level of poverty, with 63% living on below $1 daily [31]. Records have shown that poverty in Nigeria has evolved over time most spectacularly the years after the oil windfall. The lowest poverty rate of about 27.2% was recorded in 1980; and since then, the Nigeria has witnessed persistent rising poverty; from about 46.3% in 1985 to 42.8% and 65.6% in 1992 and 1996 respectively. Although poverty level dropped sharply in 2004 to about 54.4%, but rose significantly again in 2010 and 2011 [22]; [24]. The National Bureau of Statistics (NBS) report shows that about 112 million Nigerians out of the estimated population of 163 million lived in relative poverty during this period, and also 69% which is 15% higher than 54.4% estimated in 2004 [22, 24].

Although poverty in Nigeria has been thought to be a rural phenomenon, however the current poverty report revealed the pervasive nature of poverty cutting across urban and rural areas. However, that rural poverty increased to 73.2% in 2010, 9.1% higher than 2004 estimate; while urban poverty increased from 35.4% in 2004 to about 61.8% in 2010 [22].

Government efforts at reducing poverty have not been spiritedly carried out owning to a number of factors which include corruption, policy summersaults, long years of abandonment and lack of political will to implement formulated policies. Consequently, the significant economic growth the country experienced in recent years has not served to substantially reduce poverty. The resultant effect of this anomaly is an average growth in the economy as measured by the GDP at a rate a little above 7% in the last 10 years

without substantially closing the gap between the few rich and massive poor population.

Problem Statement

The report of harmonised Nigeria Living Standard survey by the National Bureau of Statistics [22] showed that 69% of Nigerians (112 million persons) in the estimated population of 163 million Nigerians lived in poverty in 2010 [22].

The data confirmed that poverty was on the rise in Nigeria. That was even amidst MDGs efforts aimed at halving the number of the poor by the year 2015 [6]. Meanwhile, according to the harmonised Nigeria Living Standard survey report for 2004, about half the population (54.4%) representing 68 million in the estimated population of 123 million Nigerians were living in poverty. However, studies on poverty in Nigeria had rarely focused on household perception of the causes of poverty. For instance, most previous poverty-based research studies in Nigeria [1, 4, 8, 9, 12, 13, 14, 15, 25, 28, 29], and various studies by National Bureau of Statistics had rarely involved household perception. It is in the light of the above, that this study on household perception of the causes of poverty in southwest Nigeria is apt at this time.

This study will enrich various literature on poverty in Nigeria by specifically adding the household content which is a major stakeholder at the receiving end. This study will also provide a better understanding on household perception of poverty causes in southwest Nigeria. This study therefore seeks to gain a thorough understanding of the southwest Nigerian households, their perception of poverty causes, their characteristics and constraints which are crucial to formulating an effective strategy for reducing poverty and for designing social protection programmes in Nigeria. It is in the view of the above that the study on households' perception of the causes of poverty in southwest Nigeria was conducted.

MATERIALS AND METHODS

The study area

The study was carried out in the southwest geo-political zone of Nigeria. The zone falls on latitude 6^0 to the North and latitude 4^o to the south. It is marked by longitude 4^0 to the West and 6^0 to the East. It is bounded in the North by Kogi and Kwara states, in the East by Edo and Delta states, in the South by Atlantic Ocean and in the West by Republic of Benin. The zone comprises of six states namely Oyo, Osun, Ondo, Ogun, Ekiti and Lagos and is characterised by a typically equatorial climate with distinct dry and wet seasons. The mean annual rainfall is 1480mm with a mean monthly temperature range of 18^0 -24^0C during the rainy season and 30^0-35^0C during the dry season. The geographical location of southwest Nigeria covers about 114, 271 kilometre square, that is approximately 12% of Nigeria's total land mass and the vegetation is typically rainforest. The total population is 27,581,992 and predominantly agrarian. Notable food crops cultivated include cassava, maize, yam, cowpea and cash crops such as cocoa, kolanut, coffee and oil palm [2, 23]. According to the Nigeria Poverty Profile for 2010 by [22], 25.4%, 49.8%, 59.1% and 50.1% were food poor, absolute poor, relative poor and poor by dollar per day measurement respectively in southwest Nigeria.

Sampling technique, size and data collection

A multistage sampling technique was used for this study. In the first stage two states of Ekiti and Ondo were purposively selected from the six (6) states that make up southwest Nigeria. The rational for selecting the two states was based on proximity and convenience. In the second stage, six (6) communities were randomly selected from each state giving a total of twelve (12) communities. In the third stage, from each of the selected communities, two (2) block was randomly selected for study. This gave a total of twenty four (24) blocks. Initially, residents from the selected blocks were invited to a community forum at which a preliminary identification of different categories of households was carried out. At the community forum, ten (10) household heads from each block were randomly selected. This resulted in a total of two 3hundred forty (240) respondents for the study.

Data analysis

Descriptive statistics was used in the data analysis. These included means, percentages, frequencies, charts, graphs and tables. The household's perception of poverty in the study area was analysed on a five-point Likert-type scale of "strongly agree" (5), "agree" (4), "undecided" (3), "disagree" (2) and "strongly disagree". Poverty causes with mean scores of ≥4.5 were regarded "very high", causes with mean responses from 3.5 to 4.49 were regarded "high", those causes with mean responses from 2.5 to 3.49 were considered "moderate" while those between 1.5 and 2.49 were regarded as "low". Finally poverty causes with responses less than 1.5 were considered "very low".

RESULTS AND DISCUSSIONS

Households' responses to causes of poverty

The respondents' perceived major cause of poverty in the study area as shown in figure 1 indicates that majority of the respondents' perceived corruption, weak institutions and poor governance as the major cause of poverty in the study among the thirteen (13) identified causes investigated. About half (51%) of the respondents perceived corruption, weak institutions and poor governance alone as a major cause. This cause score was even higher than the remaining 49% which the twelve (12) other causes shared. Capital inadequacy, inflation and underdevelopment had the lowest responses with 1%, 2% and 3% respectively. The very high percentage of corruption, weak institutions and poor governance affirmed the fact that the citizenry were aware that corruption had eaten deep into the fabrics of governance in Nigeria. It further asserts why revenue from petroleum-Nigeria's highest foreign exchange earner and the huge amount allotted to annual budgets end up in private pockets. The result of this finding corroborates the report of the Transparency International which ranked Nigeria 144th among 177 countries rated in Corruption Perceptions Index for 2013 [30].

Respondents' perception of causes of poverty

Table 1 shows the result of analysis of the respondents' perception on the thirteen (13) investigated causes of poverty in the study area using a 5-ponit Likert scale. Capital inadequacy, Inadequate growth rate, inflation and underdevelopment with only mean scores of 1.61, 2.00, 2.15, 2.20, and 2.40 respectively were described as "low" cause of poverty since their mean scores fell between 1.5 and 2.49. Moreover, social factors and low technological capacity were considered "moderate" causes of poverty while inequality (3.63), negligence and lack of political will (3.96), low human capital development (3.98), unemployment (4.2) and inadequacy or non-existence of social and welfare Programmes were perceived "high" causes of poverty given their mean scores of between 3.5 and 4.49. Corruption, weak institutions and poor governance was the only perceived "very high" cause of poverty in the study area.

The very high level of corruption, coupled with weak institutions and poor governance in the public sector had hampered the promotion of private participation in poverty eradication programmes as against the observation of [16, 17, 19], who observed that promotion of direct interaction private participation between service users and elected officials in budgetary policy could affect both how local resources are spent and living standard outcomes as well as lower child mortality rate with effects on the quality of life of the people [18, 20]

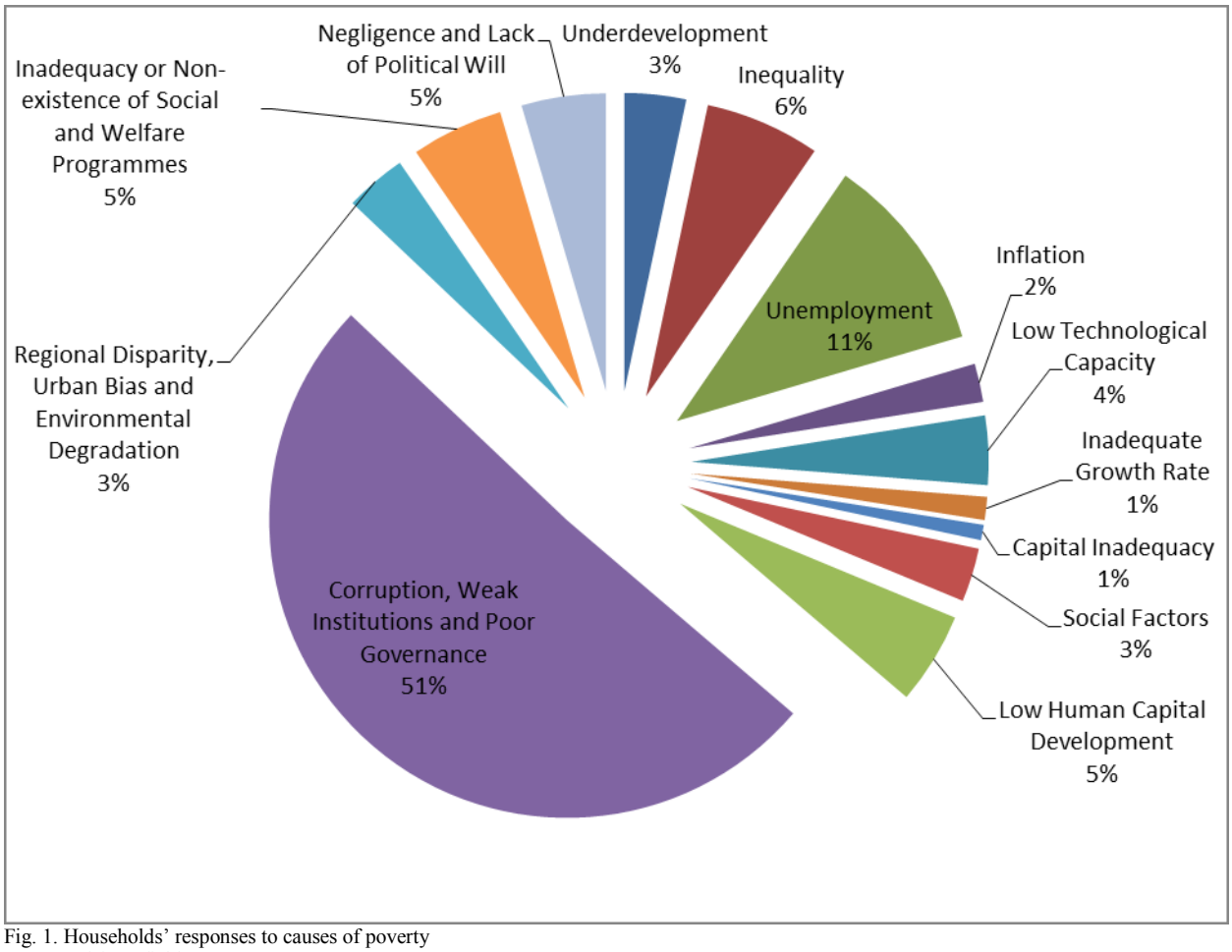

Fig. 1. Households' responses to causes of poverty
Computed from field survey, 2013

Table 1. Respondents' perception of causes of poverty

S/N	Causes of poverty	Frequency (percentage)					Mean
		Strongly agree	Agree	Undecided	Disagree	Strongly disagree	
1	Underdevelopment	-	06 (2.5)	131 (54.6)	56 (23.3)	47 (19.6)	2.40
2	Inequality	03 (1.3)	55 (22.9)	51 (21.3)	48 (20.0)	83 (34.6)	3.63
3	Unemployment	96 (40.0)	96 (40.0)	48 (20.0)	-	-	4.20
4	Inflation	02 (0.8)	03 (1.3)	89 (37.1)	94 (39.2)	52 (21.7)	2.20
5	Low Technological Capacity	01 (0.4)	40 (16.7)	97 (40.4)	98 (40.8)	04 (1.7)	2.73
6	Inadequate Growth Rate	-	-	96 (40.0)	48 (20.0)	96 (40.0)	2.00
	Capital Inadequacy	-	-	04 (1.7)	139 (57.9)	97 (40.4)	1.61
8	Social Factors	-	-	144 (60.0)	96 (40.0)	-	2.60
9	Low Human Capital Development	45 (18.8)	144 (60.0)	51 (21.3)	-	-	3.98
10	Corruption, Weak Institutions and Poor Governance	188 (78.3)	49 (20.4)	03 (1.3)	-	-	4.77
11	Inadequate Growth Rate	02 (0.8)	-	86 (35.8)	95 (39.6)	57 (23.8)	2.15
12	Inadequacy or Non-existence of Social and Welfare Programmes	95 (39.6)	141 (58.8)	03 (1.3)	01 (0.4)	-	4.38
13	Negligence and Lack of Political Will	45 (18.8)	143 (59.6)	49 (20.4)	03 (1.3)	-	3.96
	Total						40.61

Computed from field survey, 2013

CONCLUSIONS

The study was conducted to evaluate households' perception of the causes of poverty in southwest Nigeria. Based on the findings of this study and since corruption, weak institutions and poor governance was perceived a 'very high" cause of poverty, a renewed and committed fight against it may just be the needed social and corporate responsibility by southwest geo-political region and the entire nation to salvage the citizenry from poverty.

Government and stakeholders should be more focused on the implementation of poverty eradication programmes with very strong political will.

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THE TOURISM AND AGROTOURISM POTENTIAL OF BISTRIŢA-NĂSĂUD COUNTY-ROMANIA IN THE NORTH WEST DEVELOPMENT REGION

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Abstract

This work was compiled in order to identify and analyze the tourism potential of the North-West Development Region as a whole and the tourism potential of Bistriţa-Năsăud County in detail, as well as its capitalization degree. In order to achieve this approach, in our analysis we used evolution and structure indicators for the next indicators of the tourism potential: touristic units structure, their dispersal within the North-West Development Region, the areas of this perimeter which presents potential for touristic development, etc. As a result of this analysis, the data showed an area with a very high tourism potential for developing competitive touristic products, but unfortunately this potential is extremely poorly capitalized. The same trend was noticed also to Bistriţa-Năsăud County which although has an important potentially in agrotourism, the basis for its exploitation is insufficient.

Keywords**:** *agrotourism, tourism,tourist pension*

INTRODUCTION

Based on the literature and research methodology, in this article we are going to straighten out attention to the following aspects: analysis of the tourism potential of the North-West Development Region and of the development degree of regional touristic offer.
The touristic potential of an area can be defined generally as "all what constitutes as tourist attractions and that lends to an arrangement for visiting and receipt of travelers" [6].
For the overall touristic attraction, are used also tourism fund touristic heritage. Touristic fund represent the totality of natural and cultural resources with touristic destination, to denote the tourism potential and tourism heritage has a wider coverage, including specific technical-material base and elements of infrastructure that helps the exploitation and valorization of touristic riches. [6]
The North-West Region (Northern Transylvania) is one of the 8 development regions from Romania and includes 6 counties: Bihor, Bistriţa-Năsăud, Cluj, Maramures, Satu Mare and Sălaj.
The region is one of the most picturesque from Romania, from the Apuseni Mountains that have a special charm up to special cultural and popular heritage in the unique ethnographic areas in this part of Europe.
The region enjoys an outstanding tourist attractions and resources which employs it between regions with perspectives of development: thermal waters, salt mines; there are a number of projects of development of mountain resorts; popular culture and cultural and ethnography heritage with top destinations among the top objectives of Romania, fortresses and historic monuments, etc. [2, 8] [9]
Inside Transylvania is distinguished a County, with an unmatched Transylvanian spirit. Bistriţa-Năsăud County has a number of objectives, which through their artistic and historical content increase value of a touristic territory, allowing diversification of touristic palette.

The beauty of this region is determined primarily by its diversified topography, predominantly hilly and mountainous. The rural of Bistriţa-Năsăud County has a special tourism potential. In folkloric areas from the country such as Valea Bârgaielor, Valea Someşului, Valea Şieului residents store nowadays the ancient traditions and customs, which constitute unique attractions. Bistriţa Bârgăului, Ilva Mare, Lesu or Livezile are true centers of folk fabrics and seams. [1] [3]

MATERIALS AND METHODS

For the realization of this work were analyzed and interpreted the following indicators both in structure and evolution: structure of tourist establishments authorized by structures types, number of seats and quality categories, tourism potential development of the counties belonging to the North West Region.
The data analyzed and presented in this article were provided by the national authority for tourism for year 2015.

RESULTS AND DISCUSSIONS

Development within the North West Region of the villages identified as having tourism potential, according to the order of the Minister of Agriculture and Rural Development of no. 567/2008 modified by Order 54/13 March, in the framework of the North-West Region, a rate of just 1% represent administrative-territorial units with a minimum tourism potential and also 1% units with very high potential for tourism development with a total score of more than 50 points. Most localities are accurate within 20-39 points interval, these accounting 82% of total communes identified as having tourism potential. The same trend in the Northwest region, can be found in the County of Bistriţa-Năsăud, a percentage of 86% of the municipalities identified with tourism potential fits within the score 20-39.
In terms of the number of municipalities identified, most are located in the County of Maramureş (54 localities), Bistriţa-Năsăud with 37 villages.
The structure and distribution of the villages has emerged from data published in the Annex. 2 of the Order No. 54/13 March 2012.

Table 1. The villages structure of the North-West Region after the total score of tourist development

No.	County	MU	Total		Total scor for touristic development potential					
			villages	%	1-9	10-19	20-29	30-39	40-50	>50
1	Bihor	Villages No.	26	14%	0	2	14	8	1	1
		%	100	x	0%	8%	54%	31%	4%	4%
2	Bistrita-Nasaud	Villages No.	37	21%	0	1	16	16	4	0
		%	100	x	0%	3%	43%	43%	11%	0%
3	Cluj	Villages No.	27	15%	0	2	14	10	1	0
		%	100	x	0%	7%	52%	37%	4%	0%
4	Maramures	Villages No.	54	30%	1	2	31	14	5	1
		%	100	x	2%	4%	57%	26%	9%	2%
5	Satu Mare	Villages No.	10	6%	0	1	7	2	0	0
		%	100	x	0%	10%	70%	20%	0%	0%
6	Salaj	Villages No.	26	14%	0	9	13	3	1	0
		%	100	x	0%	35%	50%	12%	4%	0%
North-West Region total villages		**Villages No.**	**180**	**100%**	**1**	**17**	**95**	**53**	**12**	**2**
		%	**100**	**x**	**1%**	**9%**	**53%**	**29%**	**7%**	**1%**

Own calculation by: Annex 9 - List of areas with high tourism potential
http://portal.afir.info/informatii_generale_pndr_investitii_prin_pndr_sm_6_2_infiintare_activitati_neagricole?amp;lang=RO[5]

In the following we will analyze the tourism and agrotourism potential in the North-West Region and we start this analysis from the establishments number structure approved by types of touristic structures for each county of the region. All the data presented has as reference the year 2015.

As it appears from Table 2 in the North-West Region is recorded a total of 1,301 authorized units, the largest share being owned by the Cluj County, with a share of 29%.
Starting from the data entered in the table, we notice that more than half of the total number of tourist units are represented by hostels,

accommodation units encountered mostly in rural areas.

Unfortunately, for the agro tourism phenomenon, only 9% of the accommodation units are represented by agrotouristic pensions. At the Bistriţa-Năsăud County level the situation is even more tragic, in this county there are only 3 authorized agro touristic pensions.

A first conclusion which can be detached from these first data is that although the North-West region in general, as well as Bistriţa-Năsăud County feature a rich and varied touristic potential, rural tourism and agrotourism are very underdeveloped.

It should be mentioned that most developed counties of the Region are Cluj and Maramureş are located within a small distance of each other, on the territory of those two counties are the most units in general, but also the most accommodation units specific to rural tourism, agrotourism in number of 49/50.At the tail of the ranking in terms of agrotourism , located very close to each other Bistriţa-Năsăud, i.e. Satu Mare with three units, respectively 2.

Table 2.The structure of the authorized touristic units number in the North-West Region in 2015

No.	County	MU	Total units			From which pension:		villa	others*
			No.	%	hotel	total	agrotouristic		
1	Bihor	No. units	341	26%	45	184	4	25	87
2	Bistriţa-Năsăud	No. units	76	6%	18	38	3	2	18
3	Cluj	No. units	377	29%	61	203	49	27	86
4	Maramureş	No. units	364	28%	25	259	50	5	75
5	Sălaj	No. units	58	4%	8	38	7	3	9
6	Satu Mare	No. units	85	7%	16	16	2	9	44
North-West Region total touristic units		No. units	**1,301**	**100%**	**173**	**738**	**115**	**71**	**319**
		%	**100**	**X**	**13%**	**57%**	**9%**	**5%**	**25%**

* includes all other accommodation: hostels, motels, inns, bungalows, houses, tourist stops, camps for students and preschoolers

Own calculation by: "List of touristic establishments with classified tourism accommodation " http://turism.gov.ro/informatii-publice/[4]

In close connection with the number and structure of accommodation units we have the number of accommodations indicator, listed in table 3, grouped according to the type of the unit. From these figures there are the following conclusions: in the region there are a total of 1,301 touristic units with a number of places of 37,932. Of these places, the majority are found in hotel units namely 17,641. A large number of accommodation places immediately after those in hotel units, are found in touristic pensions, but only a number of 998 places (3% of total) can be found in agrotouristic pensions, in direct proportion to the number of pensions, a very small number.

In terms of accommodation places, the counties don't maintain the same hierarchy as in the case of touristic establishments, Bihor County recording the highest number of accommodation places, in condition that the counties of Maramureş and Cluj have most of the accommodation structures.

Table 3. The tourist accommodation number structure of the authorized touristic units, depending on the type of unit in the North-West Development Region

No.	County	MU	Total units			From which pension:		villa	others*
			No.	%	hotel	total	agrotouristic		
1	Bihor	No. places	13,280	35%	7,389	3,317	50	486	2,088
2	Bistriţa-Năsăud	No. places	3,204	8%	1,958	689	42	64	493
3	Cluj	No. places	10,560	28%	5,037	3,287	383	672	1,564
4	Maramureş	No. places	6,744	18%	1,801	3,224	412	98	1,621
5	Sălaj	No. places	1,499	4%	479	712	87	64	244
6	Satu Mare	No. places	2,645	7%	977	330	24	161	1,177
North-West Region total touristic units		**No. places**	**37,932**	**100%**	**17,641**	**11,559**	**998**	**1,545**	**7,187**
		%	**100%**	**X**	**47%**	**30%**	**3%**	**4%**	**19%**

Own calculation by: "List of touristic establishments with classified tourism accommodation " http://turism.gov.ro/informatii-publice/[4]

Following, we will approach the accommodation quality. To analyze the agrotourism phenomenon within tourism in general, we will delineate the accommodation structures belonging to the rural: rural and agro-touristic pensions classified with flowers from the rest of the touristic structures, classified with stars/flowers-urban touristic pensions.

Table 4. The number structure of authorized touristic units in the Northwest Development Region by quality categories in the year 2015 *

No.	County	UM	Total units		Of which units by the stars/flowers number*				
			No.	%	1 star /flower	2 stars /flowers	3 stars /flowers	4 stars /flowers	5 stars /flowers
1	Bihor	No. units	327	28%	28	88	195	15	1
		%	100%	X	9%	27%	60%	5%	0%
2	Bistrița-Năsăud	No. units	73	6%	2	29	38	3	1
		%	100%	X	3%	40%	52%	4%	1%
3	Cluj	No. units	325	28%	18	80	176	46	5
		%	100%	X	6%	25%	54%	14%	2%
4	Maramureș	No. units	306	26%	11	131	151	13	
		%	100%	X	4%	43%	49%	4%	0%
5	Satu Mare	No. units	83	7%	6	28	46	3	
		%	100%	X	7%	34%	55%	4%	0%
6	Sălaj	No. units	50	4%	2	8	35	5	
		%	100%	X	4%	16%	70%	10%	0%
North-West Region total touristic units		No. units	1164	100%	67	364	641	85	7
		%	100%	X	6%	31%	55%	7%	1%

* less rural touristic pensions and agro-touristic pensions
Own calculation by: "List of touristic establishments with classified tourism accommodation "
http://turism.gov.ro/informatii-publice [4]

At the region level we have a total of 1,164 units classified with stars, more than half of the units being categorized with 3 stars (55%). The predominance of 3-star accommodation is maintained at the level of each county in the region.
Fortunately the number of accommodation units that register only 1 star is quite small, being only 6% of all establishments in the region.
Equally small is the number of units at the upper pole, region-wide with a rate of 7% on 4-star units and 1% on 5-stars units.

Table 5. The structure of rural and agrotouristic guesthouses number authorized in the Northwest Development Region by quality categories in 2015

No.	County	UM	Total units		Of which units by the flowers number				
			No.	%	1 flower	2 flowers	3 flowers	4 flowers	5 flowers
1	Bihor	No. units	14	10%	1	5	7	1	
		%	100%	X	7%	36%	50%	7%	0%
2	Bistrița-Năsăud	No. units	3	2%		2	1		
		%	100%	X	0%	67%	33%	0%	0%
3	Cluj	No. units	52	38%	1	45	6		
		%	100%	X	2%	87%	12%	0%	0%
4	Maramureș	No. units	58	42%	1	41	15	1	
		%	100%	X	2%	71%	26%	2%	0%
5	Satu Mare	No. units	2	1%		1		1	
		%	100%	X	0%	50%	0%	50%	0%
6	Sălaj	No. units	8	6%		4	4		
		%	100%	X	0%	50%	50%	0%	0%
North-West Region total touristic units		No. units		100%	3	98	33	3	
		%		X	2%	72%	24%	2%	0%

Own calculation by: "List of touristic establishments with classified tourism accommodation "
http://turism.gov.ro/informatii-publice[4]

With regard to the situation on counties, Sălajul although it has only 50 units, most of them fall in the categories of quality 3 and 4-star with a total of 80%. Sălaj is located immediately after the Bistriţa-Năsăud County, with a total of 73 units, of which a percentage of 57% units with comfort-category 3-5 stars.
From the analysis of the figures presented in table 5, we can infer that from the point of view of comfort the accommodation basis is made by the accommodation units with a comfort over minimum to medium, with the majority of units of 2 and 3 stars.
The last table we enroll in our analysis is that of the tourist establishments represented by rural and agrotouristic pensions from North-West Region by quality categories (Table 5).
The number of these structures is extremely limited, being authorized in 2015 only 137 units in the Northwest region.
Just as we saw at the quality criteria by number of stars at this chapter are predominant also the units of 2 and 3 flowers, where fits most agro touristic guesthouses a number of 131 from total 137 units (96% of total establishments).
In terms of Bistriţa-Năsăud County with a rich potential in agrotourism, we meet only 3 agrotouristic pensions.

CONCLUSIONS

In our country, there is not enough capitalized the tourism heritage, and the touristic product is in course of crystallization.
A rural tourism quality involves services and benefits. It goes without saying that rural tourism equipment must have a modern, sanitary conditions of comfort for both hosting and catering, roadways, and the civilized means of communication.
The full use of natural, economic and human resources to an area with a rich tourism potential can be achieved by involving local communities in the tourism sector, by supporting the initiative groups for the development and promotion of local tourist offer, in order to protect the environment and cultural assets.

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PROPOSALS CONCERNING THE PROMOTION STRATEGY OF FOOD PRODUCTS IN FOREIGN MARKETS

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Abstract

Support and promotion of export are key elements of sustainable development, export representing at the moment growth domestic main engine. The objectives of the paper were to analyze the activities of foreign trade and economic cooperation, and the support for the domestic economic development and harmonious integration of Romania into the complex system of international relations. The methods used in this paper were: comparative analysis, bibliographic study and processing of the statistical data from the National Statistics Institute in order to generate some proposals for developing a future strategy for promoting Romanian food products on foreign markets. The main results refer to the situation of agriculture in recent years, the situation of export and import of agricultural products. The main conclusion is that the rising of prices represents an opportunity for countries with strong agricultural sectors.

Key words**:** *export, foreign markets, promotion, strategies, sustainable development*

INTRODUCTION

Compared with other commodities, agricultural trade and food shows differences arising from the nature of these products. Agricultural production is done in most types of agricultural products in certain geographical areas and specialized pools and consumption takes place throughout the country. The appearance while agricultural production is differentiated by geographic area for a period up to 20 days or more, while consumption is achieved simultaneously in most localities of the country. Agricultural production is achieved in a period of about eight months of the year and fresh consumption in most products is seasonal. [2]
For these reasons, the marketing of agricultural and food products are necessary to know the following: consumer needs, features operators who participate in the exchange and processing of agricultural products, commercial techniques, which means that can be used by an economic to influence the market. [2]
As a result of EU membership, Romania is part of the European market access strategy, called Global Europe. Global Europe strategy aims trade policy initiatives that contribute to economic growth and increased employment in Europe. In a global economy, strong economies are competitive, and competitive economies based on trade strong, free and sustainable, as European strategy.
Romania has a privileged position in terms of agricultural resources; farming land is 14.7 million hectares (61.7%), of which 9.4 million hectares is arable land. Romania is found in 7th place in Europe as agricultural land (after France Spain, Germany, Poland, UK and Italy) and 5th place as arable land (after France, Spain, Germany and Poland).
Distribution of land by use indicates that arable land occupy approximate 64% of the agricultural area, one third of the surface: 4.8 million hectares is occupied by pastures and hayfields and orchards and vineyards represent about 3%.

MATERIALS AND METHODS

By the complexity and specificity of rural areas, the relationship between market and goods market falls to a certain form of

competition (substitution), and the mutual stimulation or indifference. This is because some services are carried out by the producer of material goods. The ratios are valid for both consumer market and production services. [1]

Drafting a strategy first requires a deep analysis of the field.

In this paper we used the following methods: comparison study method, bibliographic and statistical data provided by the National Institute of Statistics.

Romania has the basic resources to have success in this sector. However, the agriculture and the industry still needs to consent and implement marketing plan able to address the great issues that are affecting those sectors [4].

RESULTS AND DISCUSSIONS

Agriculture - Sector presentation

Agriculture is an important factor in the national economy, contributing nearly 7% of GDP (compared to 2% average share in the European Union - EU). Due to the climatic conditions very favorable, Romania has a significant agricultural potential, reflected in particular in the production and yields from crop cultivation, potential that can fully cover domestic demand both in terms of quantity and assortment and substantial deliveries export.

Arable area represents 39.2% of Romania, while forests cover 28%, pastures, hayfields and orchards 12% and vines 2.5%. Arable land per capita is 0.41 ha, compared with the EU average of 0.212 ha/capita. The main agricultural crops are cereals, oilseeds, sugar beet, potatoes, vegetables, fruit and grapes. Livestock consists of pigs, in particular, cattle, sheep and goats. [6]

Employment in agriculture represents 29% of the population, one of the highest rates of employment in this sector from Europe.

From the point of view of the agricultural output of the 27 EU member states, Romania is on 3rd place by net production of natural honey, oilseeds 5th, vegetables and melons no. 6, grain 7th place, livestock on 8th place, meat and, respectively, wine 10th place.

At the Community level, organic products and their labeling is governed by the provisions and regulations which states that organic production is an overall system of farm management and food production that combines best environmental practices, a high level of biodiversity, preservation of natural resources, application of high animal welfare standards and a production method which respect the preference of certain consumers for products produced using natural substances and processes. [3][8].

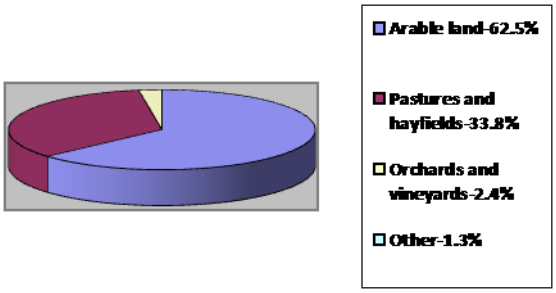

Fig.1. Agricultural area on uses
Source: Ministry of Agriculture and Rural Development [7]

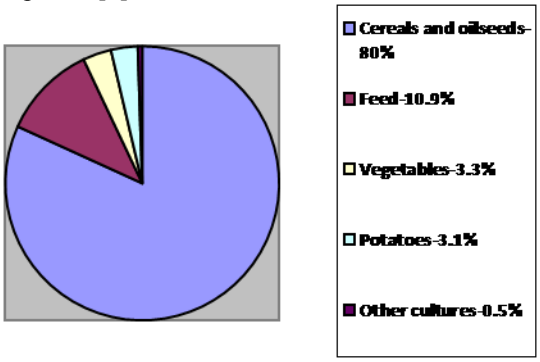

Fig. 2. Arable land on uses
Source: Ministry of Agriculture and Rural Development [7]

In the last decade, agricultural area with organic farming was expanded to 300,000 ha, which means 2.25% of the total cultivated area. Romania is an attractive market for organic agricultural production, but especially as a primary supplier of processed agricultural products, and owns the most fertile organic soil in Europe. The yield of the use of the fertilizer is less than 70 kg / ha, in comparison with the European average of 200-500 kg / ha. The main organic agricultural products grown

and processed in Romania are: grains, vegetables, oilseeds, honey and berries.

There are more than 10,000 Romanian producers of organic agricultural products processing plant. Organic livestock farms have developed, particularly in the sheep and goat sector, while the number of units of meat on the organic base has doubled to over 70 in the past few years. Organic agricultural exports have reached over 100 million euros annually, which places Romania in the top 20 of world exporters of such products. The main markets for organic agricultural products originating in Romania are: Austria, Germany, France, Italy, Denmark and Switzerland.

International trade in food and agriculture

In 2012, Romania's international trade in food and agriculture accounted for 9.0% of Romanian trade products. The trade balance for food and agriculture has been consistently in deficit. However, the sharp increase of exports compared to the imports made primarily processed agricultural products resulted in a restriction of trade deficit in five years, from -2.2 billion euros in 2009 to 0.42 billion euros at end of 2013. In 2014, however, over the previous year, export growth for agri-food products was only 9.2% compared to import growth; Romania's trade balance deficit has increased by 42.8% compared to 2013.

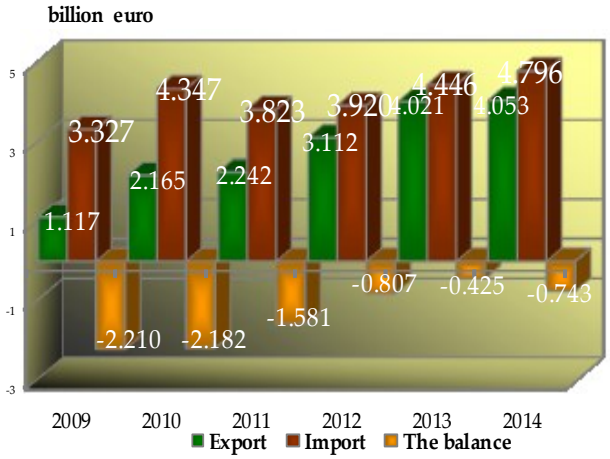

Fig. 3. Romania - The balance of trade in agricultural products, 2009-2014
Source: National Statistics Institute [9]

Romanian exports of agricultural products increased their share in total exports from 3.8% in 2009 to 9% in 2014. Over those five years, exports of agri-food sector increased by over 3.6 times over 4 billion euros in 2014, while imports of food products registered a growth of 1.4%. Exports of agricultural commodities (almost 56% of total Romanian exports of agricultural products and foodstuffs) are represented, mainly cereals (wheat and maize), oilseeds (sunflower seed and rapeseed), tobacco and livestock (sheep, goats and cattle). Exports of food and agriculture are highly diversified, covering a wide range - from fats and oils of vegetable or animal origin, meat and meat products, or tobacco products, to cheese and dairy products, sugar and sugary foods or drinks.

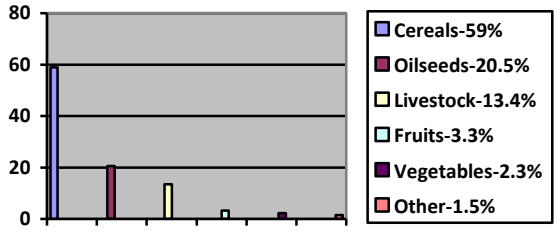

Fig. 4. The structure of exports of agricultural products in 2014
Source: National Statistics Institute [9]

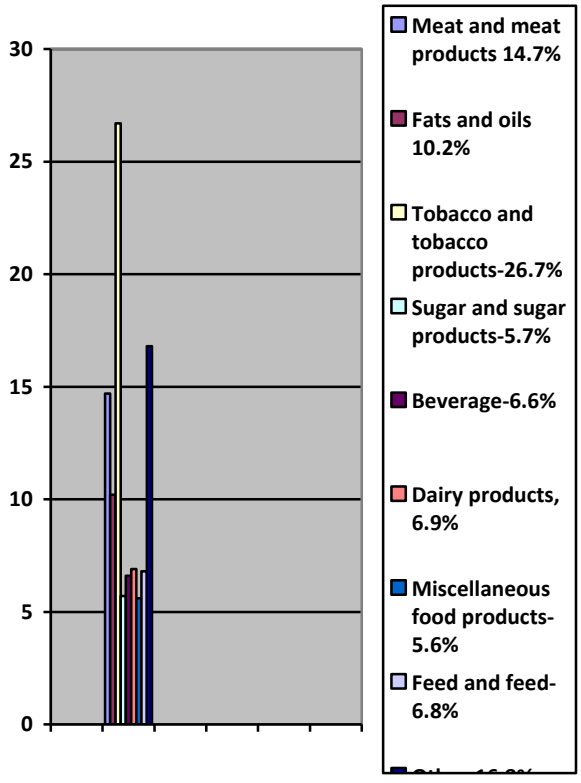

Fig. 5. The structure of exports of food products-2014
Source: National Statistics Institute [9]

The biggest markets for agricultural and food products exported by Romania in 2014 and the main categories of products delivered in these markets were Italy (tobacco and tobacco products, cereals, oilseeds, livestock, vegetables and beverages) - 13.2% of total exports, Bulgaria (meat and meat products, fodder and fodder products, sugar and sugar confectionery, beverages, vegetable oil and cereals) - 8.9%, Hungary (cereals, sunflower oil and margarine , oilseeds, poultry, livestock and refined sugar) - 8.6%, Spain (cereals, oilseeds, fats and oils, feed and fodder and livestock) - 8.3% and Germany (tobacco products tobacco, cereals, oilseeds, dairy products and cheeses and prepared food stuff) - 6.2%.

Romanian imports of agricultural commodities accounted for 32.5% of total imports of agricultural and food products in 2014, the rest being covered by imports of processed food and agriculture.

The product categories with the highest imports (each category value to import 250 million) were: pork and poultry, cereals (wheat and corn), raw sugar and refined feed and forage, food preparations diverse tobacco and tobacco products, sunflower seeds and rapeseed, milk and dairy products.

Table 1. The exports of agricultural products in the period 2012-2014 - millions euro -

Code Sec	Section NC	2012	2013	Growth 2013/2012 (%)	2014	Growth 2014/2013 (%)
	Total export of agricultural products, of which:	**4,044.2**	**5,284.41**	**30.66**	**5,572.86**	**5.46**
I	Live animals and animal products	731.14	745.29	1.94	742.76	-0.34
II	Vegetable products	1,970.33	2,984.62	51.48	3,067.41	2.77
III	Fats and oils of animal or vegetable origin; their cleavage products; edible fats; animal or vegetable waxes	182.83	239.79	31.15	213.37	-11.02
IV	Food; beverages, spirits and vinegar; tobacco and manufactured tobacco substitutes	1,160.03	1,314.71	13.33	1,549.33	17.85

Source: Ministry of Economy [8], [11], [12]

Top five external suppliers of food and agricultural products on the Romanian market in 2014 and the main categories of products delivered were:

-Hungary (cereals, pork and turkey, feed and fodder, sunflower oil, dairy products) - 18, 3% of total imports,

-Germany (pork and chicken, cheese, cigarettes, cocoa and cocoa preparations, coffee, tea and spices);

- 12.8%, Bulgaria (cereals, oilseeds, refined sugar, fat and oils, cocoa and chocolate) - 9.0%,

-Poland (confectionery, tobacco and tobacco products, dairy products, miscellaneous food preparations, cocoa and cocoa preparations and meat) - 6.8%;

-the Netherlands (meat pork and poultry, ornamental plants and cut flowers, various food preparations, livestock and oils) - 6.7%.

Table 2. The imports of food products in the period 2012-2014 - millions euro –

Code Sec	Section NC	2012	2013	Growth 2013/2012 (%)	2014	Growth 2014/2013 (%)
	Total import of agricultural products, of which:	**4,795.13**	**4,952.04**	**3.27**	**5,121.23**	**3.42**
I	Live animals and animal products	1,034.91	1,113.92	7.63	1,225.89	10.05
II	Vegetable products	1,416.34	1,455.27	2.75	1,513.74	4.02
III	Fats and oils of animal or vegetable origin; their cleavage products; edible fats; animal or vegetable waxes	238.65	205.42	-13.92	163.92	-20.20
IV	Food; beverages, spirits and vinegar; tobacco and manufactured tobacco substitutes	2,105.24	2,177.44	3.43	2,217.68	1.85

Source: Ministry of Economy [8],[11],[12]

Table 3. The exports of wines in the period 2012-2014
- millions euro -

Code NC	Product	2012	2013	Growth 2013/ 2012 (%)	2014	Growth 2014/ 2013 (%)
	Total wines export, of which:	**17.88**	**20.04**	**12.06**	**20.10**	**0.30**
22040000	Wine of fresh grapes, including wines with alcohol	17.24	18.87	9.45	19.40	2.84
22050000	Vermouth and other wine of fresh grapes	0.65	1.17	81.48	0.70	-40.52

Source: Ministry of Economy [8],[11],[12]

Table 4. Evolution of wine imports in the period 2012-2014 - millions euro -

Code NC	Product	2012	2013	Growth 2013/2012 (%)	2014	Growth 2014/2013 (%)
	Total wines import, of which:	**46.39**	**41.74**	**-10.02**	**37.61**	**-9.88**
22040000	Wine of fresh grapes, including wines with alcohol	43.29	39.71	-8.28	35.84	-9.73
22050000	Vermouth and other wine of fresh grapes	3.10	2.04	-34.30	1.77	-12.89

Source: Ministry of Economy [8],[11],[12]

Significant potential of Romanian agriculture and the increase of agricultural prices at internationally level could be a good opportunity for Romanian exporters and could, at the same time, attract the interest of foreign investors in this sector. [5]

CONCLUSIONS

After analysing this sector, we can draw the following conclusions:

Restrictive factors:

• Highly fragmented structure of agricultural land is a barrier to attracting new investment, affecting, in the same time, the productivity.

• The rural area is characterized by the existence of a considerable blankets vulnerable population in terms of economic and social difficulty fulfilling the new requirements set by European agriculture complex.

• Government support limited in terms of an austerity budget, in parallel with an increase in pressure on spending by an important social component.

• Orientation banks mainly to large customers and to a much lesser extent on the little ones who should be the main beneficiaries of national programs.

• The international financial crisis

Contributing factors:

• Rising prices represents an opportunity for countries with strong agricultural sectors.

Prices on international markets have increased significantly in recent years due to specific developments (for example: increasing demand for food from the growing number of residents and the standard of living in Asia).

• Severe climatic conditions which cyclically drastically reduced agricultural production in many countries.

• Profound structural changes in the global economy, including accelerated economic growth of China and India were faithfully reflected in stock market developments goods - food, energy, metals. The international price of wheat has increased by almost 200% between 2001 and 2008. The upward trend could continue in the coming years, but at a more modest cadence, as demand from agriculture adjust slowly in relation to the evolution demand.

• The price of agricultural land increased 5 times in the last 5 years to the level of 1000-3500 euro/ha, but still holds 3 to 7 times lower than the European average.

• Fully exploiting the advantages of integration into the European Union could open new opportunities for Romanian farmers who will be able to supply a market with a population exceeding 80 million.

Proposals for the future strategy:

-Creation and sale of products with high added value demanded by foreign markets, top quality, recognized brands in the market;
-Identifying new export markets and strengthening our position in existing markets;
-Application of EU and national legislation in the organic farming sector in order to strengthen the control system for monitoring and control measures by the competent authority for improving the quality of organic products intended for export;
-The most efficient use of trade policy instruments offered by the free trade agreements between the EU and third parts agreements providing better market access for European agricultural products in third markets and default Romanian;
-Submission to the European Commission by the specialized committees involving MECMA, non-tariff barriers faced by Romanian agricultural products in third markets; for resolution with the support of the community.
-A system of processing and distribution designed to meet the requirements of national and international markets;
-Professional development of export participants: producers, processors, importers-exporters;
-Creation of associations specializing in the sale of food products and organic products.

Target markets:

-EU - priority: Germany, Italy, France, the Netherlands, the Baltic States, Poland, Spain;
-Third countries: Asia (China, South Korea, Japan and ASEAN Countries), Africa and Middle East, USA, Canada, Russia, Switzerland and Norway.

In order to identify target markets requirements as accurately is absolutely necessary direct exchange of information through trade and economic missions with subsidy from the state budget and BPCE network sites.

Measures to be taken at the sector level:

- conducting market research that facilitate the expansion/development of exports to areas that have potential for absorption;
- intensification and optimization of business promotion and organic food products on foreign markets;
- selection as efficiently as possible of distribution channels from abroad, configuration deposits in free trade zones;
- calling consulting services to optimize costs and to optimize the storage, transport and customs activities;
- using customized packaging, correct labeling of products;
- strict quality control;
- use of the product certification and organic food;
- removing non-tariff barriers for Romanian agri-food products in third countries (Russia, China, Japan, etc.) through the effort of MARD, ANSVSA and MECMA

Sector desiderata:

a.Strengthening the competitive advantages obtained in the previous cycle;
b.The creation and consolidation of new sustainable competitive advantages and new chains with greater values and more consistent at national level;
c. Development and diversification of services of support for the potential exporters and for aspiring exporters and for those developed;
d. Initiatives to meet the challenges and effects of the financial and economic crisis;
e. A stronger partnership for the implementation of the NES;
f.Increasing awareness regarding opportunities, tools and institutions involved in supporting exports;
g.Increased appetite for entrepreneurship, innovation and internationalization of Romanian companies;
h. Diversification of exports and redirecting them to other countries outside the EU.

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INTERSPECIFIC HYBRIDS OF VINES (*VITIS VINIFERA* L. x *MUSCADINIA ROTUNDIFOLIA* MICHX.) WITH INCREASED RESISTANCE TO BIOTIC AND ABIOTIC FACTORS

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Abstract

Because of the climate change, the process of desertification intensifies. Grow requirements to the genetic resources needed to improve the cultures valuable increased resistance to biotic and abiotic factors. Feels a need to ensure the heightened autochthonous products necessities for the industrial branches of the national economy. The flowering plants adapts to the environmental conditions using various methods and the changes morfo-anatomic hold a decisive role under conditions the high environmental temperatures. The changes for adaptation of the plants can be studied on the basis of morphological and anatomical characters of the leaf, because this plant is the organ of plastic and responsive to changes in the environment. Ecological adaptation of the plants of the environment conditions of the hydric of the variability is realized based morphology and anatomy quantitative indicators leaf. So far they have created many varieties of vines, and yet has not acquired perfect of vines the variety, that has meet the maximum agro biological and technological properties. The achievements are well known in the selection of grapevine varieties resulted in obtaining high quality and resistance to biotic and abiotic factors, such as those from France, Italy, Germany, Bulgaria, Hungary, Romania, Moldova, Ukraine etc. but it should be noted that cultivation of the variety of vines requires mandatory the grafting their the rootstock north American (resistant to phylloxera), which greatly increases the cost of planting material production and the creation of plantations of vines.

Key words: *adaptation, anatomy, inter-specific hybrids, leaf, root, vines*

INTRODUCTION

For thousands of years the grapevine was included in the breeding process, so nowadays have come to be known approximately 12 000 species / varieties. However, so far failed to creating of the variety "ideal" that brings together the most valuable features of different varieties. Thus, the current the problem of obtaining new varieties of vines, characters agro-biological to satisfy the maximum requirements to the table grapes intended for fresh consumption, and towards those intended for industrial processing (juices, concentrates, wines, spirits).

The development of viticulture until the XIX century and is distinguished by creating varieties of vines varieties, such as: *Rara Neagră, Coarna Neagră, Bătuta Neagră, Frăncuşa, Feteasca Albă, Feteasca Neagră, Feteasca Regală, Galbena, Plăvaie, Grasă, Zghiharda* etc. These varieties were grown on their own roots and planting material was multiplied by the method of cuttings.

In the second half of the XIXth century (1863), European viticulture is subject to a radical turnaround in the cultivation of the vine conditional upon: *Phylloxera vastatrix / Daktulosphaira vitifoliae* (Fitch 1855); *Plasmopara viticola* (Berk. & M.A. Curtis) Berl. & De Toni, (1888); *Oidium sp.; / Uncinula necator* (Schwein.) Burrill. The methods of direct fight against the invasion of phylloxera, they have not led to the expected results. Resolve the situation in viticulture, at the time, it was only possible by introducing hybrids of direct producer vines (Seibel 1, Seibel 1000, Teras-20, Floot d'Or, Baco, Couderc, Rayon d'Or, etc.) and varieties of grafted vines. Thus grafting of grapevine was implemented everywhere because there is no other solution.

Achievements are well known in the selection grapevine resulted in obtaining new varieties

of high quality and resistance to biotic and abiotic factors, such as the: France (Chardonnay, Cabernet Sauvignon, Pinot Noir, Merlot, Muscat Ottonel etc.), Italy (Fleurtai, Soreli, Early Sauvignon; Petit Sauvignon, Sauvignon d´ore; Petit Cabernet, Royal Cabernet, Royal Merlot, Petit Merlot, Julius etc), Germany (Soliaris, Hibernal-GM etc.), Bulgaria (Pleven, Bulgaria, Mavrud, Melnik, Pamid etc.), Hungary (Bianca, Valentin, Vinitor, Gloria, Zenit, Ijaki, Chincem etc.), Romania (Napoca, Victoria, Brumăriu, Transilvania, Someşan, Splendid, Ozana, Paula, Gelu, Raluca, Arcaş, etc.), Moldova (Viorica, Legenda, Reton, Luminiţa, Alb de Ialoveni, Negru de Ialoveni; Apiren alb, Apiren roz, Negru de Grozeşti, Kiş-miş moldovenesc, Kiş-miş lucistâi; Moldova, Guzun, Suruceni alb, Leana, Ialoveni rezistent, Codreanca, Tudor etc.), Ukraine (Arkadia, Vostok, Gherkules, Dnestrovchii rozovîi, Zolotistîi ustoicivîi, Kiş-miş tairovschii, Muscat jemciujnîi, Muscat tairovschii; Aromatnîi, Golubok, Iliciovschii rannii, Muscat odesschii, Odesschii Ciornîi, Ovidiopolschii, Rubin tairovschii, Suholimanschii belîi etc.) etc. It is should be noted that the cultivation of all varieties of the vine grafting plants in requires mandatory their North American rootstock (resistant to phylloxera), which greatly increases the cost of planting material production and the creation of of vines plantations.

MATERIALS AND METHODS

Interspecific hybrids of vines *Vitis vinifera* L. x *Muscadinia rotundufolia* Michx. they were involved in that study. For determine the resistance to drought of the vine express method was applied based on morphological and anatomical characters of the leaf lamina, consisting of: leaf lamina thickness, the average area of the leaf lamina, the average volume of leaf lamina, the report the average area of leaf lamina leaf lamina average volume [8, 9, 10]

Winter hardiness of interspecific hybrids to the (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.) determined based on the buds the shoots a year.

Filloxera strength of interspecific hybrids to the (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.) Was determined based on the anatomy of the roots [6, 7, 9, 11, 13].

RESULTS AND DISCUSSIONS

As a result of studying the quantitative anatomy of lamina leaf the grapevine (Vitis L.) were revealed morphological and anatomical four characters, which causes greater relative resistance to drought, namely: lower mean surface leaf lamina; the average thickness greater leaf lamina; greater average volume of leaf lamina; lower ratio of average area of leaf lamina leaf lamina average volume (S:V).

Inter-specific hybrids leaf lamina the thickness of vines BC3 hybrid it is 312.01 μm DRX-M4-508 and 299.54 μm DRX-M4-583 [1, 2, 3, 4, 7, 11, 19].

Table 1. Characters biometric hybrids of the leaf lamina interspecific hybrids of vines (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.)

Hybrid	Average surface of the leaf lamina (cm^2)	The average volume of leaf lamina (cm^3)	The report the average surface: the average volume of leaf lamina (S:V)	The average thickness of the leaf lamina (μm)
DRX-M_4-508	102.05	3.1841	32.05	312.01
DRX-M_4-583	72.36	2.1438	33.75	299.54
DRX-M_4-677	107.83	2.7087	39.80	251.20
DRX-M_4-547	70.36	1.7329	40.60	246.29
DRX-55	62.80	1.5464	40.61	246.24
DRX-M_4-542	88.81	2.1785	40.76	230.03
DRX-M_4-660	101.76	2.3982	42.43	236.90
DRX-M_4-545	95.56	2.2180	43.08	232.11
DRX-M_4-560	84.03	1.8926	44.39	225.23

The average surface lower lamina leaf of vines hybrids within the limits of 70.36 cm^2 hybrid DRX-M4-547 and 72.36 cm2 hybrid DRX-M4-583.

The average volume greater of leaf lamina hybrids of vines is within 3.18741 cm^3 hybrid DRX-M4-508 and M4-677 2.70873 hybrid-DRX.

Lower ratio of average area of leaf lamina the average volume of leaf lamina of the hybrids of vines has been found to be limited by 32.05, hybrid DRX-M4-508, and 33.75, hybrid DRX-M4 -583.

If the ratio S : V is lower, the relative to drought resistance is higher, so hybrid DRX-55 has the highest resistance to drought. At

other study found that hybrids and they have a rather high resistance to drought: DRX-M4-660; - 677; - 560; - 508; - 583 (Tab. No. 1.).

Table 2. Winter hardiness of interspecific hybrids to the (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.) determined based on the buds the shoots a year.

Hybrid	Buds examine, (unit.)	Buds vivid, (unit.)	The percentage of vivid buds, (%)	Buds dead, (unit.)	The percentage of dead buds, (unit.)	The level the resistance
DRX-M4-502	31	30	96.78	1	3.22	1
DRX-M4-537	21	20	95.24	1	4.76	1
DRX-M4-538	65	59	90.77	6	9.23	1
DRX-M4-545	41	39	95.13	2	4.87	1
DRX-M4-578	39	36	92.31	3	7.69	1
DRX-55	42	33	78.58	9	21.42	2
DRX-M4-504	8	7	87.50	1	12.50	2
DRX-M4-510	49	39	79.60	10	20.41	2
DRX-M4-535	82	71	86.59	11	13.41	2
DRX-M4-541	64	55	85.94	9	14.06	2
DRX-M4-579	35	31	88.57	4	11.43	2
DRX-M4-580	104	88	84.62	16	15.38	2
DRX-M3-3-1	14	10	71.43	4	28.57	3
DRX-M4-508	34	24	70.59	10	29.41	3
DRX-M4-512	14	10	71.43	4	28.57	3
DRX-M4-602	28	18	64.29	10	35.71	3
DRX-M4-660	11	7	63.64	4	36.36	3
DRX-M4-511	30	17	56.67	13	43.33	4

Winter hardiness of these hybrids is within into 4 groups depending on the percentage of each hybrid vivid buds. The hybrids from the group I winter hardiness have the highest percentage of vivid buds. To this group belong hybrids DRX-M4-502 (96.78% of buds vii), DRX-M4-537 (95.24%), DRX-M4-545 (95.13%), DRX-M4-578 (92.31%) (Tab. No. 2.).

The first attempts on studying of resistance grapevine to the phylloxera were initiated in France by the Ravaz (1909) and shall draw up a scale for determining the resistance grapevine to the phylloxera building on comparing the level of infection and degradation of species of the vine. Assuming that the resistant American grapevines (*Muscadinia rotundifolia* Michx.) and non-resistant grapevines culture (*Vitis vinifera* L.).

Millardet A. has tried to determine the relationship between anatomical structure of roots and resistance to phylloxera. It was found that the resistance to grapevine of the phylloxera root anatomical structure has a fairly compact cells are small in size and nodule formation occurs when the periderm fissure cicatrisation.

Prince I., based on three cases the studies determined of attack of phylloxera:

1. The phylloxera poking roots, and leaves, over a short period of time leaves the place, as a result, forming a point necrotic dead cell and consisting of the oxidized phenolic substances (ex.: *Muscadinia rotundifolia* Michx., *Vitis cinerea* Arnold.).
2. The phylloxera, the young leaves, make the creation of galas of different sizes, but the roots formed nodules and tuberose (ex.: *V.riparia, V.rupestri, V.berlandieri* etc.).
3. The phylloxera, the young leaves and the leaves the do not form galas puncture site, the result forming necrotic points. Instead, the phylloxera root and grows very intense and tuberose forming nodules of varying size (ex.: *V.vinifera L. V.amurensis* and *V.labrusca*).

Has been demonstrated that to the grapevines resistant to the phylloxera increased when injected by the phylloxera substances forming galas (amylase, protease, etc.) occurs redox process using phenolic substances present in tissue cells , the surrounding cells perish, and not training takes place galas. Phenolic substances in this case have the function of inactivating substances (inhibitors) [8, 17].

Golodriga I. studying the physiological and biochemical characteristics, morphology and anatomy of grapevine phylloxera-resistant and pathogenic microlfora have determined that parenchymal tissues of roots have smaller cells, located most compact between them. In the roots of the secondary structure is present phloem [12, 14].

The forms of phylloxera-resistant vines have the property of forming genotypic wound periderm. Wound periderm is an obstacle to the spread of pathogenic microflora.

The not resist at phylloxera vines and rotting wound periderm only partially insulates part the healthy root affected.

Nedov P. Guler A. in the dependence studying anatomical the correlation between quantitative indices of the vine roots with secondary anatomical structure and species and varieties resistance to phylloxera vines and pathogenic microflora, concluded that the wound periderm forms the roots of varieties

and species resistant to phylloxera vines and rotting; phylloxera varieties responsive to wound periderm poorly formed or not formed at all.

By studying the characters physicochemical and morphological and anatomical resistance grapevine against phylloxera and pathogenic microflora it is concluded that vines with increased resistance to phylloxera has parenchymal tissues of the root composed of smaller cells located most compact between them . Phloem have secondary roots.

The phylloxera-resistant grapevines has the property to shape wound periderm, which has bactericidal properties and stop the spread of pathogens.

The plants attacked by the phylloxera initiates the process by creating self-defense wound periderm. The formation process of wound periderm of different species is resistant to the phylloxera is well developed and is not resistant to the undeveloped.

The vines resistant to the phylloxera periderm wound develop well as a result of the attack of the insect, that the response of the organism is formed periderm wound, which insulates by small tuberosities pathogens, thus stopping the spread of pathogens that lead to the root decay. In the cells in these tissues is increasing the synthesis of nucleic acids, proteins and starch.

The not resist at the phylloxera vines, wound periderm grows weak and insulates areas only partially damaged by the healthy and is not able to halt the spread of pathogens [13, 15, 16].

Given the physiological particularity of the insects was found that autotrophic to the sterol is an important particularity in the nutrition of insects. A plant tissue is the only source of sterols for phytophagous insects.

Based on the analysis of correlation and dispersion was found that the species of less resistant of vines of the leaves the tissues contain β-sitosterol more and less cholesterol in comparison with resistant species to phylloxera.

The species of vines resistant to by phylloxera contain in the tissues of β-sitosterol 73-82% the total quantity of the sterol and 12-14% cholesterol and the species susceptible to phylloxera contain 89-99% of β-sitosterol and 1.5-4.0 % cholesterol [15, 16].

According to some studies has been found that using of physiologically active substances with the function of stimulation growth of plants, as gibberellins, crezacin, mival, auxin etc. can influence of on the development process of phylloxera, especially on the ability of the pest propagation. This is due to changes in plant the biochemical processes under the influence of the physiologically active, inhibiting the ability of propagation of phylloxera.

The studies undertaken by the researchers Askerov Uh, Kazahmedov R. in Dagestan have demonstrated that using the physiologically active substances have reduced capacity by 50% propagating phylloxera [5].

The grapevines phylloxera-resistant forming of wound periderm, which has bactericidal properties and stop the process of spread of the pathogens.

Table 3. The thickness of the first periderm root of vineyards inter-specific hybrids to the (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.)

Hybrids	The thickness of the first root periderm (μm)	The number of cell layers of the periderm	The length of the cells (μm)	The width of the cell (μm)
DRX-55	105-116	9-12	12-20	6-9
DRX-M3-3-1	90-103	9-10	10-16	6-9
DRX-M4-508	83-105	8-10	10-12	7-9
DRX-M4-537	80-90	8-9	18-24	6-11
DRX-M4-541	80-95	8-9	9-18	6-10
DRX-M5-4-6	93-124	10-12	9-18	6-10

The thickness of the first root periderm on interspecific hybrid of vineyards studied varies from 80 μm to 124 mm, and be composed of 8-12 rows of compact the cells located next to each other (Tab. No. 3.).

The first root periderm tissue of the interspecific hybrids to the are formed in the layer of cells situated below the rizoderm. The layer of the felem (cork) of the first periderm be composed of 8-10 of cells rows tangential of radial elongated, compact located between them. The length of these the cells varies from 30 μm to 45 mm, and their width varies between 8 - 12.5 μm. Felem tissue thickness varies from 75 μm to 93 μm. The next layer of tissue felem, if formed in the same year,

developing from the deepest layers of the root bark. The 2nd layer of the film is located below the tissue layer brown crust with a thickness of 93 - 110 μm. The total thickness of this layer of dead tissue, consisting of two layers of tissue felem the outside and inside and a layer of bark, between two layers of tissue felem, thickness 170-180 mm, and protects the roots of phylloxera action and other pathogens.

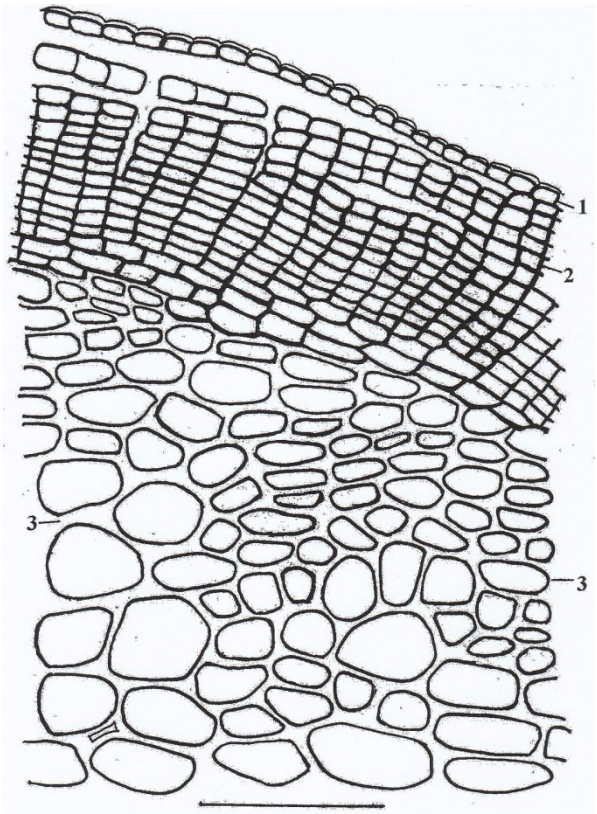

Fig. 1. The cross section through a sector of the root with the secondary anatomical structure (DRX-M4-508, 1 - epidermis; 2 - felem of the periderm; 3 - root bark)

CONCLUSIONS

As a result of interbreeding culture grapevine (*Vitis vinifera* L.), 2n = 38, with American grapevines (*Muscadinia rotundifolia* Michx.), 2n = 40 interspecific hybrids were created with diploid set of chromosomes 2n = 38.

Interspecific hybrids of vines (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.) can be multiplied by cuttings and grown on their own roots, which would allow reducing some stages and finance expense in the production process of planting material and cultivation of the vine.

Interspecific hybrids resistance to phylloxera of vines (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.) is assured of first root periderm consists of the cell layer located under rizoderm, and increased concentrations of such chemicals, as phenols, resveratrolii etc.

Improving grapevine is resulting in the expected results just in case the inter-specific hybridization method of use based on initial taxons complementary to the various eco-geographical groups, creating indigenous of vines varieties. In this case a combined genotype of the desired characteristics and properties of the parent forms. The formation takes place of adaptation genotypic properties. An obvious expression of the adaptation of varieties created, it is possible only in case to obtain them in different species interbreeding result (taxons) of vines. Although it possessing resistance to the disease and pests, they also holds an advanced adaptation to the climatic conditions, thus accentuating the process of cultivation.

The new varieties of vines must possess a period precocious maturation of the grapes to ensure the planting and their cultivation and northern borders of the areas where they are viticulture and to ensure at the same time the mechanization and automation to the maximum possible agro-technical processes.

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INTERSPECIFIC HYBRIDS OF VINES (*VITIS VINIFERA* L.x *MUSCADINIA ROTUNDIFOLIA* MICHX.) AND HEAVY METALS

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Abstract

The heavy metals, that are found in foods and in particular in wine, can lead to negative consequences for a significant excess of allowable doses. This the research study has been achieved aiming to determine the concentration of heavy metals in the berries juice of vines of the interspecific hybrids Vitis vinifera L. x Muscadinia rotundifolia Michx. compared to some varieties of the culture vines. The obtained results proves that berries juice of the hybrids distant of vines, hold heavy metals: Fe, Cu, Zn, Pb, Cd, As and Hg within limits lower than those accepted by the World Organisation of Vine and Wine. The concentration of heavy metals Fe, Cu, Zn, Pb, Cd, As and Hg from the juice of grapes of vines of the interspecific hybrids (Vitis vinifera L. x Muscadinia rotundifolia Michx.) Is much lower than the maximum allowable limits approved by the World Vine and Wine (OMVV). The quality of the products derived of vegetable origin is conditional upon a number of factors: the quality of the substrate on which the develops the plants used in irrigation aquatic resources, atmospheric air, the techniques for combating diseases and pests etc.

Key words: *interspecific hybrids, juice of vines, heavy metals*, *vines*

INTRODUCTION

The heavy metals, that are found in foods and in particular in wine, can lead to negative consequences for a significant excess of allowable doses.

The development of the living organisms it is closely in line with the factors that influences of the environment and use of derived products both of vegetal origin and also of animal origin condition the level of development of society.

The heavy metals have a toxic effect on all living organisms. Thus, the plants accumulates heavy metals from soil, air, water. The animals, particularly herbivores consumes the plants for feeding. The people consumes products derived from plant and animal origin, ambient air, water etc. The presence of the heavy metals in the organism in concentrations inadmissible put in danger its good functioning and consequently lead to perish.

For the development of a healthy society it is necessary for derived products used in food production technologies, have admissible concentrations of the chemical compounds. The World Health Organisation has established maximum permitted concentrations of heavy metals in wine-derived products.

An imperative of modern oenology is the presence of metals in wines, especially the heavy metals. Today, great attention is given to identifying the sources which makes the presence of heavy metals in wine and reducing the content of these metals by applying treatments permitted by current legislation.

It is necessary get to know each very well influence of various kinds endogenous factors such as the variety, location of vines crops, soil, climatic conditions of the year. It is also necessary to know as much as possible quantitative exogenous influence factors: growing techniques, harvesting, winemaking technology, oenological technique applied, of wines storage conditions [8].

Order to obtain high quality wines, the dosing of microelements have to be done allowable quantities. A series of investigations were performed to determine heavy metals in wines

produced from clones untreated raw Europe, widely planted in the period 1998-2013 in various micro zones in the country: Tigheci din Codrii de sud, Mindreşti din Codrii - Centru etc. Among the high quality table wines produced from clones of European Union countries were studied: Pinot noir, Merlot, Muscat ottonel, şi Traminer roz.

MATERIALS AND METHODS

In this study were included distants hybrids of vine *Vitis vinifera* L. x *Muscadinia rotundifolia* Michx. (DRX-M3-3-1; DRX-M4-502; -512; -571; -578; -580; -609; -640). The vines varieties of cultivated in the Republic of Moldova: Aligote, Feteasca Albă, Cabernet-Sauvignon, Merlot. The vines varieties of cultivated in France: Pinot noir, Merlot, Muscat ottonel şi Traminer roz. [2, 3, 4, 5, 8].

Younger wines at after a month completion of alcoholic fermentation and the malolactic, without being subject to conditioning of through various treatments and manipulations were investigated by the methods of atomic spectroscopy Centre of Metrology and Automation of Scientific Research of the Academy of Sciences Moldova.

Determination of content of heavy metals in juice of vineyards of the hybrids distance (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.) was performed in the Laboratory of physico-chemical automation of Higher School of Agronomic Research (ENSRAM) in Montpellier, France, by using the atomic spectroscopy methods [1, 6, 11, 12, 13].

RESULTS AND DISCUSSIONS

Younger wines from 2004 in 2007 and 2013 harvest, over one month after the alcoholic fermentation and the malolactic that appreciated by 8.8 to 9.2 points without being subject to conditioning of through various treatments and manipulations were investigated by methods atomic spectroscopy of the Centre of Metrology and Automation of Scientific Research of the Academy of Sciences Moldova.

The analysis of the results obtained shows evidence of a high degree of hygienic wines obtained from French clones cultivated in the Central region: Codrii of the Moldova in which concerning of the index of content of the heavy metal, all the samples investigated in the content of Pb, Cd, As, Hg, Cu, Zn, Fe. Identified the values are much lower than those admissible under current rules established by the World Health Organisation (WHO) with the Agreement of the International Vine and Wine Organisation (OIVV).

Table 1. The content of heavy metals in young wines obtained from vineyards clones of French origin, perspectives for the Codrii of the Centre of Moldava (2004 harvest)

The content of the heavy metals, mg/kg	Varieties				
	Pinot noir	Merlot	Muscat Ottonel	Traminer roz	Maximum allowable concentration of the World Health Organization
Fe	2.30	1.35	0.50	0.44	15.8
Cu	0.06	0.08	0.09	0.08	5.0
Zn	0.30	0.32	0.25	0.27	10.0
Pb	0.049	0.052	0.043	0.,080	0.30
Cd	0.0029	0.0030	0.0022	0.0024	0.3
As	< 0.01	< 0.01	< 0.01	< 0.01	0.2
Hg	<0.0016	<0.0016	<0.0016	<0.0016	0.005

Table 2. The content of heavy metals in the wines from varieties Aligote, Feteasca Albă, Cabernet Sauvignon, Merlot (2004 harvest)

The content of the heavy metals, mg/kg	Varieties				
	Aligote	Feteasca Alba	Cabernet-Sauvignon	Merlot	Maximum allowable concentration of the World Health Organization
Fe	2.30	1.35	0.50	0.44	15.8
Cu	0.06	0.08	0.09	0.08	5.0
Zn	0.30	0.32	0.25	0.27	10.0
Pb	0.048	0.052	0,050	0.080	0.30
Cd	0.0033	0,0040	0.0070	0.0070	0.3
As	<0.01	<0.01	<0.01	<0.01	0.2
Hg	<0.0016	<0.0016	<0.0016	<0.0016	0.005

The analysis of the results obtained shows evidence of a high degree of hygienic wines obtained from French clones cultivated in the Central region: Codrii of the Moldova in which concerning of the index of content of the heavy metal, all the samples investigated in the content of Pb, Cd, As, Hg, Cu, Zn, Fe. Identified the values are much lower than those admissible under current rules established by the World Health Organisation (WHO) with the Agreement of the

International Vine and Wine Organisation (OIVV).

In the laboratory of testing by the methods of atomic spectroscopy Center for Metrology and Automation of Scientific Researches of the Academy of Sciences of Moldova was determined the content of heavy metals in the wines: Aligote, Feteasca Alba, Cabernet-Sauvignon, Merlot (the 2004 harvest) .

During 2004, climatic conditions have been favorable for the cultivation of vines, in the course of the vegetation period of only four treatments were conducted anti - mildium powdery mildew and *Botrytis cinerea*. Therefore, the concentrations of heavy metals in the wines: Aligote, Feteasca albă, Cabernet-Sauvignon and Merlot from the Central region of Republic of Moldova (Ialoveni) is much less than the amounts allowed by the WHO (Table 2). Is worth mentioning that that the content of toxic metals Pb, Cd, As, Hg, Cu is significantly lower (about 10 times) than health and hygiene limits approved worldwide. The test report from the laboratory of control of wine products (NIVW) accredited National System of the Republic of Moldova, indicates not significant concentrations of in dry wines, of grapes a raw material to determination of content of copper, zinc, lead, cadmium, iron by atomic absorption.

Table 3. The content of heavy metals in grapes of the interspecific hybrids of grapevine (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.)

Hybrid	The content of the heavy metals, mg/kg						
	Fe	Cu	Zn	Pb	Cd	As	Hg
DRX-M3-3-1	2.39	0.07	0.28	0.051	0.0075	0.01	0.0019
DRX-M4-502	1.12	1.01	0.41	0.079	0.0043	0.01	0.0015
DRX-M4-512	0.73	0.09	0.39	0.066	0.0039	0.01	0.0011
DRX-M4-571	1.44	0.08	0.23	0.059	0.0068	0.01	0.0016
DRX-M4-578	2.61	1.32	0.39	0.049	0.0079	0.01	0.0013
DRX-M4-580	0.83	1.47	0.40	0.086	0.0058	0.01	0.0011
DRX-M4-609	1.91	0.12	0.29	0.049	0.0071	0.01	0.0016
DRX-M4-640	2.93	1.17	0.49	0.057	0.0044	0.01	0.0019
Maximum allowable concentration of the World Health Organization	*15.8*	*5.0*	*10.0*	*0.3*	*0.3*	*0.2*	*0.005*

The obtained results reveals that the juice from the grapes of interspecific hybrides of vineyards studied have a degree hygienic high in all the cases the contents of heavy metals Fe, Cu, Zn, Pb, Cd, As and Hg, is much smaller, the permissible limits in force, approved by the World Organisation of Vine and Wine (OMVV) (Table 3).

Similar results were obtained in joint studies conducted during the years 2004-2012 through collaboration Practical Scientific Institute of Horticulture and Food Technologies with the Centre for Metrology and Automation research Academy of Sciences, now part of the Institute of Chemistry of the ASM [8, 9, 10, 12, 13].

By determining the heavy metals in juices and wines from clones of vines of European origincultivated Republic of Moldova was formulated the same conclusion: the concentrations of these elements - heavy metals are well below allowable values internationally by WHO and OMVV [9, 11].

The concentration of phenolic substances denotes the belonging of the obtained distant hybrids to the varieties of table grapes. The amount of these substances in distant hybrids of vine with green-yellow berries varies within the limits from 201 mg/dm^3 up to 293 mg/dm^3 and for hybrids with berries with a red-violet hue - from 777 mg/dm^3 up to 809 mg/dm^3 (Table 4.)

Table 4. Phenolic substances

Hybrid	Phenolic substances, mg/dm^3
DRX-M_3-3-1	809
DRX-M_4-502	292
DRX-M_4-512	288
DRX-M_4-571	263
DRX-M_4-578	274
DRX-M_4-580	293
DRX-M_4-609	201
DRX-M_4-640	777

It is known that phenolic substances capable to accumulate heavy metals and form stable complexes with them. We carried out a correlation between the content phenolic substances and heavy metals in various wines.

Soil is the not anything other than a deposit of all of the chemical compounds, including the heavy metals released into the environment and depending on the modality actuator the substances present in the soil are taken up through brought to ways the particulate air and water absorbed by plants

Upon performing an analysis of the soil, the concentration of heavy metals in the territory where they grow interspecific hybrids of the

vines it was concluded that the concentration of heavy metals (Cu, Ni, Zn, Pb, Mn) not exceed the maximum limit be admissible (fig. 1).

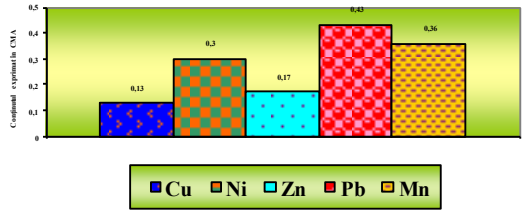

Fig. 1. The content of heavy metals in soil, Chisinău, Republic of Moldova.

The quality of the products derived of vegetable origin is conditional upon a number of factors: the quality of the substrate on which the develops the plants used in irrigation aquatic resources, atmospheric air, the techniques for combating diseases and pests etc.

CONCLUSIONS

The concentration of heavy metals Fe, Cu, Zn, Pb, Cd, As and Hg from the juice of grapes of vines of distance hybrids (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.)
It is much lower than the maximum allowable limits approved by the World Vine and Wine (OMVV).
Thus, studies have shown that the heavy metal content is within acceptable limits, and different metals are accumulated in different of hybrids the grape differently.
The correlation was revealed that the interspecific hybrids of the grape berries with peel blue-violet hue content of phenolic substances higher than the hybrids with green-yellow shade peel the berries and consequently also concentration of heavy metals was more pronounced.

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THE EXPRESSIVENESS OF THE CHARACTERS IN THE PROCESS OF CREATING NEW VARIETIES OF VINES

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Abstract

In the present article are reflected in results of the study about of resveratrol the concentration the juice berries of vine varieties both at the wild and how the culture. As the object of study having served: Muscadinia rotundifolia Michx. and varieties of interspecific hybridization results obtained with Vitis vinifera L. subsp. D.C. sativa, Vitis vinifera L. subsp. sylvestris C.C. Gmel., varieties of vine cultivation. Conducted a comparative analysis about the expressiveness of of resveratrol species of wild the vines and how the expresses the chemical compounds to progeny obtained as a result of hybridization. As a result of the researches it was concluded that the concentration of resveratrol species of wild vine is much larger, nearly double as compared to the descendants of these species and how it are advancing in generations, ie removing us from wild species the concentration of resveratrol decreases in the juice berries of vine.

Keywords: *berry, pathogenic agents, polyphenols, resveratrol, vines*

INTRODUCTION

The development of grapevine growth in the course of his evolution has known many breeding methods, such as the natural selection or directed (intraspecific interspecific clones, genetic engineering, etc.). An desideratum of the global science and practice remains to be the obtaining of new varieties of vines for quality, absolutely resistant to attack by phylloxera (root and leaf), etc. [2]

The process of creating new varieties of vines can bring the to changing and biochemical spectrum of chemical compounds responsible for flavor, color and taste of berries, juice and wine obtained.

The plants of vines in response to the attack of pathogenic agents (fungi, bacteria, etc.), secrete biologically active substances from the group of polyphenols - resveratrol with protective function.

As a result of studies carried out it was found that the red wine and especially is rich in polyphenols, the latter exerting positive effects on the body.

Basically, when reference is made to polyphenols, one means a the whole family chemical compounds that includes flavonoids, lignin or coumarin. Today, as a result of studies and researches are the more than 4 000 known polyphenols different the physiological of which the effects depend on the structure of the molecule. The plant polyphenols represents powerful antioxidant substances that protect cells and the body both the overall or by neutralizing free radicals are formed within processes or due to physiological influences environment where we live, managing to slow down the aging process of the body. [16; 17]

Polyphenols - resveratrol, for red wine characteristically is found in increased quantities in the grapes, berries and peel both in the grapevine buds. The plants produce this polyphenols (resveratrol) to protect themselves from infection. In wine, the amount of resveratrol varies according to the species of the vine, the pedo-climatic that increases the as well as method of cultivation of the plants (eg in vineyards sprinkled where the protection is secured externally the amount of polyphenol is lower).

This polyphenolic compound is found in nature in four different forms, of which trans-

resveratrol appears to be the most biologically active.

Resveratrol is of interest from three different points of view:

• oenological - phenolic compound involved in determination of color, taste and maturing the of the wine, participates in oxidation-reduction the reactions etc.

• phytopathological - proprietary of defense against phytopathogenic organisms;

• pharmacologically - the compounds with antioxidant properties / radical scavengers in the organism, preventing and treating different diseases: cardiovascular, cancer etc. [18]

MATERIALS AND METHODS

In the study were included species of vine: *Muscadinia rotundifolia* Michx., *Vitis vinifera* L. subsp. *sylvestris* C.C.Gmel., *Vitis vinifera* L. subsp. *sativa* D.C., hibrizii interspecifici de viță-de-vie: *Vitis vinifera* L. subsp. *sativa* D.C. x *Muscadinia rotundifolia* Michx. [3, 4, 6, 7, 8, 9, 16]

Uvological and biochemical studies have been conducted at the Agricultural the Superior School Montpelier, France and the Institute of Scientific and Practical Horticulture and Food Technology of the Republic of Moldova. [12, 13, 14, 16, 19, 21, 22]

RESULTS AND DISCUSSIONS

The resveratrol represents a fitoalexină of the vine which determines resistance to: *Botrytis cinerea*, *Daktulosphaira vitifoliae* (Fitch 1855) etc. [18, 19]

It is significant that the species of wild vines *Muscadinia rotundifolia* Michx. has the on average 35 mg/l of resveratrol. (Fig. 1 and Fig. 3)

Trans-resveratrol varies within from 4.9 mg/l to 13.4 mg/l and cis-resveratrol varies in the range of 9.2 mg/l to 35 mg/l. (fig. 2)

As a result of interbreeding *Vitis vinifera* L. subsp. *sativa* D.C. with *Muscadinia rotundifolia* Michx. have been created interspecific hybrids by vines.

Analyzing the juice from the berries varieties of vine *Vitis vinifera* L. subsp. *sativa* D.C. x *Muscadinia rotundifolia* Michx. It has been a higher concentration of resveratrol. Varieties with yellow-green berries have the resveratrol in the range of 4.9 mg/l (DRX-M4-510 etc.) to 9.3 mg/l (DRX-M4-515 etc.) and the variety of blue-violet berries have 8.5 mg/l (DRX-M3-3-1 etc.) to 14.0 mg/l (DRX-M4-660, etc.). (fig. 2)

By comparing the concentration of resveratrol of the vine varieties of Cabernet-Sauvignon, Merlot and Pinot Noir, cultivated in the south of the Republic of Moldova has been found that the concentration of resveratrol in the juice berries of these varieties have varied from 5-7 mg/l.

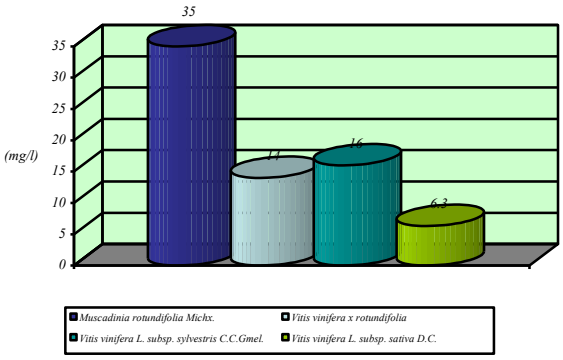

Fig. 1. The outstanding amount of resveratrol from of vines varieties.

Therefore, the concentration of resveratrol in interspecific varieties berries *Vitis vinifera* L. subsp. *sativa* D.C. x *Muscadinia rotundifolia* Michx., exceeds almost twice the concentration of this component as compared to with varieties *Vitis vinifera* L. subsp. *sativa* D.C.

Analyzing the juice of berries forest vine (*Vitis vinifera* L. subsp. *sylvestris* CCGmel.) with blue-violet berries, has been found that resveratrol concentration within the limits 16.0 mg/l. (Fig. 1)

By determining the concentration of resveratrol in vines berries varieties *Vitis vinifera* L. subsp. *sativa* D.C. it was found that the cis-resveratrol concentration which vary from 0.8 mg/l to 3.9 mg/l, and the concentration of trans-resveratrol varies over a range from 1.2 mg/l to 6.4 mg /l. (Fig. 4)

Analyzing the results of the biochemical study on grapevine berries the expressiveness of resveratrol it has been found that the juice of wild berries vines varieties resveratrol concentration is significantly higher than in cultivated varieties of vines.

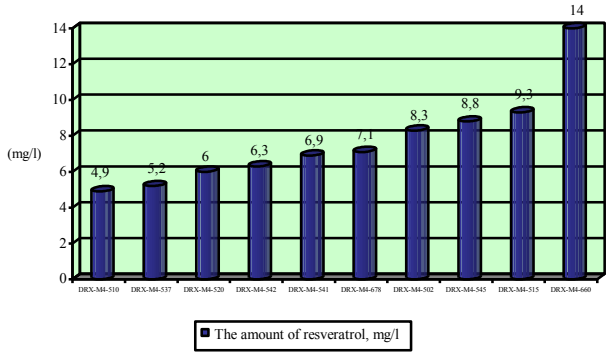

Fig. 2. The amount of resveratrol in berries varieties of interspecific vines *Vitis vinifera* L. subsp. *sativa* D.C. x *Muscadinia rotundifolia* Michx.

The wild vine of American origin *Muscadinia rotundifolia* Michx. has approximately 35 mg/l of resveratrol and varieties of interspecific hybridization result of obtained with this species have on average about 11 to 14 mg/l.

Looking at the further the works interspecific hybridization, the interspecific varieties with involve, by advancing generations, it is determined that the concentration of this chemical compound, also will decrease.

This assertion may be observed when creating the vine varieties within species *Vitis vinifera* L.

By determining the total concentration of resveratrol in the berries of the vine forest, subspecies *Vitis vinifera* L. subsp. *sylvestris* C.C.Gmel. within the limits 16 mg/l. However, subspecies, varieties of the grapevine cultivated *Vitis vinifera* L. subsp. *sativa* D.C. varies between average of 4-6 mg/l.

Therefore, be found that, the more is advanced in generations, appropriate by obtaining new varieties of vines, thus moving away our from of the initial the species (of spontaneous) concentrations of the chemical compounds (especially resveratrol) are the decreasing.

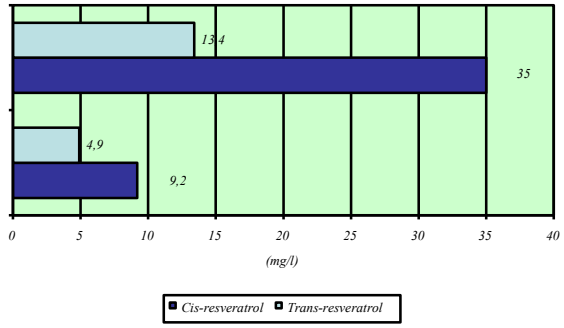

Fig. 3. The concentration of resveratrol in the berries of *Muscadinia rotundifolia* Michx.

It is very important as to the creation of new the vines varieties, both the interspecific hybridization method, and the intraspecific to take into account of the concentration of the chemical compounds in berries that provide plant resistance to certain of the environment factors.

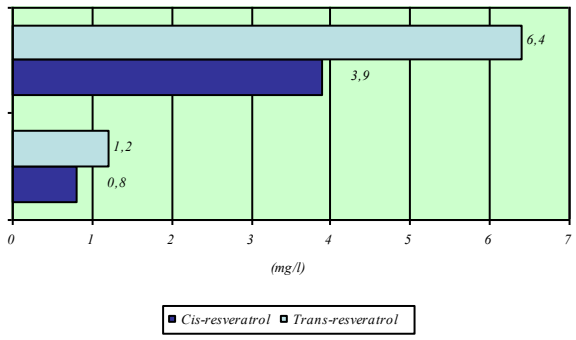

Fig. 4. The concentration of resveratrol in the berries of *Vitis vinifera* L. subsp. *sativa* D.C.

CONCLUSIONS

When creating of new the vines varieties, both the interspecific hybridization method, and the intraspecific it is very important to take into account the concentration of the chemical compounds in the berry, resveratrol that ensure plant resistance to certain of the environment factors.

The concentration of resveratrol of the species of the wild vine is much larger, nearly double as compared to the descendants of these species and as well as it progresses in the generations, ie moving away us from the wild species, the concentration of resveratrol in the juice berries of vines decreases .

The generation is advancing by obtaining new varieties of vines, thus moving away from our of the initial the species (of spontaneous) concentrations of the chemical compounds (especially resveratrol) are the decreasing.

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THE CONCENTRATION OF THE CHEMICAL COMPOUNDS AND THE COLOR OF BERRY TO THE VARIETIES OF THE INTERSPECIFIC HYBRIDS TO THE VINES *(VITIS VINIFERA* L. X *MUSCADINIA ROTUNDIFOLIA* MICHX.*)*.

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Abstract

The color of the berry vine is a very stable morphological character and some varieties can only be determined based on this indicator. The diversity of berry vine color is due to the biochemical characteristics of the juice berry. The concentration of resveratrol from the juice of the berry of interspecific hybrids of vineyards (Vitis vinifera L. x Muscadinia rotundifolia Michx.) is consistent with the color of the berry. So yellowish-green berry contain the 6.68 mg/l, berry rosy color - 9.3 mg/l and blue-violet berry - 14 mg/l of resveratrol. As a result of studies carried out it was found that hybrids from third (BC2) generation is characteristic of a higher concentration of diglucozid-3,5-malvidol and methyl anthranilate than hybrids from fourth generation (BC3). So it once the removal from the parental forms, the concentration of these chemical compounds in the juice of berry the interspecific hybrids of the vineyards (Vitis vinifera L. x Muscadinia rotundifolia Michx.) is decreasing.

Key words: *berry, chemical compounds, color, interspecific hybrides, polyphenols, resveratrol, vines.*

INTRODUCTION

The color of the berry vine represents a very stable morphological character. This index has the practical significance not only for winemaking but is also used for determining the character and classification of the species and varieties of vines, some of which are only distinguished by the color of berry [4, 7].

The varieties of the grapevine cultured the color of berry is very varied and rich in nuances. The diversity of the nuances of vines berry is due to the biochemical characteristics of the juice of the berry.

The berry because of the chemical composition represents a food product very valuable sanogenous. They contain many nutrients necessary for human body, such as sugars (glucose, fructose) - 12-25%, organic acids (tartaric, citric, malic) - 1-2% mineral salts (Ca, Fe, K, P, etc.) - about 1%, nitrogenous compounds - 0.15-0.2%, vitamins (C, B1, B2, PP, A, E), enzymes, polyphenols (anthocyanins, resveratrol, flavonoids), etc. Although the "vine" has been carefully studied and multilateral however some aspects of the interdependence between of the various factors specific to this plant, are to be investigated and analyzed further [4, 6, 14].

MATERIALS AND METHODS

As object of the study have served interspecific hybrids of vines *Vitis vinifera* L. x *Muscadinia rotundifolia* Michx. BC2; BC3. [1; 2].

The biochemical and uvological analyzes were used of the methods disclosed in the Reports of Methodes des analyzes des vins de l'Office International de Vigne et du Vin (Paris 2014), the Technical Regulations "Analytical methods in the manufacture of wines".

The determination of the quantitative and qualitative diglucozid-3,5-malvidol was performed according to qualitative and quantitative fluorimetric method. The determination of methyl anthranilate was carried out according to the gas phase chromatographic method. [8,9,14,15].

The total acidity was performed by titration acids from must with an alkaline solution with known titre in the presence of phenolphthalein indicator.

RESULTS AND DISCUSSIONS

By analyzing the physical and chemical characteristics of the interspecific hybrids of vines (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.) it was found that the concentrations of chemicals substances: phenolic substances, resveratrol, pectins, anthranilate de methyl, diglucozid-3,5-malvidol etc. varies depending on the color of of the berry.

The concentration of phenolic substances in the berry of interspecific hybrids of vines varies depending on their respective colors: the interspecific hybrids with berry green-yellowish contain phenolic substances within the limit of 268 mg/l, the interspecific hybrids with berry colored pink containing 597 mg/l and the interspecific hybrids with blue-violet berry contain 1970 mg/l.

The concentration of resveratrol, also the varies from 6.68 mg/l in berry of green-yellow, 9.3 mg/l in berry of pink color and 14 mg/l in berry of blue-violet (fig. 1.).

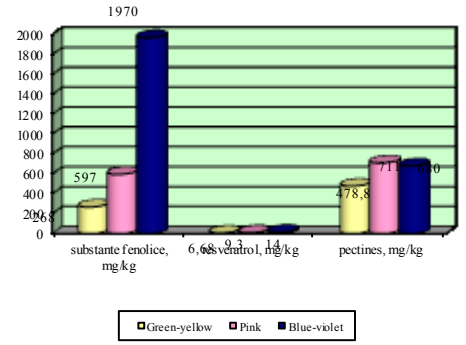

Fig. 1. The physico-chemical peculiarities depending on the color of berry of the interspecific hybrids of vines (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.)

The total concentration of resveratrol from berry is in accordance with the color of the berry, so, according to a conventional system out of 10 units, blue-violet berry have the 10 units of resveratrol, berry pink color have the 2-3 units and the berry green-yellowish color have the 0.5-1 units. [11,12 16]

The pectin's concentration in berry varies from 478.8 mg/l in the color green-yellowish berry, 711 mg/l in the color pink berry and 680 mg/l in the blue-violet berry (Fig. 1).

According to the European Union requirements, the production of wine products, the chemical composition of the starting material must correspond to the strict requirements, for example diglucozid-3,5-malvidol should not exceed the limit of 15 mg/l. Recently the World Organization of Vine and Wine discussed the issue of reducing the index wines at the limit of 5 mg/l, fact which imposes the severe monitoring of the selection of interspecific hybridization to homologate only varieties with low diglucozid-3,5-malvidol.

Another important component of the juice of berry of the hybrids of any order, including the interspecific it is methyl anthranilate (3,4-benzoxazole), to whom the has the main role in establishing the taste and odor (aromas) of foxat (the naphthalene and/or phenol) [11].

As a result of the study on the presence of methyl anthranilate in the berry juice of the interspecific hybrids of vines (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.), it was found that in green-yellow berry of this chemical varies from 0.08 mg/l (DRX-M4-502) to 0.17 mg/l (DRX-M4-571) (Fig. 2), and the red-violet berry of methyl anthranilate the concentration of the varies within the limits 0.20 mg/l (DRX-M4-665) to 0.24 mg/l (DRX-M3-3-1) (Fig. 3).

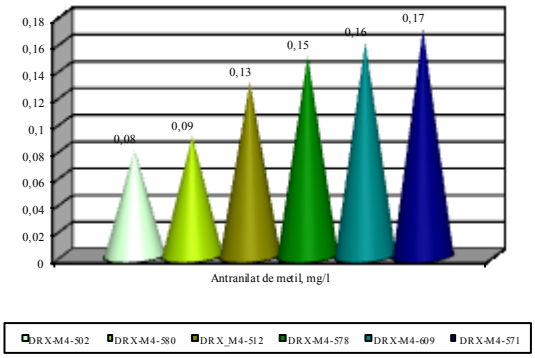

Fig. 2. The concentration of methyl anthranilate in the green-yellow berry of the interspecific hybrids (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.)

Methyl anthranilate represents a nitrogen compound from the group of benzoxazoles is

formed in the grapes (especially the hybrids direct producers) in amounts of from 0.2 to 3.5 mg/l of must (the juice). This is found in the wine along with the same concentrations of volatile aromatic another chemical component - izoamyl acetate [11], important chemical compound that contains in the juice of the berry interspecific hybrids new selection, to be determined, studied and taken as a criterion preselection.

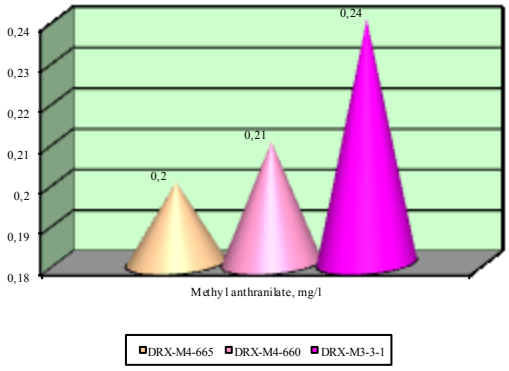

Fig. 3. The concentration of methyl anthranilate red-violet berries of the interspecific hybrids (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.)

By determining the concentration of methyl anthranilate of the berry of interspecific hybrids of vines (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.) it was found that third-generation hybrids (BC2) of methyl anthranilate limit hold approximately 0.24 mg/l (DRX-M3-3-1 etc.) and hybrids of generation the fourth (BC3) hold approximately 0.21 mg/l (DRX-M4-660 etc.) (fig. 4).

Diglucozid-3.5-malvidol also varies depending on the degree of distancing from of initial the species. In the result of studying interspecific hybrids of vines (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.) it was found that third-generation hybrids (BC2) containing diglucozid-3.5-malvidol in the limit of 9.3 mg/l (DRX -M3-3-1 etc.), and the fourth generation hybrids (BC3) contains 7.7 mg/l diglucozid-3.5-malvidol (DRX-M4-660, etc.) (fig. 5).

Analyzing the interspecific hybrids the titratable acidity in the berry of vines (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.) In comparison with to their respective colors, we find out that the green-yellow berry the titratable acidity is in the limit of 6.26 mg/l , the color pink berry is 7.2 mg/l and blue-violet berry of 8.1 mg/l. (Fig. 6).

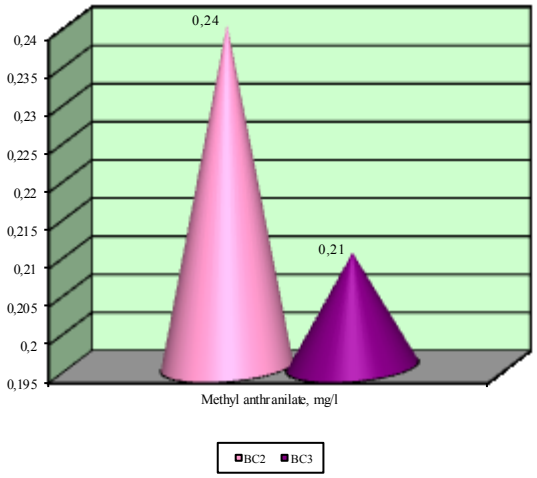

Fig. 4. The concentration of methyl anthranilate interspecific hybrids berries of vines (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.)

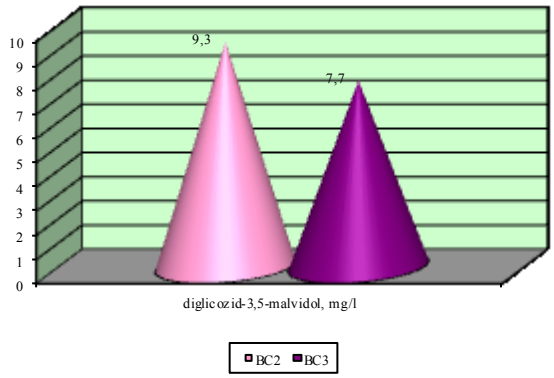

Fig. 5. The concentration of diglucozid-3.5-malvidol in berry of the interspecific hybrids of vines (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.)

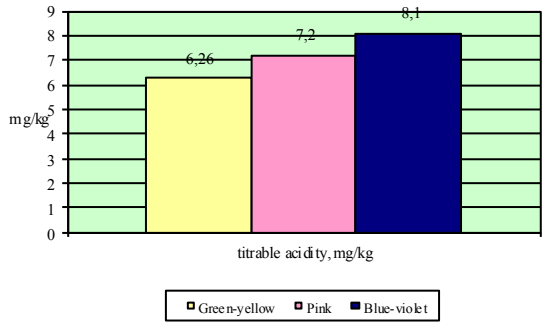

Fig. 6. The titratable acidity of the juice berry of interspecific hybrids of vines berry in relation to color.

CONCLUSIONS

Depending on the degree of distancing from initial the species, the concentration of diglucozid-3,5-malvidol and methyl anthranilate from the juice of berry of the interspecific hybrids of grapevine (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.) decreases. It was found that the hybrids from third generation (BC2) contain higher concentrations of diglucozid-3.5-malvidol and methyl anthranilate than hybrids in fourth generation (BC3). So it once the removal from the parental forms, the concentration of diglucozid-3.5-malvidol and methyl anthranilate from the juice of the berry of interspecific hybrids of vines (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.) is decreasing.

The total concentration of the resveratrol from the juice of the berry of interspecific hybrids of vines (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.) is consistent with the color of berries. Thus, if conventional blue-violet berry possess 10 units of resveratrol, then color pink berry have the 2-3 units, and the green-yellowish 0.5-1 units.

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PRELIMINARY RESEARCHES REGARDING THE EPIGEAL FAUNA IN THE GUȘTERIȚA ECOLOGICAL GARDEN (SIBIU COUNTY)

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Abstract

The researches in the agroecosystem Guștericța started in 2014 with the identification of the fauna on the vegetal substratum, by the method of observation. In the year 2015, the purpose of our researches was to collect and to identify the epigeal fauna of the same agroecosystem. By using the "Barber traps" method, in the period between 04.05.2015 -22.05.2015 the were collected 1,877samples of invertebrates. In the laboratory were identified 12 taxonomical groups; among them, the insects have the biggest number.The research will continue with the identification of invertebrate hill the species level. It will be established the report between the useful and pest fauna in the studied agroecosystem.

Key words**:** *the epigeal fauna, Guștericța (Sibiu county)*

INTRODUCTION

The simple plants exercised from the beginning, a strong fascination on the man, because they assured his sustenance, having in the same time a great degree of magic.
Homer was interested in the herbs used by Circe in the metamorphosis of Ulysses' comrades. Pythagoras claimed the existence of the soul in all the plants and respected them as a result of the theory of metempsychosis. The immortal soul in his wanderings in order to obtain his salvation, embodied himself in men, animals or plants.
His excessive piety got him lost; by his run from enemies he stopped at the edge of bean field where he was found and assassinated. In the Hellenistic kingdom of Pergam, the king Attalos the III, tilled plants in his royal garden, mostly medicinal herbs for the famous doctor and physician Galenus in order to be used in the Asclepion medical establishment.
Pliny the Elder praised the vegetables gardens in Rome and underlined the emulation between the patricians in obtaining the best vegetables. He told us how much Cato appreciated the cabbage from his own garden. Pliny the Elder was delighted by the Romans gardens that he sustained that their admiration was as high as for the Hesperidins Gardens. The noble Valeria family was given the cognomen of Lactucini (garden lettuce). Pliny the Elder asserted in the 9th book of Naturalis Historia that: "I presented the system of constellations and of the seasons in a simple shape and above all doubts even for those lacking experience in the field; for those who truly understand, the fields don't contribute less to the observation of the sky than the astronomic science to the cultivation of the soil". [14]
In the last years, the researches of the agricultural [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 17, 21], forest [16, 18, 19, 20, 22] and a meadows [11, 13, 15] ecosystems in the Sibiu county, demonstrated the important role of faunadiversity in soil and on the soil of the studied areals.
Biodiversity is a large term that comprises all the component parts of the biological diversity to emphasize for food and agriculture and all the components of the biological diversity that constitutes the agricole and forest ecosystems: animal variety and variability, the plants and microorganisms, at the genetic, specieis and ecosystematical level that is necessary for the maintaining of the key function of the agro-forest system and of his

internal processes [23]
Although it can not be established a direct value of biodiversity, the economic value of the goods and servicies offered by ecosystem were estimated between 16-54 trillions USD/yearly [12]. The values were calculeted taking into consideration the services offerend by ecosystems: food production, raw materials, the climate, and the atmospherical gases control, the circuit of the nutrients, of the water, the control of erosion, building of the soil and also we can add the educational aspect.
The basic idea of the experiment in the *Gușterița ecological garden*, knowu under the name: the ”Priestess's garden”, is the educational one. In the present it is about a return in the past regarding the agriculturel practice and it can be added new notions like biodiversity, the use of the natural factors and the removing all the allogen elements in practice, sustainability, durability and the education of population in order to understand and to practice the ecological agriculture. [1]
The purpose of our researches is to collectand to identify the epigeal fauna in the agrosystem Gușterița, Sibiu County. These data will be corroborated with the data obtained by direct observation method, in agroecosystem. [1]
Our study refers to two major objectives: the synthesis of the tehnological measures applied in the Gușterița garden, and the collecting and identification of the biodiversity of the epigeal fauna present in the studied agroecosystem.

MATERIALS AND METHODS

The period of investigation was between 04.05.2015-22.05.2015.
Locality of investigations: Gușterița (Sibiu county).
The samples were collected by ”Barber traps” method.
These were installed at the soil level, using alcohol as attractant and conservant, too.
The collecting time for such a trap was 48 hours from its installing.
The first traps were installed in 04.05.2015, with the first collecting on 06.05.2015, the last one was 22.05.2015.They used a number of ten traps: three in solarium (BT8, BT9, BT 10) and seven in the garden (BT1, BT2, BT3, BT4, BT5, BT6, BT7) (Fig.1).
The traps were placed in the different culture, crops, at 10 m distance between them (Table 1).
The biologicol material was collected in the plastic container, in 70% alcohol, one for every traps (sample) and them it was studied in laboratory.

Fig. 1. The setting of the ”Barber traps” in the studient agroecosystem
Source: Google Earth – adapted

Table 1. The setting of the ”Barber traps” in the culture of the ecological garden Gușterița

The settings of the traps	Barber traps Number	The culture where the traps was installed
garten	BT1	Parsley, rucola
	BT2	Salad (lettuce), cabbage
	BT3	Salad, field spinach
	BT4	Grund with weeds
	BT5	Pea, onion, garlic
	BT6	Cucumber, lean
	BT7	Celery, cabbage, red beet
solarium	BT8	Carrots, peppers
	BT9	Tomatoes, hot peppers
	BT10	Oats, turnips, salad

In laboratory on develop the standard proceeding: to unpack, the samples, to label, to number and to identify the collected material.
They were analyzed a total 80 samples.

RESULTS AND DISCUSSIONS

The Gușterița was included in the Sibiu city as early as 1950. Here, the Lutheran-Evangelist Parish from Sibiu, certified in the community system EMAS (Environmental Management Systems), foundet in its

precincts of the fortified ckeerch and educational youthful and medium centre.
In this centre, the pupils, the students and the citipens of Sibiu learn to respect the environing medium.
In this context was refounded the ”Priestess's garden” [1] a garden with vegetables (Fig. 2), as the first informal, educational school in our county Sibiu. Here is applied technology of culture that respect the methodology of the traditionel and ecological works accepted by ecological agriculture (Table 2).

Fig. 2. The ecological garden Gușterița (original photo)

Table 2. The technological measures used in the ecological garden Gușterița

The technological measure	Observation
Using of adequate tools to protect the soils and the organismus in soil	On use only hoe, weed hook and grubbing hoe. In this way on avoid the return of the soil layers with soil structure protection, mostly its microorganismus.
Using”the green fertilifer”	An ecological fertiliger is a mixture of *Sinapis alba*, *Brassica rapa* and *Avena sativa*. This encourage the activity of the faune in soil.
Using “ointment of the soil” (”mulch”)	Protective work, on use a mixture of horse manure with sawdust.
Compost	Compost is natural fertiliger extremely valuable for soil and for plants, too. It proceed from personal, own sources: sawdust, grass from haymaking, leafs from orchard, stalks, corn cobs, beau-creeping stabes and ou adds animal manure (horse and cow).
Wattering the soil with natural, bioactive preparates.	The preparates are ecological and have the role to recover the health of the soil.
Using seeds not treated, traditional, multiyearly.	They are not used hybrids and treated transplants.
The culture rotation.	Crops rotation is in the incipient phase.
Alelopatie	The plants are associated after needs and their specific feature (Table 1).
Applying the culture in bands.	It is preventive or reduce the pest attack, encourage the biological activity of soil, reduce the weeds.
Encuraging the useful weeds and eliminating the dangerous ones.	The useful wceds are not eliminated, but only when they disturb the cultivated plants.
Rational wattering	Using the rain water (Fig.3)
Hygiene of the culture	Breaking up the vegetal material.

Fig. 3. The colleting rain water in Gușterița (original photo)

Another objective of our researches was the identification of the epigealfauna in the studied agroecosystem till the order level. The knowledge of the faunistical components and the interrelationship between different structural parts of the agro-biocenosis Gușterița has a special importance for the establishment of the most effective phytosanitary measures and in the same time the total removing of the chemical materials used for the eliminating the animal and vegetal pest.
In the table 3 are presented both, the taxonomic and quantitative structure of the fauna collected by ”Barber traps” method in the agroecosystem Gușterița during the May month, 2015.
In the period between 06.05.2015-22.05.2015 they were collected 1,877 specimens of invertebrata.
In the 80 analized samples were found 12 taxonomic groups of invertebrata: Gasteropoda, Aranea, Acarina (Acari), Julida, Polydesmida, Isopoda, Collembola, Orthoptera, Homoptera, Coleoptera, Diptera, Hymenoptera (Table 3).

Table 3. Taxonomic and quantitative structure of the fauna collected by "Barber traps" method in the agroecosystem Gușterița in May monts, 2015

Class/Order	Numerical Abundance	Relative Abundance
Gasteropoda	7	0.38
Aranea	142	7.57
Acarina (Acari)	66	3.52
Julida	111	5.92
Polydesmida	10	0.54
Isopoda	256	13.64
Collembola	90	4.79
Orthoptera	4	0.22
Homoptera	3	0.16
Coleoptera	353	18.80
Diptera	66	3.51
Hymenoptera	769	40.95
Total	**1,877**	**100%**

Source: Own calculation.

The most abundant groups are Hymenoptera with 769 specimens (40.95%), Coleoptera with 354 specimens (18.80%), Isopoda with 256 specimens (13.64%), Aranea with 142 specimens (7.57), Julida with 111 specimens (5.92%).

The groups with Numerical Abundance reduced are Polydesmida with 10 specimens (0.54%), Gasteropoda with 7 specimens (0.38%), Orthoptera with 4 specimens (0.22%). The most numerical group is Homoptera with 3 specimens (0.16%) (Fig. 4). In the same Table 3 on can observe the dominant group of Insecta class (Collembola, Orthoptera, Homoptera, Coleoptera, Diptera, Hymenoptera) with 1,285 specimens (68.46%) comparative with other invertebrata group (Gasteropoda, Aranea, Acari, Julida, Polydesmida, Isopoda) with only 592 specimens (31.54%).

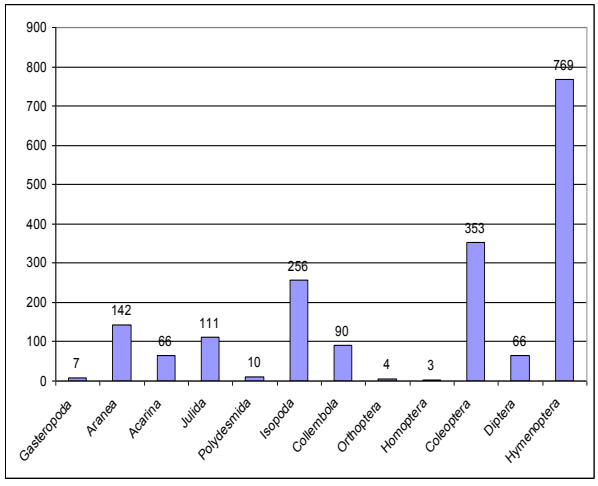

Fig. 4. The structure of the invertebrata faune in the ecological garden Gușterița (by Barber method).
Source: Own calculation.

CONCLUSIONS

The survey of the technological measures applied in Gușterița garden certified that the technology og culture is an ecological one.

Using the "Barber traps" method were collected 80 samples with 1,887 specimens.

The collected fauna belongs to 12 taxonomical groups: Gasteropoda, Aranea, Acarina (Acari), Julida, Polydesmida, Isopoda, Collembola, Orthoptera, Homoptera, Coleoptera, Diptera, Hymenoptera.

Among the Invertebrata the most numerous are Insecta wits 1.285 specimens, comparative with the other Invertebrata groups with only 592 specimens.

They are a reduced number of researches in the corenty Sibiu rgarding the faunistical components structure in a cultivated agroecosystem in ecological conditions.

Our researches will continue with identification of the Invertebrata fauna till species level and also with survery about the report between useful and pest fauna in the studied agroecosystem.

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THE ECOLOGICAL RECONSTRUCTION AT COPȘA MICĂ, SIBIU COUNTY, A NECESSITY FOR A HEALTHFULL ENVIRONMENT

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Abstract

The paper studied the ecological reconstruction applied at Copsa Mica, Sibiu county. It is presented the forest which is administrated by the Forest District Mediaș situated in the Tarnave plateau especially. First, it shows the region's economic-forest specific and then the cause of degradation of large areas of forest vegetation.The total surface subject to ecological restoration through afforestation totals in Copsa Mica 644 ha, of which 470 ha forest fund and improvement perimeters outside the forest fund 174 ha. There are presented the main improvement and maintenance works of the land subjected to excessive pollution and the planting schemes used.

Key words**:** *ecological reconstruction, pollution, sustainable development*

INTRODUCTION

Forests managed by the Medias Forest District are located mostly in Sibiu, on the cadastral territory of the municipalities: Aţel, Axente Sever, Bazna Biertan, Blăjel, Dirlos, Micăsasa, Mihăileni, Moşna, Slimnic, Seica Mare Seica Mica Tărnava, Valea Viilor, Copsa Mica and Medias.

From a geographical point of view, these forests are located mostly in the Târnavelor plateau and only to a small extent Secaşelor plateau.

The forest-economic specific of the region

The area is complex, industrial and agriculture around cities Medias and Copsa Mica and agrosylvicultural hills for the more remote areas. [8]

Forests in the area presented consist of nine management units numbered 1-5, 7-9, 11. [10, 13]

These forests , as an unit have been created in 1953 and 1954 in 4 M.U.F. - Sites Seica Mare, Valea Lungă, Medias. The rearrangement of the forests from this district was made in 1967, the district is divided into 13 U.P. sites. [9]

The entire surface of the Medias Forest District is framed in Group 1 functional absolute protection. The largest share is held by forests in areas with polluted atmosphere with a medium to excessive level, forests in areas with a low level of pollution in the atmosphere, forests on steep slope greater than 35 °. These forests were exposed to one of the most intense industrial pollution in Romania, due to the work of two businesses on the industrial platform Copsa Mica, SC Sometra S.A. and S.C. Carbosem S.A. Forms of land degradation identified in Copsa Mica are surface erosion which is manifested with different intensity. This form of degradation occurs in all degrees of intensity, from the most moderate to the most excessive. [3, 4] Land degradation processes with large amplitude are the movements of the ground and they are more common in the form of deep and large extension landslides. [1, 12]

In this context, the paper aimed to study the possibilities to reconstruct Copsa Mica area for a healthy environment.

MATERIALS AND METHODS

The work is based on literature review and ecological restoration works carried out in the forest area described above.

RESULTS AND DISCUSSIONS

The total area subjected to ecological restoration through afforestation work in intensely polluted territory of Copsa Mica

totals 644 ha, of which 470 ha forest fund and improvement perimeters outside the forest fund 174 ha.

The territory that is analyzed lies in the climatic region Transylvanian Depression, at the crossroads of western continental climate. [7]

The main maintenance works that were performed are:

-completing the cultures with species used in planting, with a preference for those that have the best grip percentage;

-the saplings reception immediately after planting , including the saplings planted to supplement crops;

-maintenance works of plantations consisting of revisions and hoeing.

Establishing the necessary saplings was made taking into consideration planting schemes and additioning procedures for afforestation on each composition and rescheduling planting areas. Everything comes from own nurseries.

Table 1. Ecological reconstruction works carried out in the perimeter Copsa Mica, Sibiu County, in the period 1998-2014

Type of works MU								Total
		1998-2002	2003-2014	Total	1996-1999	2000-2014	Total	
Full plantations	ha	168	302	**470**	68	106	**174**	**644**

Works carried out in the forest stock for its recovery: replacing dry forest through reforestation with species resistant to pollution which will return to the fundamental type of forest.

No species has given great results in the highly polluted areas, on deconstructed soils strongly affected by degradation processes. Most sensitive have proved to be the sapling spruce, black pine, maple and ash, even the locust that has survived a great number of years and had a small growth.

The first symptoms of pollution were observed on the parcel 7N from UP3, with a surface of 2 ha, located about 1.5 km from the pollution source-NE direction, where te old arboretum, aged 80 years has dried fully.

In order to prevent the erosion process on the rut line _ have been built about 150 wattles _ and for protection against grazing were built 4.6 kilometers of fencing wire mesh supported on concrete pillars.

Photo 1. Soil under ecological reconstruction at Copşa Mica, Sibiu county (original photo)

There have been built fences with an overall height of 40-50 cm, which dropped into the ground 15-20 cm and 25-30 cm above the ground. To ensure a longer lasting life, the stakes that have been used to build the fences, with a diameter of 6-8 cm, were made of oak.

In the last places with excessive erosion or torent, at the base of the ditches were littered willow branches, which entered into the vegetation and have contributed to increase the effect of land consolidation.

In the line of the strong strings the building of the fences was made in a V-shape, and to prevent their undermining at the cross of each runoff, has been stretched a perforated plastic foil arranged vertically over the entire height of the fence.

The administration of calcium amendments aims to increase over 5.8 the pH value of the polluted soils and the annihilation of the toxic effect of the heavy metals. It was used calcium carbonate, usually administered in the year preceding planting.

The administration of the amendments was made by spreading them over the entire terraces platform or over the fireplaces, on the ground, deployed at a depth of 25-30 cm.

In Copsa Mica was kept as a main species the acacia due to its outstanding qualities. It has a rapid growth in the early years, it is a good breeder of degraded lands and in addition it is considered one of the most resistant species to

sulfur dioxide and metals pollution.
As species of trees that mixed with acacia are Sălcioara, censer, Malin American, manna, and among shrubs have been chosen amorphous and hawthorn, which gave satisfactory results.
The maintenance works were carried out over 3-5 years, and starting with the first year there have been made mobilizations around the trees through annual seedlings and revising the made plantations.
The works to assist the natural regeneration were: soil mobilization on a surface of 84.3 ha, removal of existing seedlings and young hornbeam tree
Crop density formulas of acacia have been generally made with 6,700 seedlings per hectare and 625 poplar saplings (large) per hectare, high density, 1,000 seedlings per hectare was achieved for white underbrush.
Sea buckthorn is one of the most rustic and indicated species in the land fixing battle with extreme stationary conditions such as slopes, ravines and landslides. [5]

CONCLUSIONS

Based on experienc acumulated over more than three decades fighting to rebuild the stands destroyed of industrial pollution or creating new stands in the Copsa Mica, one can say that in terms of reduction of toxic fumes at the source, especially after 1990, there are viable solutions for (re) installation of forest vegetation. These works involve effort and high costs.
The species of trees that have achieved the best results in conditions to _ their ecological requirements are acacia (Robinia pseudacacia L.) willow (Eleagnus angustifolia L.), black hybrid poplar (Populus x canadensis Moench.), Malin American (Prunus serotonin Ehrh.), ash (Fraxinus excelsior L), and among shrubs, amorphous (Amorpha fruticosa L.), hawthorn (Crataegus monogyna Jack.) and in some situations, white underbrush (Hippophaë rhamnoides L.).
A requirement which must be taken into consideration is to avoid monocultures, especially when using the acacia as a baisc species (in which the mixture should be achieved as a group
In the case of new perimeters the new technical solutions must be based on a thorough mapping of the forested lands _ that cu¬prindă an analysis of the soils.
An important role on the success of plantations on lands affected by excessive erosion is the aidind works of construction and assembly such as fences an wattles.
The amending and the fertilization are mandatory operations, where the situation requires their application. They may be repeated every 2-3 years.
Amendments is better to be applied a year before planting.
The success of the action of ecological restoration will depend on full implementation of the requirements of environmental protection regarding the upgrade of the production processes and mounting _ depolluting instalations at the S.C. SOMETRA S.A., in a view to reducing the threshold of allowance of plants of concentration of all pollutants emitted. Soil toxicity - which will continue for many years to come - will be corrected with the help of calcium treatments and fertilizer.
The tree stands created will have a priority role for protection, their main aim being to combat and prevent degradation processes and revitalize the soils.
For the implementation of appropriate solutions it is necessary to follow up further executed work and conducting experiments on various species best suited to conditions, afforestation technologies that were adopted, the effect of amendments and fertilizers, etc. [2,6]
Regarding the ecological restoration of the polluted area Copsa Mica is very important that everyone involved in this large process to work together to bring local, national and community funds.

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THE EVOLUTION OF AGRICULTURAL HOLDINGS AND ELIGIBLE AGRICULTURAL SURFACES FOR GRANT AWARD, AT OLT COUNTY-LEVEL FOR THE PERIOD 2007-2014

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Abstract

Agricultural holdings business financing from public funds (EU budget and national budget), constitutes an important element in the process of consolidation of agricultural competitive structures from Romania and. In the period 2007-2014 at the level of the Olt County, the number of agricultural holdings eligible to receive subsidy was reduced on account of an increase in their size. The process of consolidation of Romanian agricultural holdings is barely at beginning. The average size of a farm in Romania is 3.6 ha, four times lower than the EU average, which lies at 14.2 hectares. New conditions for the subsidies granting in the period 2014-2020 commits small farmers in finding solutions in order to be eligible for payment. The budget allocated to Romania through the new Common Agricultural Policy (Cap) for direct payments on the surface will be over 10.6 billion euros in the period 2014-2020, and the aid per hectare paid from European funds will reach 196 euros in the year 2019, compared to Euro 139.17 in 2013. During this period the transformations among agricultural structures will continue because of the new rules that are stipulated since 2020 in accessing the communitarian funds.

Key words: *agricultural holdings, Agency of Payments and Intervention for Agriculture (APIA), consolidation, subsidies*

INTRODUCTION

The date of Romania's integration in the European Union, year 2007, coincided with the start of the multiannual exercise of Common Agricultural Policy 2007-2013.
As a result, since 2007 the Romanian farmers have benefited from a new subsidy scheme-single payment on area (SAPS). In order to obtain subsidies, farmers must exploit areas of at least one hectare, divided into plots of at least 0.3 ha. In addition, the applicant must declare all agricultural parcels and meet a series of conditions for the care of the soil (Good agricultural and Environmental Conditions) on the entire agricultural area of the holding.
Romania succeeded after negotiations for the 2014-2020 CAP, to maintain the single payment scheme on the surface-SAPS until 2020 and granting Complementary National Direct Payments (PNDC) under the conditions and for the sectors that have been granted to such payments in 2013. Whereas there is a discrepancy between the amounts of subsidies granted for single payment scheme (SAPS) and the single payment scheme (SPS), granted in other Member States, the new CAP reduces the differences between subsidies received by farmers. In Romania, the subsidy per hectare paid from the EU budget will increase in 2019 at an average of Euro 196 towards Euro 139.17 as it was in 2013, and the budget allocated to Romania for direct payments that they will perform during the period 2014-2020 will be more than Euro Billion 10.6.

MATERIALS AND METHODS

The research was carried out in the framework

of the Agency of Payments and Intervention for Agriculture (APIA) and the Agency for Rural Financing Investments (AFIR) of Olt County, that have provided the details necessary for this study.

Stages of investigations shall cover the following aspects: the study of the bibliography from the specialty literature; concrete information-gathering within the area investigated; ordering, processing and presentation of results in a synthetic form (tables, figures, schemes); analysis and interpretation of results.

Formulas used to calculate these indicators are further presented [2], [3]:

For arithmetic average ; $= \bar{x} = \frac{\sum xi}{n}$ where: $\bar{x}$ = arithmetic mean; n = number of years included in the analysis.

For the calculation of trend phenomena analyzed we used fixed-base indices, indices with base in chain and the annual growth rate.

The annual growth rate [3]= $r_{2007\text{-}2014} = (\Pi(p1/po))^{(1/(n-1}$; where:

$\prod$ p1/po = prudusul chain indicators during the reporting period

For the standard deviation (σ) is calculated a square average of all deviations from the series from their arithmetic average[9].

The standard deviation is an indicator that is used in the analysis of variance, estimation errors of selection in the correlation calculation.

Coefficient of variation (V) shall be calculated as a ratio between the standard deviation and arithmetic average. It is expressed as a percentage: $\nu = \frac{\sigma}{\bar{x}} \cdot 100$

Significance. The higher the value of v is close to zero so the variance is weaker, the collectivity is more homogeneous, with a high degree of representativeness. The higher the value of v is greater than the variation is more intense, the collectivity is more heterogeneous, and has a low level of significance.

It is estimated that at a factor of over 35-40%, the average is no longer representative and the data should be separated in a series of components, groups, depending on the variation of another grouping features. In this paper we considered grouping farms in large groups (holding up to 50 ha and holdings more than 50 ha), and small groups (< 9.99 ha; 10 to 49.9; 50-ha to99.9 ha; 100-499.9 ha; 500 to 1,000 ha; > 1,000 ha)

The aim of the research was the evolution of agricultural holdings under the impact of European funding eligibility at Olt County level.

RESULTS AND DISCUSSIONS

As a result of the data processing and analysis, it was found that there is a strong trend of strengthening agricultural structures benefiting from subsidies. Grant remains an important source for farmers to cover a substantial part of their expenses. Subsidies granted to Romania remain, also for the next period, below the level of those in Western European countries, putting in an unfair competition position the agricultural producers in our country. They will be forced, as below, to find the own way to the status of "*sustainable economic family farm*" by renouncing to individual consumption. The effects **of capital penury are** materialized in reduced agricultural yields, compared with those in the EU [7].

The SAPS grant is conditional upon compliance with the GAEC (Good agricultural and Environmental Conditions). These requirements also apply to actions supported by pillar II aimed at financial aid in less favored areas (LFA), the application of agro-environmental practices and compliance with the requirements of the management plans for the protected areas of Community interest Natura 2000. GAEC determines the reduction of suitably according of support, conditioned by these requirements.

Another source of subsidies are Complementary National Payments, which are introduced also in 2007, and added to the single area payments, which are paid by the Romanian State, the budget of the Ministry of Agriculture. Complementary National Payments are given on the area under cultivation, respectively on animal head, according to the European model.

Olt County agricultural area of 434,846 ha in

2007 presents a slight increase of 3% over the year 2013, which constitutes a positive aspect within the County Land Fund (Table 1). In respect of the eligible land it grew from 307,531 ha in 2007 to 337,681 ha in the year 2013, representing an increase of 9.8%.

Table 1. The structure and evolution of land areas benefiting from APIA, subsidies on the period 2007-2013

Specification	2007		2010		2013	
	HA	%	HA	%	HA	%
1 Total agricultural land, Olt County	434,846	100.00	434,442	100.00	435,943	100.00
compared with 2007 (%)	*100.0*	*x*	*99.9*	*x*	*100.3*	*x*
2 Agricultural area benefiting from APIA subsidies	307,531	70.72	324,390	74.67	337,681	77.46
compared with 2007 (%)	*100.0*	*x*	*105.5*	*x*	*109.8*	*x*
3 Agricultural area which do not benefit from APIA subsidies	127,314	29.28	110,051	25.33	98,261	22.54
compared with 2007 (%)	*100.0*	*x*	*86.4*	*x*	*77.2*	*x*

Source: Internal statistical data, APIA, Olt County; Statistical Yearbook of Olt County, INS, DJS, 2012 and 2014 Editions

Share in relation to the total agricultural land, of eligible land areas grew from 70.72% in 2007 to 77.46% in 2013. This was accomplished by merging agricultural land in the lease process. Not to be overlooked any sale of land by local and foreign investors.

Romania has the most fragmented agricultural area in the European Union, with 3.86 million farms in 2010, accounting 31% of total EU, this being the result of the refund property after 1989. In 2010, 7.07 million Romanians were working in family farms, according to the 2010 census. If the number of those working in agriculture represents 30% of the total EU, the agricultural surfaces from Romania represented only 7.6% of the agricultural surfaces in use, according to Eurostat data [1].

In the Olt County in the period 2007-2013, the number of farms has declined from 139,220 in 2007 to 2013 129,098 (decrease of 92.7%). At the same time has been reduced also the number of eligible holdings from 54,215 in 2007 to 40,914 holdings in the year 2013 (decrease at 75.5%).

Table 2. The structure and the evolution of agricultural holdings receiving APIA subsidies, on the period 2007-2013

Specification	2007		2010		2013	
	No	%	No	%	No	%
1 Total agricultural holdings	139,220	100.00	134,911	100.00	129,098	100.00
compared with 2007 (%)	*100.0*	*x*	*96.9*	*x*	*92.7*	*x*
2 Agricultural area benefiting from APIA subsidies	54,215	38.94	48,379	35.86	40,914	31.69
compared with 2007 (%)	*100.0*	*x*	*89.2*	*x*	*75.5*	x
3 Agricultural area which do not benefit from APIA subsidies	85,005	61.06	86,532	64.14	88,184	68.31
compared with 2007 (%)	*100.0*	*x*	*101.8*	*x*	*103.7*	*x*

Source: Internal statistical data, APIA, Olt County; Statistical Yearbook of Olt County, INS, DJS, 2012 and 2014 Editions

In share, compared to the total agricultural holdings, the holdings number which have benefited from the subsidies fell from 38.94% in 2007 to 31.39% in 2013. (Table 2)

Also the EU agriculture is characterized by a trend of decrease in the number of farms, maintained continuously from the 1970s (the 5.8 million holdings of the 9 members since 1975 have been reduced to 2.6 million until 2007). The rate of decline appears to have accelerated in the last decade, and some of the new Member States recorded greater rate (for example, Bulgaria: -7.2% from 2003 to 2007)[5].

The number of agricultural holdings eligible for Community subsidies have the same downward trend as the total number of farms. Thus, during the period 2007-2013, the total number of farms dropped from 54,215 at 38,560, annual average rate of -6.59 %. The agricultural holdings from the group up to 50 ha were at an annual decline rate of -6.82%, and holdings of more than 50 ha presents an annual increase rate of 13.42%. (Table 3)

The increasing trend toward the number of agricultural holdings over 50 hectares is logically accompanied by another trend- that of reducing the total number of agricultural holdings. The reduction is based on each year's disappearance of a large number of small farms unviable economically, or by the death of the farmers. Young people that left

the city or abroad have created favorable conditions for the lease of land.

Table 3.The agricultural exploitations number evolution that benefit of subsidies (SAPS and PNDC) in Olt County during the period 2007-2014

Specification		MU	2007	2010	2011	2012	2013	2014	Average/ Annual rythm	Standard deviation	Coef. Of Var.
1. Beneficiary farms	Total	No.	54,215	48,379	46,160	44,014	40,914	38,560	34,030	11,004	32,33
	Compared to 2007	%	100	89.2	85.1	81.2	75.5	71.1	X	X	X
	Chain indices	%		0.89	0.95	0.95	0.93	0.94	-6.59	X	X
	Abs. Dif. towards 2007	No.		5,836	8,055	10,201	13,301	15,655	X	X	X
2. Farms<50ha	Total	No.	53,808	47,863	45,556	43,330	40,173	37,796	33,566	10,874	32.4
	Compared to 2007	%	100	89.0	84.7	80.5	74.7	70.2	X	X	X
	Chain indices	%		0.89	0.95	0.95	0.93	0.94	-6.82	X	X
	abs. Dif. towards 2007	No.		5,945	8,252	10,478	13,635	16,012	X	X	X
3. Farms>50 ha	Total	No.	407	516	604	684	741	764	465	200	42.98
	Compared to 2007	%	100	126.8	148.4	168.1	182.1	187.7	X	X	X
	Chain indices	%		1.27	1.17	1.13	1.08	1.03	13.42	X	X
	abs. Dif. towards 2007	No.		109	197	277	334	357	X	X	X

Source: Internal statistics data, APIA, Olt County

In conclusion, we can say that poverty and demographic evolution of villages in Olt County have created prerequisites for reducing agricultural holdings and increase their size. At Olt County-level, between 2007 and 2014 disappeared 16,012 holdings eligible SAPS smaller than 50 hectares. During this time as it was natural the number of farmers with holdings more than 50 hectares has grown from 407 in 2007 to 764 in the year 2014. (Table 4)

Table 4. Structure of agricultural holdings benefiting from subsidies (PNDC and SAPS) in Olt County during the period 2007-2014

Specification	2007		2010		2012		2014	
	No	%	No	%	No	%	No	%
1. Beneficiary Holdings	54,215	*100.00*	48,379	*100.00*	44,014	*100.00*	38,560	*100.00*
2. Holdings with surfaces < 50 ha	53,808	*99.25*	47,863	*98.93*	43,330	*98.45*	37,796	*98.02*
3. Holdings with surfaces > 50 ha	407	*0.75*	516	*1.07*	684	*1.55*	764	*1.98*

Source: Internal statistics data, APIA, Olt County

This trend of increase in the number of agricultural holdings eligible SAPS who works more than 50 hectares is obvious. The new holdings that emerged after 2007 to 2014 in number 357 were able to merge 74,323 ha. (Table 4). It should be mentioned that the area declared by these holdings at APIA in 2014 represents 38.58% of eligible area of Olt County.

In Romania, the majority of individual farms are characterized by reduced economic power and are geared mainly to own consumption. Their opening to the market is relatively small, both in terms of the necessary input and output. These farms are characterized by a very diversified production structure, driven by the needs of the household, as well as through a unfit and technical equipment, which impedes productivity and achieve a surplus of products for sale[6]. That is why accessing European funding is urgently needed for enhancing agricultural holdings.

Table 5. Total grants structure on large groups of agricultural holdings size in the Olt County during the 2007-2014

Farm size	UM	**2007**		**2010**		**2013**		**2014**	
		MIL lei	%	MIL lei	%	MIL lei	%	MIL lei	%
1. Total Grants	Total	25,027	*100.0*	42,129	*100.0*	56,408	*100.0*	52,073	*100.0*
Compared to 2007	*%*	*100*	*X*	*168.33*	*X*	*225.39*	*X*	*208.07*	*X*
2. Farms with < 50 ha	Total	13,928	*55.7*	19,557	*46.4*	22,057	*39.1*	20,052	*38.5*
Compared to 2007	%	*100*	*X*	*140.41*	*X*	*158.36*	*X*	*143.97*	*X*
3. Farms with > 50 ha	Total	11,098	*44.3*	22,572	*53.6*	34,351	*60.9*	32,022	*61.5*
Compared to 2007	%	*100*	*X*	*203.39*	*X*	*309.52*	*X*	*288.54*	*X*

Source: Internal statistics data, APIA, Olt County

Olt County-level size of grants increased from Lei Million 25,027 in 2007 to Lei Million 52,073 in 2014 representing a doubling of subsidies (208%). For the group of up to 50 hectares per farm subsidies increased by 43.97% and for the group of more than 50 hectares has been increasing by 288.54%, because this group has attracted a greater number of eligible hectares in this period.

Agricultural holdings which works over 50 ha represent only 1.98% of the total number of farmers benefiting from subsidies and 0.56% of the total number of agricultural holdings in the Olt County.(Table 5, Figure 1).

The increase of subsidies on small groups of farm size has different growth rates.

The lowest annual growth is at the group up to 9.99 ha per holding of 3.1% annually and reach an annual growth of 21% in the group of 50 ha to 99.9 ha.

Annual important increases are also at groups over 1000 hectares of 17.3%, group 100-499.9 ha of 17.3%, group of 10 to 49.9 ha of 14.9%. (Table 6).

At Olt County-level the average surface area on a farm has grown from 3.12 ha/farm in 2007 at 3.38 ha/farm in 2013 (Table 7).

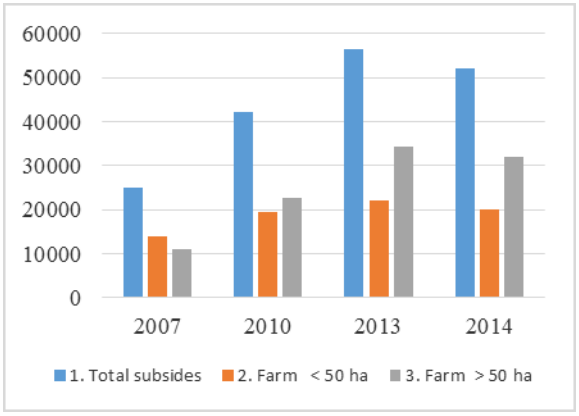

Fig. 1. The total grants evolution on dimensions groups of agricultural holdings in the Olt County during the 2007-2014

The average area of a farm from Romania is 3.4 hectares, compared with an average of 14.2 hectares in the EU and 53.9 hectares in France, the largest agricultural producer.

The area of the agricultural land on an eligible holding increased in Olt County to 145% in 2013, i.e. 5.67 ha in the year 2007 to 8.25 ha in 2013.

At the same time the surface of an ineligible farm decreased from 1.5 ha to 1.11 ha. (Table 7, Figure 2)

Table 6. The total grants structure on dimensions groups of agricultural holdings in the Olt County during the 2007-2014

Farm size	2007		2010		2013		2014		Media	Rhythm	Standard Deviation	Coef of variation
	MIL lei	%	MIL lei	%	MIL lei	%	MIL lei	%	MIL lei	%	MIL	%
< 9.99 ha	11,918	*47.6*	16,226	*38.5*	16,472	*29.2*	14,747	*28.3*	15,038	3.1	1,649	11
10 to 49.9	2,010	*8.0*	3,331	*7.9*	5,585	*9.9*	5,305	*10.2*	3,719	14.9	1,350	36.3
50 at 99.9	734	*2.9*	1,597	*3.8*	2,919	*5.2*	2,916	*5.6*	1,873	21.8	828	44.2
100-499.9	3,912	*15.6*	7,834	*18.6*	12,265	*21.7*	10,932	*21.0*	8,318	15.8	2,710	32.6
500 to 1000	2,804	*11.2*	5,568	*13.2*	7,729	*13.7*	7,030	*13.5*	5,346	14.0	1,728	32.3
> 1000 ha	3,648	*14.6*	7,573	*18.0*	11,438	*20.3*	11,144	*21.4*	8,034	17.3	2,812	35
Total grants	25,027	*100.0*	42,129	*100.0*	56,408	*100.0*	52,073	*100.0*	42,328	11.0	10,649	25.2

Source: APIA and own processing

Table 7. Evolution of the land surface on a agricultural holding, managed for the period 2007-2013

Specification	UM	**2007**	**2010**	**2013**
1.Average surface/ farm	HA/farm	3.12	3.22	3.38
	Compared to 2007 (%)	*100*	*103.1*	*108.1*
2.Surface/ beneficiary farm	HA/farm	5.67	6.71	8.25
	Compared to 2007 (%)	*100*	*118.2*	*145.5*
3. Surface/ non beneficiary farm	HA/farm	1.5	1.27	1.11
	girl 2007 (%)	*100*	*84.9*	*74.4*

Source: APIA and own processing

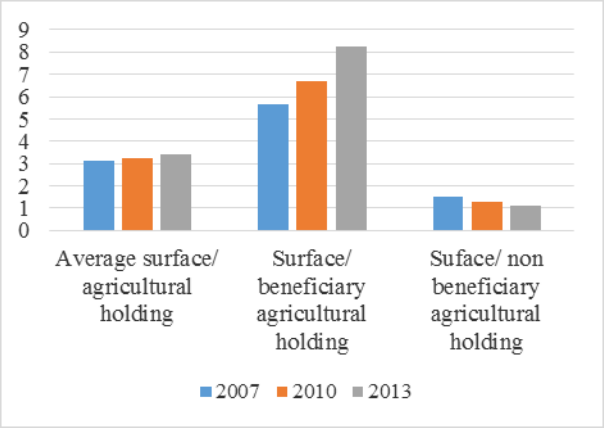

Fig. 2. Evolution of the land surface on a agricultural holding, managed for the period 2007-2013

In the EU are countries like Greece or Cyprus where a holding area is as small as in Romania (in Hungary, Poland and Italy is not far above).
Also like Ireland where the population of Ireland is almost 40%.
However in these countries the agriculture occupies a special importance in the economy of these countries[5].

CONCLUSIONS

For the period 2007-2013, the total number of farms dropped from 54,215 at 38,560, annual average rate of -6,59%. Holdings from the group up to 50 ha were at an annual rate of decline of -6.82% holdings of more than 50 ha presents an annual rate increase of 13.42%.
At the level of the Olt County the average area on a farm has grown from 3.12 ha/farm in 2007 to 3.38 ha/farm in 2013.
The area of the agricultural land on eligible holdings has increased in Olt County to 145% in 2013, i.e. from 5.67 in the year 2007 at 8.25 ha in 2013. At the same time the surface on a farm ineligible decreased from 1.5 ha to 1.11 ha.
At the level of the Olt County the size of grants increased from Lei Million 25,027 in 2007 to Lei Million 52,073 in 2014, representing a doubling of subsidies (208%).
For the group of up to 50 hectares per farm subsidies increased by 43.97% and for the group of more than 50 hectares increased by 288.54%, because this group has attracted a greater number of eligible hectares in this period.
The increase of subsidies on small farm size groups has different growth rates. The lowest annual growth is at the group up to 9.99 ha per holding of 3.1% annually and reach an annual growth of 21% in the group of 50 ha to 99.9 ha.

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PROSPECTS FOR ORGANIC FARMING IN ROMANIA

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Abstract

This article aims to highlight the fact that agriculture is one of the most important economic sectors of the country and it was the field for which implementation of a common policy was provided from the early stages of European construction. One of the key elements of the Common Agricultural Policy, concerning rural development is to promote and develop organic farming.

Key words: *agriculture, agricultural area, organic farming, rural development*

INTRODUCTION

In today's society we live in, amid the excessive growth of the industry, organic life is a natural and necessary alternative. In Romania, organic farming has experienced an upward trend, both in the vegetal and in the livestock sectors.

Organic agriculture is a production system that sustains the well-being of soils, ecosystems and people. It is based on ecological systems, biodiversity and cycles adapted to local conditions of life, instead of using chemicals with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the environment and promote fair relationships and a good quality of life for everyone involved. [3, 6, 8] According to IFOAM principles, agriculture is the main activity of mankind. The principles focus on how farmers care for soil, water, plants and animals to produce, process and market foods. IFOAM principles are considered sources of the ways organic agriculture grows and develops. They refer to the fact that organic agriculture has the potential to improve the agricultural situation globally.

Organic farming is based on certain principles [9]:

-Principle of Health: "Organic agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible". This principle points out that the health of individuals and communities cannot be separated from the health of ecosystems. This principle shows that the health of individuals and communities cannot be separated from the health of ecosystems. In this regard fertilizers, pesticides, drugs and food additives that may have adverse health effects should be avoided.

-Principle of Ecology: "Organic Agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them". This principle roots organic agriculture within living ecological systems. According to it, production is to be based on ecological processes, and recycling. Nourishment and well-being are achieved through the ecology of the specific production environment. For example, in the case of crops this is the living soil; for animals it is the farm ecosystem; for fish and marine organisms, the aquatic environment. It is necessary that all those who produce, process, sell or consume organic products to protect and help the environment.

-Principle of Fairness: "Organic agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities". This principle emphasizes that those involved in organic agriculture should conduct human relationships in a manner that ensures fairness at all levels and to all parties - farmers, workers, processors, distributors, traders and consumers. Organic agriculture should

provide everyone involved with a good quality of life, and contribute to food sovereignty and reduction of poverty. It aims to produce a sufficient supply of good quality food and other products.

-Principle of Care: "Organic agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment". This principle stipulates that prudence and accountability are essential elements of strategies of management [2], development and technology choices in organic agriculture. This should prevent the emergence of major risks by adopting appropriate technologies and rejecting unpredictable ones, such as genetic engineering.

The objectives of organic farming [5] can be summarized as follows: avoid all forms of pollution, both in products and in the environment; maintain the natural fertility of soils, thereby being able to sustainably ensure food security in a planet; to allow farmers a decent standard of living; to produce in sufficient quantities and at an appropriate quality level food products which, to a large extent, consumer health depends on.

MATERIALS AND METHODS

The methods used in this research provides a wide range of answers to the complex issue of organic farming but making a bibliography to consult the establishment of assumptions from which we start to set up the first steps in choosing this theme. Exploiting the data was based on the wide range of statistical information provided by Eurostat database and the National Institute of Statistics.

The information was processed through analysis, evaluation, comparison or simply having a high coefficient of synthetic truth. The resulting data were systematized documentation done by the aim, having a clear applicative being processed so as to provide a clear message sent suggestibility.

The research used a variety of tables and charts that can lead to identification of conclusions, thus providing the necessary arguments and visualize correlations between the concepts.

It has identified a causal relationship between variable called organic farming and the implications that it generates in the national economy but also in the EU economy.

We started from the idea of organic farming system purpose is to produce cleaner food, more suitable for human metabolism, in relation to environment development and conservation.

Table 1. Advantages and disadvantages, benefices and obstacles of organic farming

Advantages	Disadvantages
-Does not pollute the soil and groundwater with pesticides; -Increased biological diversity in plant and animal kingdom; -Keep the soil structure and its balance of components at microorganism level; -Uses natural resources and local sources; -Uses inputs with low energy consumption and reduce external dependence of agriculture; -Product quality responds to consumer needs; -At the macroeconomic level, the beneficial effects of organic farming could translate into better employment of labor and, where there is, eliminating surplus [3]. -Less infected water, air, food products; -Safe working conditions for farmers; -Biodiversity; -Fertile and healthy soil; -Reducing loss of nutrients; -Efficient use of water; -Nutritional quality of organic products; -Environmental protection; -Less use of non-renewable resources; -Risk reduction for farmers; -Quality responds to consumer products; -Promotes a sustainable rural economy; -Rewards through payments to farmers and maintaining the natural landscape; -Competitive and comparative advantage.	-The lack of support and payment certification of organic products at their real price -During the conversion, the farmer cannot compensate for the loss of productivity, because organic products are produced in a relatively long time; -Organic farming involves higher production costs than conventional agriculture costs due mainly to using more labor force and low yields of crops; -The prices are higher in organic products; -Low yields; -Sale price of organic food is higher than that of traditional products; -The need to support organic farming -Organic products are often suspected of being toxic -Organoleptic characteristics are sometimes unbalanced for certain agricultural products -The existence of fake organic products on the market -The continuous monitoring and certification action are required to be improved -Lack of extension and research systems for organic farming
Benefices	**Obstacles**
-Use of manure develops concentration of microorganisms in the earth; -By multi-annual turns, several main types of primary cultures fodder and vegetables are grown. -Growing indigenous varieties of species of animals and plants helps keeping the variety of natural growing areas; -The inclusion of natural enemies of weeds and pests, rather than using pesticides, supports increasing the life of animals.	-Lack of technical information and the relevant legislation; -Lack of money; -Lack of market outlets; -Subsidies; -Lack of agricultural equipment and machinery; -Lack of materials / organic seeds.

Source: European Commission, *Organic Farming* - http://ec.europa.eu/agriculture/organic/organic-farming_ro

The most important role of organic agriculture is to develop authentic and fresh agricultural food, through processes developed in order to appreciate nature and its systems.

Organic farming analysis shows a wide range of benefits of sustainable growth of this sector; but it is also overshadowed by the disadvantages and obstacles in the way of sustainable development at the national level (Table 1).

Currently, in Romania there are approx. 4,000 certified farmers and about 32 companies that produce and market organic products; There are 8 inspection and certification bodies for organic products accredited by MAPDR, of which one is Romanian ("ECOINSPECT" based in Cluj), and the rest are from Germany, France and Hungary; organic products market volume is amounted to approx. 400,000 Euro; There is only one shop for exclusive marketing of organic products, although organic products, such as vegetables, fruits (apples), milk, cheese, Schweitzer, butter, herbs are found in large chain stores.

Romanian organic food production is based on foreign investment. Romanian producers entering the system sign from the start contracts for the entire production is going to be exported, mainly to EU states. For this reason, so far in Romania, in terms of organic food production, we ca say it is due primarily to NGOs and then to the authorities, who took the issue seriously only after signing Romania's accession to European Union.

Romanian productive potential of agriculture to obtain organic products can reach, after the estimates, up to 15-20% of the total land area of the country. Romania is a great outlet that has as main feature the easy adaptation to anything new [1].

Although agriculture contributes only 8% in achieving the country's GDP, incentives for young people to engage in agriculture are necessary. In support of these objectives, the EU encourages subsidizing this sector according to the needs of member countries, especially for the development of *Pillar II* of the CAP. Romania supports the training of farmers by developing rural education and agricultural academic profile as it seeks transition from a resource-based economy to a knowledge-based economy.

Compared to EU-27, with an arable area of only 62% of total agricultural area available, we managed to maintain above average in most chapters of agricultural activity, ranking 7th in cereals production, and 5th for the potato, 6th overall for crops and ranked first for agricultural exploitations. Romania aims to become a competitive country in terms of agricultural sector production through its modernization and adaptation to EU standards and environmental quality.

Regarding organic agriculture, Romania has great potential for development. Though still in development, the domestic market has had an agricultural production from which a large proportion of organic products were exported to countries like Germany, Switzerland, Netherlands and Italy. As in these countries demand for such products is continuously growing, Romania could benefit by increasing domestic production and fulfillment of considerably higher orders. Although private consumption is based more on imported products, the development of this sector in our country could increase public confidence in domestic products.

The most obvious solution package for the revival of Romanian agriculture comprises of: land consolidation, construction of silos for improved collection of agricultural products, shifting to intensive farming by buying necessary machinery, agricultural modernization and the presence of strong support from the government for farmers [4].

Another innovative idea is the cultivation of medicinal plants. As promising as it sounds, it is less practiced. Although this type of agriculture does not enjoy much popularity, there are entrepreneurs who had the courage to cultivate such plants and have contracts with foreign companies producing drugs and cosmetics.

Regarding the EU, agriculture integration of central and east European countries shows a series of threats and risks: Central and Eastern European countries can produce cheaper and hence their products will dominate the market. A phenomenon of massive immigration to European Union countries in search of a job may happen. Integration of new members is

an additional expense of the European budget. There is a risk that recently integrated countries cannot cope with the competition and shortly become ineffective.

RESULTS AND DISCUSSIONS

In 2015, the Ministry of Agriculture and Rural Development has published an overview of the plant sector about the changes in the value of agricultural production (which accounts for producer prices, plus subsidies on products and decrease taxes on product) (Table 2)

Table 2. Agricultural sector production

	2007		2008		2009		2010		2011		2012		2013		2014	
	Lei Mil. current prices	%	Lei Mil. current prices	%	Lei Mil. current prices	%	Lei Mil. current prices	%	Lei Mil. current prices	%	Lei Mil. current prices	%	Lei Mil. current prices	%	Lei Mil. current prices	%
Plants	28,723.4	60.2	45,742.2	68.3	35,735.5	59.6	43,488.5	67.5	54,179.8	70.8	40,169.1	62.5	53,843.8	68.6	49,058.3	65.8
Livestock	18,271.6	38.3	20,535.7	30.6	23,441.6	39.1	20,406.8	31.6	21,784.1	28.5	23,555.2	36.7	23,876.5	30.4	24,481.6	32.9
Agricultural services	684.8	1.5	716.0	1.1	751.3	1.3	557.3	0.9	544.8	0.7	535.1	0.8	744	1	984.5	1.3
TOTAL	**47,699.9**	**100**	**66,993.9**	**100**	**59,928.4**	**100**	**64,452.6**	**100**	**76,508.7**	**100**	**64,259.4**	**100**	**78,464.4**	**100**	**74,524.4**	**100**

Source: Statistical Yearbook of Romania, 2013-2014, tab. 14.82014 NIS, Press release of October 15, 2015 no.263 - final data

Table 3.Organic farming operators and areas dynamics

Indicator	2010	2011	2012	2013	2014
Number of certified organic agriculture operators	3,155	9,703	15,544	15,194	14,470
Total area used for organic farming (ha)	182,705.7	229,945.67	288,260.83	301,148.1	289,251.79
Cereala (ha)	72,297.78	79,166.95	105,148.5	109,105.3	102,531.47
Dried pulses and protein crops for the production of grain (including seeds and mixtures of cereals and pulses) (ha)	5,560.22	3,147.36	2,764.04	2,397.34	2,314.43
Total tuberous and root plants (ha)	504.36	1,074.981	1,124.915	740.75	626.99
Industrial crops (ha)	47,815.07	47,879.68	44,788.73	51,770.78	54,145.17
Green harvested plants (ha)	10,325.4	4,788.49	11,082.93	13,184.14	13,493.53
Other crops on arable land (ha)	579.61	851.44	27.77	263.95	29.87
Pulses (ha)	734.32	914.08	896.32	1,067.67	1,928.36
Permanent crops (ha) orchards and vineyards	3,093.04	4,166.62	7,781.33	9,400.31	9,438.53
Permanent crops (ha) pastures and hayfields	31,579.11	78,197.51	105,835.57	103,701.5	95,684.78
Out of crop land (ha)	10,216.78	9,758.554	8,810.734	9,516.33	9,058.66
Collection from spontaneous flora (ha) * not included in the total organic farming area	77,294.35	338,051	1,082,138	944,546.2	1,787,548.25

Source: Communications from inspection and certification bodies, http://www.madr.ro/agricultura-ecologica/dinamica-operatorilor-si-a-suprafetelor-in-agricultura-ecologica.html/Clasificare Eurostat

In 2013 and 2014, grain had the largest share in the value of crop production (37% and 34.9%), followed by vegetables and watermelons (15.1% and 17.2%) and potatoes (10.6% and 10.5% respectively), while milk products obtained from the processing of farm livestock had the largest share in livestock (27.7% and 28%), followed by cattle (24.6% and 25.2%) and poultry (20.3% and 20.7% respectively). [10]

Organic sector in Romania has developed dynamically in recent years. In 2013, the total area where organic production is grown was 301,148.1 hectares, which accounts for an increase of 61% compared to 2010 (Table 3).

For 2014 acreage by mode of organic production was 289,251.79 ha, observing a slight setback compared to 2013 (Fig. 1).

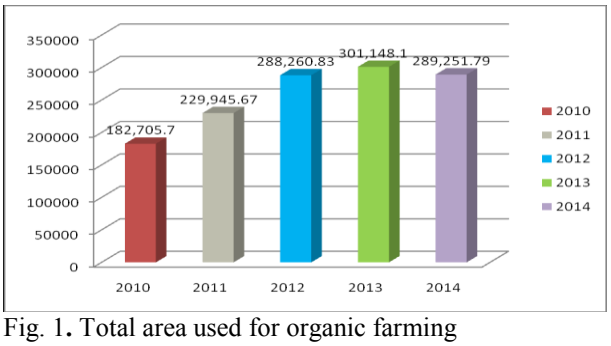

Fig. 1. Total area used for organic farming
Source: Data processed based on information MARD, 2015

The dynamics of this sector has evolved quite sustained in the last period. It is noted in 2010 that the collection from spontaneous flora (ha) where organic production was 77,294.3 hectares and for 2014 was 1,787,548.25 ha

(Fig. 2).

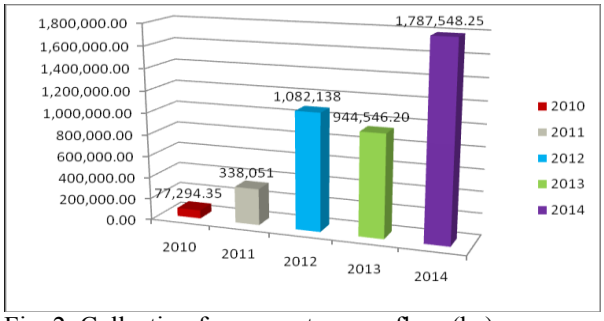

Fig. 2. Collection from spontaneous flora (ha)
Source: Data processed based on information MARD, 2015

Producers of organic food products in Romania must register their activity with the National Authority of Organic Products (N.A.O.P.) - Ministry of Agriculture and Rural Development and submit to the control of an accredited inspection and certification body. The number of operators registered in the MARD organic farming system in 2010 was 3,155 and 14,470 in 2014 (Fig. 3).

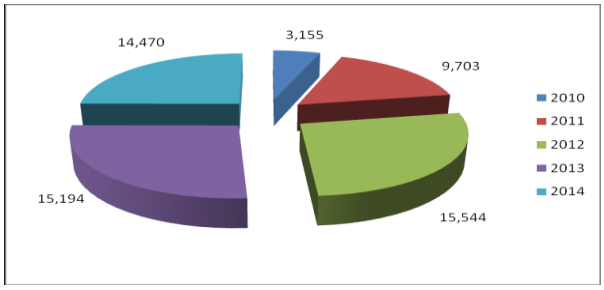

Fig. 3. Number of certified organic farming operators
Source: Data processed based on information MARD, 2015

For Romania organic food production and marketing is a real chance to enter the European market, this market being oversaturated with products from conventional farming while organic products are lacking. Thus, supporting the promotion and development of organic agriculture is a fundamental issue. (Fig.4).
This implies a rural development policy designed to encourage rural initiatives, helping simultaneously farmers to restructure their farms and to diversify the range of products [6] as well as penetrating different markets for the marketing of organic products. In recent years interest of economic agents in the country to organic food production has grown, confirmed by the fact that production volume and surfaces have increased [7].

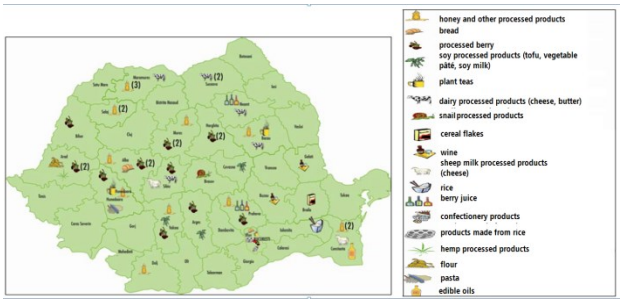

Fig. 4. The distribution of organic food products in Romania
Source: MARD, 2010

The main weakness of the organic food industry is, currently, the processing, packaging and marketing. This problem that organic industry faces is driven mainly by high prices of industrial and packaging equipment that conform to the standards of organic farming. Increasingly higher demand and lack of domestic processors determines the gross organic product to follow external routes, while only a small part of this type of food found its place in the internal market. The only way to solve this problem is by locating processing and distribution facilities as close to the sources of food, where small farmers can sell more easily. This is also extremely important to ensure a range of jobs for rural areas, in order to build a sustainable economy.

CONCLUSIONS

We conclude by saying that I believe that the future of agriculture in Romania is extremely bright. Peasants in rural areas are the cornerstone of Romania's past and will be the cornerstone of the future of Romania.
Romania is a rich country with great potential for agriculture and with the help of a fair policy it can become a prosperous country, one of the pillars of the European Union. I believe that the leaders of Romania should develop policies in support of this idea, managing to make our country a sustainable place with safe food. In this regard they will need to start by supporting the peasants of Romania in their cultivation of healthy local

food. The future depends on it. We are an optimistic country, firm in our faith that the peasants can show direction not only in Romania but also in the EU. The peasants of Romania, today at a crossroads, can give way to a bright future tomorrow.

Organic Agriculture is a complex issue, and opinions about the chances of creating a competitive market for Romanian organic products are quite different. To create this market it is necessary to lay the foundations of competitive ecological agriculture. For example, low levels of chemical pollution, considered a positive factor, are equivalent to subsistence farming of the land subject to other disadvantages.

Solutions for market expansion can include: presence of organic products in large networks of retail distribution, consistency of supply, competitive prices, informing consumers about the benefits of eating these products, an effective promotion of products that does not create confusion among consumers but on the contrary, helps them choose products.

As a result, a conclusion for the present times shows the necessity and possibility of coexistence of the two systems of agriculture: on the one hand the system of conventional agriculture which would provide necessary affordable crops sufficient to cover needs for food of human communities; on the other hand, the organic farming system, currently under expansion, which promotes agricultural production technologies with reduced environmental impact, focused on biological technology links can provide food and agricultural products with lower production costs and high biological quality.

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IMPACT OF THE COMMON AGRICULTURAL POLICY ON NATIONAL ECONOMY – ILFOV COUNTY STUDY CASE

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Abstract

This article aims to highlight the fact that Romania's accession to the European Union had a major impact on all sectors of the national economy, particularly on agriculture, due to the application of CAP-specific funding tools and mechanisms for addressing farms producing for the market. Since EU mechanisms for supporting agriculture are diverse and will evolve further in this direction, Romania must simplify and redirect their support so that the current types and forms, highly diversified and with difficult to estimate favorable effects, will be able to insure convergence with CAP.

Key words: *Common Agricultural Policy, financial mechanisms, labor productivity, occupied population*

INTRODUCTION

Agriculture is a key element of any civilization and is at the forefront in the economy and politics of each country. First, the common agricultural policy is a structural component of economic policy which has the function of allocating society's resources to agriculture.

According to the Treaty on the Functioning of the European Union, Article 39 (Article 33 of the consolidated version of the Treaty), sets specific objectives of the CAP [1]: increase agricultural productivity by promoting technical progress and ensuring the optimum use of production factors, especially labor [2]; ensure a fair standard of living for farmers; stabilize markets; ensure the availability of supplies and ensuring reasonable prices for consumers.

Agricultural policy is built around two pillars: the first – also the initial one -is that of the common market organizations, and the second, which gained momentum in the last decade is that of rural development.

During the last two decades, major state or collective owned farms and their physical infrastructure (irrigation systems related to the 3 million hectares of arable land, animal breeding facilities, body farming machinery) were broken down into about 4 million small farms (mainly subsistence), some of them being abandoned, destroyed or damaged.

In our country's agriculture there are two types of holdings: *individual farms,* mostly peasants and *units with legal personality*.

In 2013 the last stage of the reform of the Common Agricultural Policy took place.

This stage sets the following objectives for 2014-2020: turning decoupled aid into a multifunction support system; strengthening the two pillars of the CAP; a unique strengthening of the CMO (common market organizations) as a protective measure to be used only in case of price crises and market disruption; a more integrated approach, with clear objectives and focused on regions for rural development [8].

MATERIALS AND METHODS

The present study uses a range of tools and instruments leading to exposure under various categories trends in the common agricultural policy. Successfully combines research analysis and synthesis of two ways, the authors try to capture the essence, by separating and dissemination of information on the one hand and by reconstituting key element, thus pulling out the dominant phenomenon under investigation.

Graphic illustrations of the research were simple, suggestive and highlight the results of the processing of personal data from the National Institute of Statistics and the www.eurostat.ro. Tables and charts used during this research increase the importance attributed to the chosen topic.

The case study highlights the characteristics of agriculture in Ilfov County. Important to note is that this research can be extended to the macro level.

The research has been well documented, using a variety of sources and bibliographical references comply with the rules academic field.

Starting argument to begin this research is when financing agriculture in a more prolonged transitional period was marked by the implementation of different agricultural policies in line with the programs of the governments that have succeeded but also with a policy of sustainable management, thus ensuring an audit showing the progress of the development of the agricultural sector [13].

The many changes in the ways the land reform was performed have led to *excessive fragmentation* of land to the property rights holders, with serious consequences on long-term competitiveness of agriculture and waste of financial resources, while maintaining subsistence agriculture.

The main elements determining real convergence of Romanian agriculture with the European Union are synthesized and can be formulated as lines of action and specific sectoral reform measures for agriculture and rural development [7].

The strengths of Romanian agriculture, such as climate and soil are favorable for the development of organic farming, using traditional and no intensive methods.

Weaknesses of Romanian agriculture consist of: agricultural market is less functional; the declining share of agricultural output in GDP has been accompanied by a significant increase in the share of total agricultural population in the occupied civilian population.

Key objectives: Romania has proposed itself that, by joining the EU, to obtain or consolidate: economic stability; large investments from structural funds; higher incomes for farmers; access to the single market for their products (the 375 million consumers EU market, plus the 100 million consumers market of the Central and Eastern Europe - ECE); an increased demand for products with high added value.

Some conclusions can be drawn at national level, such as:

-agriculture has proven to be the most difficult chapter in the accession negotiations with countries candidate to EU agricultural structures, due to the complexity of the objectives pursued which relate to economic stability, high investment from Community funds, higher incomes for farmers, access to the single market *for farmers, given the fierce competition*;

-for Romania, the current socio-economic condition of the agriculture makes a strong obstacle to integration of this sector in U.E. agricultural structures [11]. The low level of labor productivity in agriculture, crumbling agricultural structures, dysfunctions manifested in the system of agricultural markets, marginal relations of subsistence and semi-subsistence farms to the market, predominant self-consumption, reduced access to credit, shortcomings regarding product marketing etc., were the main weaknesses Romanian agriculture faced during the pre-accession stage;

-the need to intensify the efforts of all central institutions in the field as well as of the direct and indirect participants to agricultural activity, in terms of production, marketing and trade, in terms of the acquis communautaire, the use with high social responsibility of funds from the state budget

and especially of those from community sources.

-current interstate European construction is a ongoing process, amid the trend of globalization of the world economy and the deepening of economic interference between countries of the contemporary world, embodied in a system for managing supranational economic, social, political, cultural and military powers.

RESULTS AND DISCUSSIONS

Since EU agriculture supporting mechanisms re diverse and will evolve further in this direction, Romania must simplify and redirect their support so that the current types and forms, highly diversified and having difficult to estimate favorable effects, in order to succeed ensuring convergence with CAP [12]. Functional legislative framework regarding land credit, and simplified regulations for lending and financing of agriculture makes this sector to feel the strongest impact of EU integration. [9]

Table 1. Labor productivity in Romania and EU 2010-2014

	2010	2011	2012	2013	2014
UE	35.32	39.59	40.86	41.86	41.77
Romania	9.34	11.78	9.16	11.35	11.49

Source: data from www.eurostat.com, processed by the author

Highlighting the multifunctional valences of agriculture and rural development, through content, this study transits from the analysis of the Romanian agriculture in the process of revival after 1989, the development strategy of the rural economy [15] and increase productivity in the agricultural sector in the context of EU integration (Table 1), seen in the light of globalization, for a deeper approach on the financing arrangements [14] of the agriculture before and after joining the EU, how the implementation mechanisms of internal and external funding can help the achievement of real economic and social cohesion, reaching to the realities of the Romanian agricultural sector, overviewing *the guidelines at regional (county) level* by conducting a case study on public funding of agriculture at territorial level in order to quantify the impact.

Knowledge of labor productivity is an important prerequisite when you want to create an agricultural policy [4] to support and develop the agricultural sector, as in the services sector. Labor productivity in agriculture = agricultural production / working hours (labor force occupied in agriculture).

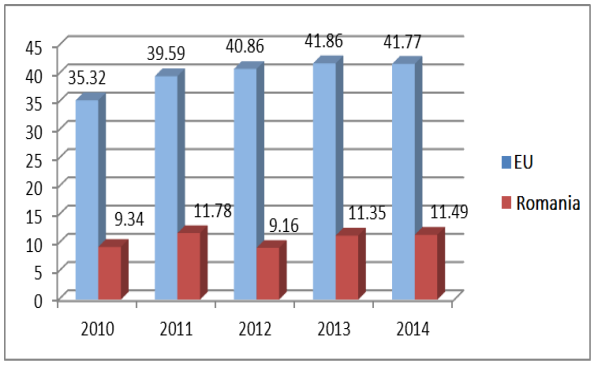

Fig. 1. Labor productivity in agriculture
Source: data from www.eurostat.com, processed by the author

It notes that compared to the agricultural productivity of labor in the EU 28, Romania record a low productivity (Fig. 1).

The causes for low labor productivity in agriculture are varied and differ from area to area. Thus we have identified as determinants the following: agriculture in Romania is not technologically evolved; because of low wages, the motivation to work in agriculture is low; there is no training for workers in the agricultural sector; Romania's agricultural surface is highly fragmented; using raw material of poor quality.

At the same time, Romania lacks a developed agricultural infrastructure, including modernization of irrigation, building huts and grain silos, and improving rural road network [10].

As regards the implementation of the Common Agricultural Policy in Romania, when they became an EU Member State (2007) and had direct access to the benefits of common policies they had to respect certain limits. Thus, direct subsidies that could attract them were only 25% of EU-15 (EU countries

before 2004), this level increased by 5% per year until 2010 and then by 10% every year until 2016.

Direct subsidies are payments in Romania are SAPS[1], unlike single payments used in the EU-15, since SAPS are more manageable. Romania and was allowed to use the SAPS until 2011 after which it passed to the single farm payment scheme in 2012.

SAPS remains connected with the production of certain crops and are paid even if a farmer does not produce as long as the land is kept in good agricultural condition. At the same time, Romania has been allowed to supplement the SAPS's for certain agricultural products in order to help the development of certain areas. These additions were supported from the budget for Pillar II of the CAP but most funding was from the national budget [5].

Table 2. Agricultural area by usage, in Ilfov County(ha)

Agricultural area usage	**2010**	**2011**	**2012**	**2013**	**2014**
Total	**158,328**	158,328	158,328	158,328	158,328
Agricultural Land	**102,122**	**101,825**	**101,581**	**1020,27**	**101,453**
Arable	97,832	97,535	98,390	98,677	98,080
Pastures	1,973	1,973	1,869	1,791	1,875
Meadows	58	58	58	58	58
Vineyards and Vineyard nurseries	1,412	1,412	681	886	812
Orchyards and tree nurseries	847	847	583	615	628
Non-agricultural Land	**56,206**	**56,503**	**56,747**	**56,301**	**56,875**
Forests and other forest vegetation	25,253	25,253	25,253	25,350	25,217
Occupied by waters, bogs	5,292	5,365	5,292	5,286	5,107
Occupied by buildings	20,364	20,657	20,829	20,277	20,898
Communications and railway infrastructure	4,251	4,182	4,333	4,281	4,491
Degraded and nonproductive land	1,046	1,046	1,040	1,107	1,162

Source: National Institute for Statistics, TEMPO Database

In most EU Member States, Pillar I area has contributed to the greater allocation of financial resources, but in the case of Romania, Pillar II has received 55% of the fund allocated to the CAP from 2007 to 2013.

[1] SAPS= A simplified version of single farm payment, which has been used by almost all new Member States in the first three years, with a possible two-year extension

Ilfov County agriculture characterization

The situation in Ilfov county land by categories of uses in the years 2010-2014, is presented in Table 2.

Agricultural land includes cropland, pastures, meadows, vineyards and vineyard nurseries, orchards and tree nurseries. Regarding the usage of total agricultural area there is a decrease in the year 2014 compared to previous years; this drop is below the level of the year 2012, which was under economic crisis coordinates (Fig. 2).

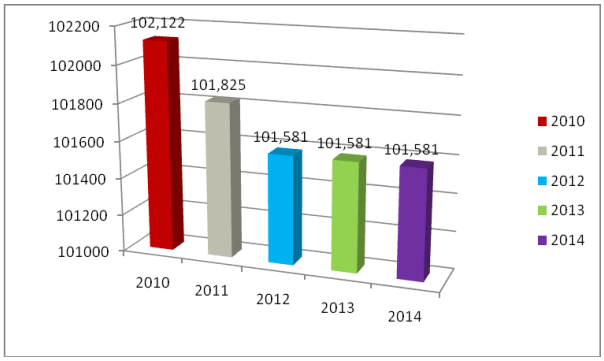

Fig.2. Evolution of agricultural land, Ilfov County
Source: data processed based on data from the National Institute for Statistics

Non-agricultural land made up of forests and other forest vegetation, filled with water, pools, construction, roads and railways, degraded and unproductive lands etc. have a considerable increase in the year 2014 compared to 2013 (Fig.3).

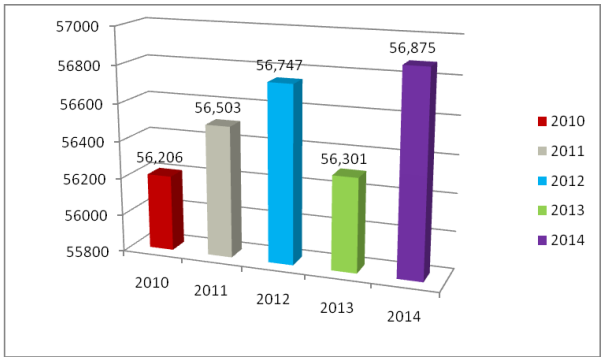

Fig 3. Evolution of non-agricultural land, Ilfov County
Source: data processed based on data from the National Institute for Statistics

The share of agriculture households rose slightly, indicating that the decline in livestock was registered by economic entities with legal personality.

However, some representative livestock industry have resisted in the county, strong enough to revive the livestock sector in the future as well, such as S.C. Romsuintest S.A. Periş for pigs and Avicola Buftea for poultry.
Related to the county specific, with a strong agricultural character, agriculture representing the dominant component of economic activity (featuring reserves and development potential due to soil quality, adequate labor force etc.) situation of agriculture indicators reflects lack of sufficient capitalization of the existing resources (Table 3).

Table 3. Population occupied with national economy branches at NEAC section level 2nd Revision, in Ilfov county

NEAC Rev.2 (national economy activities)	Macro regions, development regions and counties	Thousand capita				
TOTAL	TOTAL	8,371.3	8,365.5	8,569.6	8,530.6	8,431.7
-	Ilfov	157.2	162.5	168.4	165.9	170.7
A Agriculture, Forests And Fishing	TOTAL	2,439.9	2,442	2,510	2,380.1	2,304.1
-	Ilfov	34.1	34.4	35.5	33.6	32.5
B Extractive Industry	TOTAL	65.4	64.8	65.2	63.3	61.9
-	Ilfov	0.3	0.3	0.3	0.2	0.3
C Processing Industry	TOTAL	1,471.9	1,495	1,508.8	1,531.8	1,536.2
-	Ilfov	32.3	32.4	32.9	33	33.7
D Production And Supply Of Electric And Thermal Energy, Hot Water And Air Conditioning	TOTAL	72.7	71	68.6	59.8	58.3
-	Ilfov	0.4	0.4	0.4	0.4	0.3
E Distribution Of Water, Salubrization, Activities Of Water Decontamination	TOTAL	123.3	123	122.7	122.7	125.4
-	Ilfov	3.9	3	3.3	3.4	3.9
F Buildings	TOTAL	627.8	610.9	606.3	631.7	627.9
-	Ilfov	7.8	7.8	8.1	7.9	8.7
G Retail And Gross Trade, Car And Motorcycle Servicing	TOTAL	1,140.3	1,156.9	1,178.3	1,229	1,205.5
-	Ilfov	12.2	12.7	13.7	13.9	13.8
I Hotels And Restaurants	TOTAL	133.1	137.9	154.2	155.7	164.5
-	Ilfov	3.1	3.5	3.8	3.4	3.9
J Information And Communications	TOTAL	134.2	136	153.2	152.9	160.7
-	Ilfov	1.7	2.2	2.6	3.4	4
K Finances And Insurance	TOTAL	133.3	130.2	114	122	118.1
-	Ilfov	0.8	1	1.1	1	1.2
L Real Estate	TOTAL	30.9	30.6	31.4	35.3	28.7
-	Ilfov	1.6	1.8	1.3	1.2	1.4
M Professional Scientific And Technical Activities	TOTAL	155.9	161.1	165.9	169.1	175
-	Ilfov	7.1	7.4	7.4	6.6	7.4

Source: National Institute for Statistics, *TEMPO Database*

The negative development of agriculture during recent years, due to modest financial possibilities of the peasants and the substantial reduction of aid granted by the state, can be stopped at least two ways:
-orienting investment towards optimizing the

conditions offered by the natural environment;
-applying the results of agronomic research obtained by local research institutes [6].

The SWOT matrix for Ilfov County is presented in Table 4.

Table 4. The SWOT Analysis Matrix, Ilfov County

Strengths	Weaknesses
-Geographical positioning around Bucharest -Traditionally agricultural county, benefiting from the existence of a major agricultural / livestock research institute affiliated with a university (University of Agronomic Sciences and Veterinary Medicine of Bucharest) -Existence within the county's economy of a tradition of livestock industry and meat processing -Potential for development of tourism and agro tourism -Trained and qualified workforce available at reduced cost -Greater involvement of public authorities in developing regional development projects and inter institutional cooperation with reference centers in Bucharest -Lowland relief, water flows usable for irrigation and temperate climate make agriculture a sector with large reserves and possibilities, creates a significant hydroelectric, forestry and touristic potential -Plain area is favorable to the development of agriculture, especially vegetables in order to satisfy the growing supply requirements of the Capital, county population's consumption and to provide the raw material to cannery facilities in the county -The 10 large lakes in the county provide fishing significant quantities of fish for the needs of residents in the county and the Capital -Using chemical fertilizers and pesticides on reduced scale can contribute to green agricultural products with low pollution -The variety of ecosystems and species habitats of wildlife, due to lakes and ponds etc. -The crossing of the County by two pan-European corridors	-County marked by the exodus of labor to Bucharest -Young people disinterested to work in agriculture -Natural population decrease -The aging of workforce employed in agriculture -Existence of an information gap and underdeveloped consultancy in the county -Poor entrepreneurial education -Serious problems with rural poverty, poor social services -The high degree of land division -Lack of clarity on the legal regime of the land -The mentality of non-acceptance on land consolidation and association -Delaying funding for land -Lack of equipment and machinery used in agriculture, lack of associative structures on farms -Lack of viable associations that operate according to a strategy, having dedicated staff, promoting the objectives of the association -Decrease of the number of livestock farmers; the absence of support measures for this category of farmers -The decrease in cattle and poultry -Existence of a small number of collection centers for products of plant origin at the county level, corresponding to EU standards -The decrease in cultivated areas -Delays in aid to farmers -Growing of certified organic seeds on small areas only
Opportunities	**Threats**
-European integration may increase the role that Ilfov County plays in Romanian agriculture by increasing the number of investors -Development possibilities for extensive farming –organic agriculture -Existence of support for projects through active measures of the RDP, regarding organic farming through the development of technologies designed to protect the environment -Development of partnership relations with Bucharest Municipality -Existence of legal regulations to create associations, producer groups by product in livestock growing -The possibility of obtaining EU funds to finance projects on active measures in RDP -The possibility of obtaining government subsidies -Existence of European funds to support and subsidize agriculture -Establishing partnerships with organizations from other EU countries with developed agriculture on the exchange of experience, transfer of technologies and good practices -Organization of exhibitions / seminars / fairs in the region (County) and Bucharest -Possibility to capitalize on agricultural products by traditional methods	-Expanding urban Bucharest -The migration of young people to the city of Bucharest -Misapplication of decentralization with negative influences in agriculture -Maintaining practicing a subsistence agriculture -Elimination from the market of small agricultural producers who do not comply with EU PAC legislation U.E. -Budgetary limitations on state aid -Legislative loophole on the definition of rural areas -Legislative incoherence and political instability

The territorial analysis must be structured in four chapters, each of them analyze the different ways of financing depending on the source of the funds, namely: State funding through subsidies from the state budget and own MAPDR funds through APIA; funding through the SAPARD program; mixed financing, in the *Private-State-External* system, through the "Farmer" program, and the *Private-External* system through the World Bank. We can perform a case study on the implementation and financing of the project *"Agricultural Pollution Control Project"* at Tiganesti-Ilfov.

Another phase of analysis may represent a case study on the financing of economic agents in agriculture program SAPARD measure 3.1. "Investments in agricultural holdings", the modernization of a pig farm, and another analysis, the purchase of machinery to modernize the vegetable farm.

Analyzing the forms of financing county agriculture from public funds, we can draw some conclusions related to:

-financial resources meant to support county agriculture come from the State budget, MAPDR own sources and irredeemable foreign sources. Allocation schemes and assessing the impact on the agricultural sector can highlight the positive effects and shortcomings that show up in the implementation process, allowing improved agricultural policy mechanisms;
-between 2002 - 2014, farmers in the county have benefited from financial support from the state, the subsidy for the purchase of irrigation facilities, agricultural equipment, diesel, seeds, etc., while livestock farmers have received financial support from the state, the subsidy for milk, meat, heifers, calves, beehives, sheep.
Thus, Romania has recorded, following the EU accession, increases in farm incomes, a polarization of farms took place, reducing the number of household farms and seeing a land transfer from small to large farms that prompted the use of owned farm land in production [3].
Also, Romania should develop an infrastructure that will enable investments in agriculture, thus becoming an attractive area for investors.

CONCLUSIONS

The draft regulations for the future common agricultural policy take into account the territorial and structural realities of EU-27, giving Member States more flexibility to choose the right type of policy for each state.
Some measures in Pillar 2 and the measures in Pillar 1 can contribute to a more sustainable process of merging, but not enough unless supplemented by national measures of the above mentioned kind (an agency with the role of land bank, a State aid measure to support cadaster registration costs), measures that require long term funds allocated in the national budget.
By the end of 2016, the merger will not be more vigorously than before, being inertial, but with the new multiannual financial framework, if the information on the new opportunities will be disseminated properly and on time, there could be an interest in accessing new measures.
If resources will be found and there will be a long-term political vision in this regard, the process will probably accelerate.
In the most optimistic variant of a massive absorption of EU funds and in terms of support from the national measures financed from the state budget, it is possible that by 2020, there should be significant structural changes of the holdings, increasing the share of farms 10- 100 hectares while reducing that of farms under ten hectares, especially those owned by farmers over the age of 65, which will lead to a process of rejuvenation of the workforce in agriculture.
Trend analysis of the private sector of agriculture emphasizes besides urgent need to institutionally address these issues, the importance of collaboration between different types of specialists, through the confluence of economic, social and environmental factors, currently justified by the quality of Member State of the European Union, both regarding detection and extrapolating trends, and the implementation of required measures.
All countries have tried to promote agricultural development by funding research, providing services and other support schemes, boosting production through subsidies. This is what allowed the fourfold increase of the agricultural production of the century, contributing to society development in general. But at the same time, it increased agricultural pollution and a number of landscape qualities were degraded.

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RESEARCH ON THE EXPLOITATION TECHNOLOGY APPLIED IN SHEEP BREEDING HOUSEHOLDS IN SIBIU COUNTY

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Abstract

The paper studied the dimension of sheep household from Răşinari and Agnita, Sibiu county based on a sociological survey using a sample of 34 sheep breeders.The results pointed out that 76% of farmers own areas under 10 ha, 9% between 11-50 ha, 4.5% between 51-100 ha respectively 101-200 ha and 6% have more than 200 ha. Regardinh sheep livestock owned, 12% of sheep breeders surveyed have between 0-100 heads, 24% have between 101-200 head, 9% have between 201-300 heads, 24% have between 301- 400 heads, 18 have between 401-500 heads, 12% have between 500-1000 and 1% have in property more than 2,000 head of sheep. As a final conclusion, the changes in the land ownership had a deep influence on sheep breeding both from a technological and economical point of view in the studied area.

Key words**:** *animal breeding, extensive system, sheep, sustainable development*

INTRODUCTION

Sibiu County has an agricultural area of 307,974 ha, of which 116,276 ha are arable land (38%), natural meadows totals 107,126 ha (35%) and 75,724 ha of natural hayfields (25%). This structure of the agricultural area shows that meadows and hayfields are approx. 60% of the agricultural land, hence the giant plant resources can be harnessed effectively by ruminants, especially sheep.

Of the total farms in the county, there are 1,732 holdings that are considered sheep breeders as they hold more than 50 counts./exploitaton. [10].

Sheep breeding in Sibiu County, is a traditional activity, many centuries old, being the basic activity for the Marginimea Sibiului area, which along with animal breeding traditional activities relating to the processing products with a strong local character are being practiced (cheese, clothing, crafts, tools processing, products, inventory items of tin, weaving workshops, traditional hat, workshops fabrics, etc.). [6,9]

National statistics presented on the Ministry of Agriculture and Rural Development website show that in 2013 Romania was raising approx. 12,710 thousand sheep, and in 2015, 13,096 thousand heads. [12]

Sibiu County ranks second in the country in terms of the number of sheep. In Sibiu there are currently approx. 459,000 sheep and there are several associations sheep farmers. They face problems related to: the sales market, subventions and lack of productive races, etc. If they want to stay on the European market in this sector, the farmers will have to find quick solutions. With all the raised problems , there are still in the county breeders who obtained great performance, both by increasing the purebred herd Ţurcană bred or Ţigaie bred, but also by crossing sheep from the bred Ţurcană and Ţigaie with rams from the German meat with black head bred, to improve the carcass qualitty.

The extensive transhumant system of cattle is considered economic because it does not rely on costly investments in shelters or for the establishment and maintenance of cultivated pastures. The sheep livestock exploited in this system expresses biogenetic potential of adaptability, breeding and production.[3,11]

The peculiarities of transhumance confer

functions: environmental, economic, zootechnic and social biologically based concept: fresh air; autofurajare; accumulation beneficial; self-fertilize; autoeficientizare; autoconfort. [8]
Some authors tried to understand modernization of agriculture like a continuing process and it is the essence of progress in agriculture and in rural areas. [5,7]

MATERIALS AND METHODS

To know the current "status" of the holding of sheep breeders in Sibiu in the course of 2015 was conducted a sociological survey using a questionnaire with 39 items, which was managed by a single interviewer and applied to a number of 34 sheep breeders from Răşinari and Agnita, Sibiu county.

RESULTS AND DISCUSSIONS

In their papers some authors showed that a new strategy of sustainable and competitive development of animal production in Romania, with principles, methods and efficient techniques, clearly formulated it is needed. [4]
Sustainable development can be harmonious combined with tourism development, especially the rural one. [1, 2]
Of the total sheep farmers surveyed, 18 are part of an associative structure 53%), most of Sheep Breeders Association "Mărginimea" Răşinari or A.J.C.O.C. "Mărginimea" Sura Mare, the remaining 47% being independent.
When asked in which village they operate 58% of the farmers stated that the the locality of residence.Farmers owning large herds, leased areas for grazing in localities in Sibiu (sheep breeders from Răşinari in: Poplaca, Sorostin, Chirpăr, Rosia, Motis and those from Agnita in: Veseud, Chirpăr, Retis, Ighişu Vechi , Merghindeal, Ruja, Veseud). Only two breeders move with their flocks outside the Sibiu county into Mures County or in Satu Mare county. In Răşinari I met one farmer who practices transhumance.The percentage of 42% which represents the breeders who maintain their sheep across other localities than home, show insufficient pasture areas in respect of the herds exploited.
As regards the surfaces of land owned, 76% of farmers said they own areas under 10 ha, 9% between 11-50 ha, by 4.5% between 51-100 ha respectively 101-200 ha and 6% have more than 200 ha. When asked if there are other sources to supply the animal feed, 68% of producers responded that they supply with corn from the open market, with concentrates from different companies or older associations, while 32% of breeders do not use other sources of procuring food.
About sheep livestock owned, 12% of sheep breeders surveyed have between 0-100 heads, 24% have between 101-200 head, 9% have between 201-300 heads, 24% have between 301- 400 heads, 18 have between 401-500 heads, 12% have between 500-1,000 and 1% have in property more than 2,000 head of sheep. (Chart 1)
Within the structure of the sheep population by age and physiological status, which form the core breeding sheep is 65% -90% of the total herd of sheep.

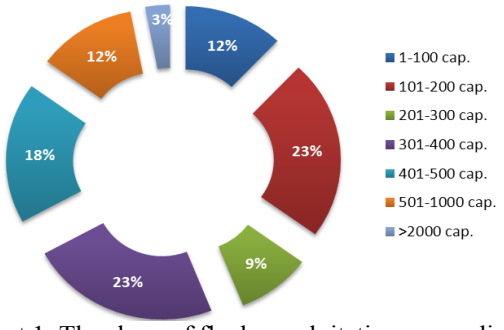

Chart 1. The share of flocks exploitations according to the number of sheep owned

The prevalent breed is Ţurcana (encountered in 85% of the holdings where the survey was conducted), but there are breeders (15%) which operate other breeds such as Ţigaia and German with black head meat sheep (36% of all farmers in the growth center Agnita, which shows an opening towards the farmers in the hilly region to obtain hybrids with improved breeds for meat production).
Most sheep farmers (68%) use for feeding sheep during the indoors period hay and corn, 12% of them administrate hay, corn and succulents 20% (the area Agnita) hay, corn, succulents and leguminous vine. The

assortments of feed given to the animals depend by the zone in which the holding is situated. The ration administered is generally made up of approx. hay 3 kg / head / day, plus corn averaged 600 g / head / day.

88% of the respondents don't feed animals differentiated by age or physiological state, while 12% of breeders administrate feed differently. So the barren sheep receive straw and stalks and other categories, hay and succulent (maize during births).

All manufacturers responded that mating season is in autumn (august-september) applying natural mount. When asked whether pregnant sheep are kept separate from other animals, we observe that 92% of breeders maintain pregnant sheep separately, as far away from the rest in special places (in pens in the winter stables), where females with access to water and feed. Only 8% of pregnant sheep breeders did not separate from the other sheep.

During births, most farmers (62%) arrange a separate compartment where these take place (generally in the form of rectangular boxes to ensure access to food and water, taking into account 1.5 m2 / ewe-lamb couple), while the remaining 38% do not have places for calving.

The weaning of lambs is differentiated: so, 26% of breeders wean the lambs _ from 2 months, 6% from 3 months, 58% at ages exceeding four months (generally when lambs have around 20 kg). All respondents give special attention during lactation.

Sheep shearing is manual and takes place in May-June, depending on weather conditions.

The wool production declared for 74% of breeders is up to 2 kg wool / head, while for 26% are between 2 to 3 kg wool / head. Almost all breeders are unhappy with the way they currently exploit wool in our country.

With regard to the average productions of milk / sheep head / day, 47% of the breeders say that they obtain 500 ml milk / sheep head / day, 12% between 600-800 ml milk / ewe / day and 41% obtain approx. 1000 ml milk / ewe / day in peak lactation curve.

Sheep's milk is used to make dairy products from the shepherd camp. They are used exclusively to ensure the consumption needs of the family in case of 6% of the farmers, while a proportion of 94% capitalize them by selling from the henhouse or markets.

The program of a working day in the holdings where the survey was conducted starts at 4 am and ends at 22.

The pasture is used rationally for 5-6 days and then it has a recovery of 15 to 20 days until reaches 8-10 cm tall grass.

The pastures with a higher load than their productive potential causes grazing ,shaving", leading to their degradation by the disappearance of valuable plant species and the growth of the ones more resistant which means insufficient food for animals and low nutritional value, which influences negative on the yields of milk and meat. The pastures which are inefficiently used with a too small animal load, allow the development of lush plants, typically the ones with a low nutritional and productive value, resulting in a poor use of biomass, aging herbs, decrease of the nutritional value which results in the appearance of reeds, hrubswhich and molehills which ultimately leads to the deterioration of the grasslands.

The grassland capitalization is not made after a scheduled basis (avoiding mixed grazing sheep-cattle establishing the load per ha in compliance with the production of green mass and its quality, etc.) There are areas where pastures are overloaded, leading to their degradation and insufficient food for animals, which will record low production of milk and meat

Sheep best use pastures and meadows in the mountain area. In the climatic conditions from our country the sheep may graze in the mountains with altitude between 700 - 1,300 m, between 90 and 120 days. Grazing usually ends between August 31 to September 10, depending on weather developments by grazing, sheep contribute to raising the soil fertility and increase production of green mass. In general the rations consist of green mass during the grazing period hay in the stabulation period with coarse during calving. Mostly they are not well balanced and do not provide physiological nutritional requirements at the various stages. In private households, in winter the sheep are kept generally arranged

in shelters near the house.

There are also breeders who practice transhumance, a very old tradition. In Sibiu from over 1,700 sheep breeders, only 5 still practice transhumance.

Sheep farming in the county in the past included a compulsory period of transhumance which took various forms from one place to another, depending on the number of animals owned by breeders and human and economic opportunities. In general the system of raising animals in the mountain area is the short swing with wintering based on natural hay in the stabulation period and using during summer highest mountain pastures, through herdsmen, sheepfold or mixed farms. This system of farming causes a very good quality of meat, milk and cheese, though yields obtained are low.

CONCLUSIONS

The data shows that most farmers have done training in animal husbandry. Also, most manufacturers inherit this tradition of ancestors. Sale of products is as follows: cheese, Cibin market, Campina, Ploiesti, Bucharest; Wool: Bucharest, Campina; - Meat: markets in stands; - Skins: they sell with 2 lei / pc via intermediaries centers in Sevis, which is then used both domestic and foreign markets.

The price of the products domestic markets is: lamb meat sold for 8 lei / kg alive and 20 lei / kg carcass, milk 3-3.5 lei / liter, the cheese has price range of 12 to 30 lei / kg. A good sheep gives 1 liter of milk per day in peak lactation curve and an average of 120 to 15l/year total production plus variants lactation values between 120-150 l / year. From such a sheep may be obtained about 13 to 15 kg cheese / year; sheep belonging to the Sibiu growth area achieve an average body weight of 40-45 kg, give 2-3 kg wool / head, a production of 80-90 liters of milk, cheese 13-15kg/head/ year manufacturers who sell products in markets have displayed specific product name, date of manufacture, date of expiry.

There are producers who pasture their personal property, but there are producers who rented pastures. They pay Lei 160 / ha / year.

Many producers are unhappy with the legislation that forces them to modernize the area where yields are obtained.

Between the ruminants growth and crop production is a strong connectin. Animals contribution in an important measure to improve crop production and increase its profitability.

Exploitation and valorification of the meadows in the mountain and piedmont area is done in most cases by extensive grazing (moving cattle freely on the pasture), modern use of made (lots, Mixed operation: grazing, mowing, respect the load per per hectare depending on quantity and quality of biomass, etc.) is very rare.

Sibiu border shepherds complain that they can not comply with the millenary tradition because they do not have where to "remain" sheep transhumance risking only to be a reason to stay ballad. Neither the small breeders do not see a business of raising sheep. Some of them, even those who raised sheep from father to son, trying to sell their flocks. Wool, which was an important product obtained their sheep, for several years has no market, which requires farmers to another product orientation, as required by European or even global market. Generally sheep are raised for milk, meat wool less.

When exploited for meat, animals are kept on pasture, with traditional technologies, and recovered at the end grazing in September.

In general livestock and especially in Sibiu. Sibiu Borders is a family activity, inherited from ancestors specific principles held by each family. Changes in land ownership prompted changes in sheep, both technologically and economically. They require a new approach to technical and economic based and in line with market requirements, veterinary European competition.

In the context of sustainable development, the production and consumption of rural product process needs: upgrading access roads in rural areas, intensified conservation of natural resources, integration of some tourism based on traditional and organic farming.

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AGRICULTURAL GROWTH POTENTIAL OF RURAL COMMUNITIES FROM THE PLAIN AREAS – ROMANIA

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Abstract

The present paper has as main objective to design a development index to capture the agricultural potential of a rural community. The main working hypothesis is that there are rural communities where the development/diversification of farming activities can be supported both by the existence of certain endogenous natural and human resources and by the productive behaviour of household heads. The paper presents an aggregation model of certain agricultural indicators impacting both the farming sector and the development of rural communities. The focus is laid only on the agricultural indicators that describe the potential (resources) of a given area or only on the result indicators (average yields per hectare, LLU, etc.); it also develops an assessment model of the agricultural activities that takes into consideration the indicators from these two categories.

Key words**:** *agricultural activities, rural communities, rural development, agricultural development index*

INTRODUCTION

In Romania agriculture represents an activity with strong economic and social influences, the agricultural sector polarizing the labour force, the economic activities, the infrastructure and the natural resources from the rural area [1].

The need to develop an agricultural development index appeared from the necessity to evaluate and hierarchize the agricultural potential of pilot rural communities from the investigated area.

The development of an agricultural development index for a rural community is also useful for the orientation of those communities in order to develop the farming sector by adjusting those flexible components.

The development modality of a rural community is different depending on the natural and human resources of the area we refer to, on the tradition and history of the respective place, as well as on the adaptation and assimilation mechanisms of the new values from outside the community.

In this context, the aim of the paper is to design a development index to capture the agricultural potential of a rural community.

MATERIALS AND METHODS

In order to evaluate the agricultural activities from the Romanian rural communities we shall consider the calculation of a *Composite index by commune,* named *Agriculture development index,* to measure the economic growth potential of the community through the development/diversification of agricultural activities.

The following components will be taken into consideration in the evaluation of the agriculture development index: land resources; cultivated area; livestock raising; sale of crop and animal products; productive endowments; production services.

Having in view that not all these components are equally important for the farming activity, some of them having a higher agricultural value, each of these components is assigned an importance coefficient ranging from 0 to 1 (0% - 100%); thus, the following participation shares were established for the components of the farming activity: land resources: 10%; cultivated area: 15%;livestock raising: 15%; sale of crop and animal products: 25%; productive endowments: 20%; production services: 15%.

The qualitative and quantitative level of these

components will be appreciated by using three-step scales, and thus there is the possibility to more objectively evaluate the quality of investigated components. The factors included in the structure of each element were assessed on a scale from 0 to 3, depending on the quality, namely: 0 – for the non-existence of factor, factor unfavourable to agricultural activity; 1 – for low quality; 2 – for satisfactory quality, factor; 3 – factor favouring agricultural activity development.

The formula used for the calculation of agriculture development index is:

$$I_{da}=sum\ (q_i \times c_i)/3,\ where:$$

I_{da}=*Agriculture development index*

i= number of components considered for the calculation (1, 2, 3, ... n)

Q=share of each component (sum q_i *=1, thus* $0<= q_i <=1$*)*

C= quality of components (c= 0-3)

The same calculation method will be used for each component of the agriculture development index depending on the elements defining it.

The utilized data were obtained on the basis of a field survey [4], by the application of a questionnaire that had the following research theme: economic and social diagnosis of rural communities.

RESULTS AND DISCUSSIONS

Land resources

The land component will be investigated from the point of view of its importance in the development of the agricultural activities on the investigated Romanian rural households.

A commune index will be calculated that should present the agriculture development potential from the point of view of the main production factor, i.e. land. This index will be named Agricultural area index (I_{sa}).

The elements taken into consideration are the following: average agricultural area into ownership – importance coefficient 30%; average number of parcels – importance coefficient 40%; the average age of the person who leased in agricultural land – importance coefficient 30%.

The average agricultural area owned by the rural households is obtained by dividing the total area of the commune by the number of households that have agricultural land.

The average agricultural area of the rural households in the plain area, in the investigated communes, is 3.17 ha. The average agricultural area ranges from 1.91 ha in the commune Răchiţi to 4.12 ha in the commune Mitoc.

Table 1. Score obtained in the case of indicator "Average agricultural land area"

Commune	Average total area into ownership	Scores
Chirnogi	3.18	2
Ghimpaţi	4.07	3
Grădinari	2.52	1
Iepureşti	2.80	2
Mănăstirea	3.76	3
Mitoc	4.12	3
Prundu	2.83	2
Răchiţi	1.91	1

Source: own calculations on the basis of field survey data

Each commune obtained scores from 0 to 3, depending on the average size of agricultural area owned by the rural households, by three size classes: score 1 for the size category 1.91-2.65 ha, score 2 for the size category 2.66-3.39 ha, score 3 for the size category 3.40-4.12 ha.

The hierarchy of the rural communities from the plain area, by the average size of the agricultural land area size of the household is the following: Mitoc 4.12 ha, Ghimpaţi 4.07 ha, Mănăstirea 3.76 ha, Chirnogi 3.18 ha, Prundu 2.83 ha, Iepureşti 2.80 ha, Grădinari 2.52 ha, Răchiţi 1.91 ha.

The average number of parcels per hectare is another important element that reveals the land resource potential in the development of modern agriculture.

It is estimated that the number of parcels resulting from the application of Land Law totals over 25-30 million [3]. It can be said that on the basis of Land Law application, there was a shift from the excessive concentration of land ownership to an exaggerated land fragmentation and from the small-sized farms to the small peasant household farms.

Land consolidation, i.e. the diminution of land fragmentation into scattered parcels, has the following positive effects: economy of labourforce, labour productivity increase respectively; access to advanced technologies,

to mechanization in land operation; economy of fuels and other inputs and materials occasioned by the travel of technical means from one parcel to another; increase of the yields of technical means utilization; the diminution of production costs and economic efficiency increase.

Arable land prevails in the investigated plain area, with 92.82%, followed by orchards 4.19%, pastures and hayfields 2.95% and vineyards 0.05%.

The average number of parcels for the arable land is 1.05 parcels per hectare. The hierarchy of communes by the average number of parcels per hectare is the following: commune Mănăstirea 0.66 parcels per hectare, commune Chirnogi 0.73 parcels per hectare, commune Mitoc 0.96 parcels per hectare, commune Ghimpaţi 0.98 parcels per hectare, commune Iepureşti 0.25 parcels per hectare, commune Răchiţi 1.26 parcels per hectare, commune Grădinari 1.32 parcels per hectare and Prundu 1.32 parcels per hectare.

For the calculation of the parcelling index for agricultural land, we used the following formula:

$$I_{Nmp}=sum(q_i \times c_i)/3$$, *where:*

I_{da}=*Parcelling index*

i= number of components considered for the calculation (arable land, pastures and hayfields, orchards and vineyards, i.e. 4 components in total).

Q=share of each component (arable land=92.82%, orchards=4.19%, pastures and hayfields = 2.95% and vineyards=0.05%)

C=quality level of components (c= 0-3)

Each commune was assigned scores ranging from 0 to 3, depending on the parcelling index, namely: score 1 for the interval 0.31-0.52, score 2 for the interval 0.52-0.73, score 3 for the interval 0.73-0.93.

Depending on the parcelling index result, the communes with the best position on this list are Mănăstirea and Chirnogi, with the index value 0.93. These are followed by the communes Ghimpaţi with the index value 0.69 and Mitoc with 0.65, while the last positions are occupied by the communes Grădinari, Prundu, Răchiţi with 0.33 and Iepureşti with 0.31.

Table 2. Score obtained in the case of parceling index

	Arable (92.82%)		Pastures/hayfields (2.95%)		Orchards (4.19%)	
Commune	A.n.p.	Score	A.n.p.	Score	A.n.p.	Score
Chirnogi	0.73	**3**		**0**		**0**
Ghimpaţi	0.98	**2**	0.79	**3**	4	**3**
Grădinari	1.32	**1**	4.00	**1**	7.14	**1**
Iepureşti	1.25	**1**		**0**		**0**
Mănăstirea	0.66	**3**		**0**		**0**
Mitoc	0.96	**2**	1.43	**3**		**0**
Prundu	1.32	**1**	2.00	**2**		**0**
Răchiţi	1.26	**1**	2.31	**2**		**0**

	Vineyards (0.05%)		Index	
Commune	A.n.p.	Score		Scores
Chirnogi	6.48	**3**	0.93	**3**
Ghimpaţi	1.82	**3**	0.69	**2**
Grădinari	6.49	**3**	0.33	**1**
Iepureşti	6.94	**3**	0.31	**1**
Mănăstirea	9.27	**2**	0.93	**3**
Mitoc	20.00	**1**	0.65	**2**
Prundu	5.95	**3**	0.33	**1**
Răchiţi		**0**	0.33	**1**

Source: own calculations based on field survey data
Note: A.n.p.=average number of parcels

Another element considered in the calculation of the agricultural area index is *land lease*. This represents the process by which the households that have the potential to farm the land take over certain land areas from those who no longer have the necessary resources or who are not willing to farm their land.

Although the land lease process has developed for the last three years [3], it has to face certain constraints, among which we can mention: elderly peasants' reluctance to land lease due to its exploitation nature in the past; low number of entrepreneurs willing to assume the risk to establish a farm on the basis of leased in land; lack of capital; small size of parcels to be leased out and the difficulty to consolidate them; existence of a surplus of agrarian population that is manifested as small landed property and small-sized farm conservation factor, as long as this is not attracted into other activities; insufficient knowledge of the law or elusion of the law.

Agricultural land lease has the following advantages in our country:

- it facilitates the establishment of large-sized farms, with minimum investment costs in the agricultural land transaction actions;
- it represents an alternative for land farming by those land owners who out of objective reasons (old age, urban residence, scarcity of

production factors) are not able to farm their own land;
- it does not affect the land ownership regime, both during the land lease contract and after it ends.
The average age of lessee is an indicator that reflects of the land lease process quality.

Table 3. Scores obtained for the indicator "Average age of lessee"

Commune	Age	Scores
Chirnogi	62.0	**1**
Ghimpaţi	57.0	**1**
Grădinari	39.0	**3**
Iepureşti	-	0
Mănăstirea	39.0	**3**
Mitoc	43.1	**3**
Prundu	54.2	**2**
Răchiţi	50.4	**2**

Source: own calculations based on field survey data

The younger the lessee, the more the land lease can reach its economic goal.
The average age of the person who leased in agricultural land in the investigated communes is 46.2 years, ranging from 39 years in the communes Grădinari and Mănăstirea to 62 years in the commune Chirnogi.
Each commune obtained scores from 0 to 3, depending on the age of lessee: score 0 for the communes where no land lease exists, score 1 for the age category 54.3-62 years, score 2 for the category 46.7-54.2 years, score 3 for the category 39-46.6 years.
The hierarchy of rural communities from the plain area, depending on the average age of the person who leased in agricultural land, is the following: commune Grădinari and commune Mănăstirea 39 years, commune Mitoc 43.1 years, commune Răchiţi 50.4 years, commune Prundu 54.2 years, commune Ghimpaţi 57 years, commune Chirnogi 62 years.

Result

For the first component of the Agriculture Development Index, i.e. Agricultural Area Index, the following elements were taken into consideration: average agricultural land area into ownership; average number of parcels; average age of person who leased in agricultural land.
The calculation formula is the following:

$$I_{sa}=sum(q_i \times c_i)/3,$$

I_{sa}=farmland index
i= number of components considered for the calculation (average agricultural land area into ownership, average number of parcels, age of lessee, i.e. 3 components)
Q=share of each component (average agricultural land area into ownership – importance coefficient 30%; average number of parcels –importance coefficient 40%; average age of person who leased in agricultural land – importance coefficient 30%)
C= quality level of components (c= 0-3)

Table 4. Scores obtained for the Agricultural Area Index (Isa) in the plain area

	Scores:			Farm land Index
	Av.* agricultural area into ownership	Av.* age of person who leased in agric. land	Av.* number of parcels per ha of agric. land	
Mănăstirea	2	1	3	1.0
Mitoc	3	1	2	0.9
Chirnogi	1	3	1	0.7
Ghimpaţi	2	0	1	0.7
Grădinari	3	3	3	0.5
Prundu	3	3	2	0.5
Răchiţi	2	2	1	0.4
Iepureşti	1	2	1	0.3

Source: own calculations based on field survey data
*average

From the agricultural area index point of view, the commune with the highest land potential for agriculture development is Mănăstirea, with the index value 1.0, followed by the commune Mitoc 0.9, commune Chirnogi 0.7, commune Ghimpaţi 0.7, commune Grădinari 0.5, commune Prundu 0.5, commune Răchiţi 0.4 and commune Iepureşti 0.3.

Cultivated area

Crop production represents an important base of raw products for population's consumption, for livestock raising and for food industry. The natural conditions of Romania represent an opportunity for the cultivation of a wide range of species.
In the plain area, the cereal crops prevail with 63% of the cultivated area; this share ranges from 51.2% in the commune Mitoc to 85.6% in Iepureşti.
In the total rural households that have land into ownership and use it, the crop structure is the following: 31.55% maize, 19.22% wheat,

14.71% sunflower, 5.46% alfalfa, 3.91% oats, 3.91% vegetables, 3.8% barley, 2.2% soybean, 1.78% grass, 1.42% clover, 0.95% potatoes, 0.71% beans, 0.47% sugar beet and 3.68% other crops.

In order to highlight the quality of agricultural land utilization modality we shall calculate the intensive agricultural land use index. This index represents the share of industrial, food and fodder crops in the utilized agricultural area. The closer this index is to 100, the higher the intensification level.

The average index in the investigated plain area is 36.9, being relatively close to the national average, i.e. 30.8. The value of the intensive agricultural land use index ranges from 14.4 in the commune Iepureşti to 48.8% in the commune Mitoc.

Table 5. Scores obtained for the intensive agricultural land use index and Scores obtained for the indicator "Number of animals per hectare"

Commune	Index value	Scores	UVM/ha	Scores
Mitoc	48.8	3	1.09	3
Răchiţi	46.8	3	0.70	2
Mănăstirea	38.5	3	0.65	2
Ghimpaţi	32.0	2	0.61	2
Prundu	30.5	2	0.48	1
Grădinari	29.4	2	0.41	1
Chirnogi	20.9	1	0.37	1
Iepureşti	14.4	1	0.35	1

Source: own calculations based on field survey data

Each commune obtained scores from 0 to 3, depending on the intensive agricultural land use index value, by three intervals: score 1 for the interval 14.4-25.8, score 2 for the interval 25.8-37.3, score 3 for the interval 37.3-48.5.

The hierarchy of the rural communities from the plain area, based on the intensive agricultural land use index, is the following: commune Mitoc 48.8, commune Răchiţi 46.8, commune Mănăstirea 38.5, commune Ghimpaţi 32.0, commune Prundu 30.5, commune Grădinari 29.4, commune Chirnogi 20.9 and commune Iepureşti 14.4.

Livestock raising

Livestock production is extremely important for our agriculture, due to the favourable conditions. In the rural communities, the on-household raising system is practiced that is characterized by a low concentration of animals.

The indicator number of animals per 1 hectare of agricultural land reveals the intensive land utilization level. The optimum level of this indicator is 1 livestock unit (LU) per hectare.

The average value of this indicator in the investigated plain area is 0.59 LU per hectare, being also equal to the national average. The value of the indicator number of animals per hectare ranges from 0.35 LU/ha in the commune Chirnogi to 1.09 LU/ha in the commune Mitoc.

Each commune obtained scores ranging from 0 to 3, depending on the value of the indicator number of animals per hectare, by three intervals: score 1 for the interval 0.35-0.60 LU/ha, score 2 for the interval 0.60-0.84 LU/ha, score 3 for the interval 0.84-1.09 LU/ha.

The hierarchy of the rural communities in the plain area, by the indicator number of animals per hectare, is the following: commune Mitoc 1.09 LU/ha, commune Răchiţi 0.70 LU/ha, commune Grădinari 0.65 LU/ha, commune Prundu 0.61 LU/ha, commune Ghimpaţi 0.48 LU/ha, commune Mănăstirea 0.41 LU/ha, commune Iepureşti 0.37 LU/ha and commune Chirnogi 0.35 LU/ha.

Structure of sales

In the communes from the plain, the share of households that sell animal products is 11.35%, and the share of households that sell crop products is 8.91%.

The commercial behaviour of peasant households is very important for the future development, both for them and for the community. In order to make an assessment of the sales of agricultural (crop and livestock) products in the investigated rural communities, we shall calculate a composite index per commune named Commercial behaviour index.

The calculation formula is the following:

$$I_{cc}=sum(q_i \times c_i)/3,$$

I_{cc}= Commercial behaviour index

i= number of components considered (share of households that sell crop products, share of households that sell animal products, i.e. 2 components)

Q=share of each component (share of households that sell crop products – importance coefficient 40%, share of

households that sell animal products – importance coefficient 60%)
C= quality level of components (c= 0-3)

Table 6. Commercial behaviour index

	Scores for the sale of products:		Commercial behaviour index
	crop	animal	
Chirnogi	1	1	0.3
Ghimpaţi	1	1	0.3
Grădinari	3	2	0.8
Iepureşti	1	1	0.3
Mănăstirea	3	1	0.6
Mitoc	1	3	0.7
Prundu	2	1	0.5
Răchiţi	1	1	0.3

Source: own calculations based on field survey data

In Romania, the farmers' commercial spirit on the rural households is very low, the agricultural products going to the human consumption and to animal feeding, following a closed circuit. As regards the farmers' commercial behaviour, the rural communities that are on top positions are the following: commune Grădinari (0.8), commune Mitoc (0.7) and commune Mănăstirea (0.6).

Productive endowments

Among the analyzed productive endowments in the investigated rural areas, the animal shelters prevail (71.39%) on the interviewed households. The storage facilities come next, with 39.75% followed by the agricultural machinery and implements on only 13.67% of the rural households.

The investments in animal shelters are relatively low, compared to the storage facilities, but mainly compared to the cost of agricultural machinery and implements.

The age of those who own these productive endowments is quite important for the longer term utilization in good conditions, mainly in the case of agricultural machinery and implements. The average age of productive endowment owners, in the plain area, is 49.5 years for the owners of agricultural machinery and implements, 52.5 years for the storage facilities owners and 53.6 years for the owners of animal shelters.

In order to calculate the Productive endowment index we must take into consideration two elements, namely: number of productive endowments and average age of productive endowments owners.

Table 7. Calculation methodology of the Productive endowment index

Index of productive endowments number (I_{ndp})	***Index of productive endowments owners' age (I_{vpdp})***
Indp =sum(qi x ci)/3, *Indp = Index of productive endowments number* *i= number of components taken into consideration (number of agricultural machinery and implements, number of storage facilities, number of animal shelters, i.e. 3 components)* *Q=share of each component (number of agricultural machinery and implements – importance coefficient 45%, number of storage facilities – importance coefficient 35%, number of animal shelters – importance coefficient 20%)* *C=qualitative level of components (c= 0-3)*	*Ivpdp =sum(qi x ci)/3,* *Ivpdp = Index age of productive endowment owners* *i= number of components taken into consideration (average age of agricultural machinery and equipment owners, average age of storage facilities owners, average age of animal shelter owners, i.e. 3 components)* *Q=share of each component (average age of agricultural machinery and implements owners – importance coefficient 45%, average age of owners of storage facilities – importance coefficient 35%, average age of animal shelter owners – importance coefficient 20%)* *C= qualitative level of components (c= 0-3)*
Productive endowment index	
I_{dp}=sum(q_i x c_i)/3, *I_{dp}=Productive endowment index* *i= number of components taken into consideration (total number of productive endowments, average age of productive endowments owners, i.e. 2 components)* *Q=share of each component (total number of productive endowments –importance coefficient 40%; average age of productive endowments owners – importance coefficient 60%)* *C= qualitative level of components (c= 0-3)*	

Before calculating this index, we shall calculate 2 support indices, namely:

- *Index of productive endowments number (I_{ndp})* summarizing the number of agricultural machinery and implements, the number of storage facilities and the number of animal shelters.
- *Index age of productive endowment owners (Ivpdp)* summarizing the average age of productive endowments owners: agricultural machinery and implements, storage facilities, animal shelters.

The hierarchy of communes by the calculated indices is the following:

- depending on the *Index productive endowments owners' age:* commune Mitoc with index value = 1, commune Mănăstirea 0.9, commune Grădinari 0.9, commune Chirnogi 0.6, commune Ghimpaţi 0.5, commune Prundu 0.5, commune Răchiţi 0.5 and commune Iepureşti 0.3. The closer to 1 is the index value, the better the utilization of productive endowments in the respective region, as these are into the ownership of

younger persons.
- depending on the *Index number of productive endowments:* commune Prundu with the index value 1, commune Mitoc 0.9, commune Grădinari 0.8, commune Mănăstirea 0.7, commune Ghimpaţi 0.7, commune Răchiţi 0.5, commune Iepureşti 0.5, commune Chirnogi 0.4.

Table 8. Productive endowment index value

	Scores on owners' age:			**Ivpdp**	Scores on the number of:			**Indp**
	Machinery and impl.	Storage facilities	Animal shelters		Machinery and impl.	Storage facilities	Animal shelters	
Chirnogi	3	1	1	0.6	1	1	2	0.4
Ghimpaţi	1	2	1	0.5	2	2	2	0.7
Grădinari	2	3	3	0.9	3	2	1	0.8
Iepureşti	1	1	1	0.3	1	2	2	0.5
Mănăstirea	2	3	3	0.9	3	1	2	0.7
Mitoc	3	3	3	1.0	3	2	3	0.9
Prundu	1	2	2	0.5	3	3	3	1.0
Răchiţi	1	2	2	0.5	1	2	1	0.5

	Scores on:		**Productive endowment index**
	Age	Number	
Chirnogi	2	1	0.5
Ghimpaţi	2	2	0.7
Grădinari	3	3	1.0
Iepureşti	1	1	0.3
Mănăstirea	3	2	0.9
Mitoc	3	3	1.0
Prundu	2	3	0.8
Răchiţi	2	1	0.5

Source: own calculations based on field survey data

If the index value is closer to 1, this reveals a larger number of endowments in the respective communes that can be used in the farming activity.
The productive endowment index cumulates the values of the two indices presented above and reveals the situation of productive endowments in the investigated rural communities. The conclusion that results from this index value is that Mitoc and Grădinari (index value = 1) are the best endowed communes, with the highest utilization potential of endowments in the production activity. The other communes come next not a far distance: commune Mănăstirea (0.9), commune Prundu (0.8) and commune Ghimpaţi (0.7), yet the situation is not as good in the communes Chirnogi (0.5), Răchiţi (0.5) and Iepureşti (0.3).

Production services

The most frequently used service is that of the vet, 60.18% of households used it, followed at a very great distance by the services of the specialized firms 14.48%, by the services of the Agricultural Chamber 12.22%, by the agricultural engineer's services 11.31% and the accountant's services 1.18%.
89.59% of the households that used these services were satisfied. These were mostly satisfied by the vet's services i.e. 92.86%; they were the least satisfied by the accountant's services, i.e. 62.50%.
60.51% of the interviewed persons answered that they intended to use the vet's services in the future, too and only 15.44% the services of specialized firms, 11.99% of the agricultural chamber's services, 11.39% the agricultural engineer's services, 1.77% the accountant's services.

Table 9. Scores obtained in the case of indicator "Production services"

Commune	Scores
Chirnogi	1
Ghimpaţi	1
Grădinari	2
Iepureşti	1
Mănăstirea	1
Mitoc	3
Prundu	3
Răchiţi	1

Source: own calculations based on field survey data

From the analysis of answers to the questions "Have you used these services?" and "Do you intend to use these services in the future, too?" it results that the households that used the vet's services, the services of specialized firms, the services of the agricultural chamber, the agricultural engineer's services and the accountant's services, will use them in the next period, too.
The scores for this indicator took into consideration the weighted average of services used in the investigated communes. The hierarchy of rural communities in which the households use these production services, according to the obtained scores, is the following:
- Score 3: communes Mitoc and Prundu;
- Score 2: commune Grădinari;
- Score 1: communes: Mănăstirea, Iepureşti, Chirnogi, Ghimpaţi and Răchiţi.

Most households use the vet's services both

for the treatment and for the prevention of animal diseases on the short and medium term. Yet very few use the other services that would help them very much in orienting and developing their farming activities (crops production, livestock raising).

CONCLUSIONS

Agriculture development index – plain area

The *Composite index by commune,* named *Agriculture development index* was calculated on the basis of the methodology presented above, to measure the economic growth potential of the community through the development/diversification of the agricultural activities.

The agriculture development index value reveals the development level of the commune, as well as the potential of agricultural activities for the investigated rural communes. This index values range from 0 to 1, yet 1 does not represent the optimum or maximum value, but rather the development potential of a commune compared to the other investigated communes.

Table 9. Agriculture development index

Commune /Importance coefficient	Isa	Iusa	Iuvm	Icc	Isp	Idp	Ida
	0,1	0,15	0,15	0,25	0,15	0,2	
Chirnogi	3	1	1	1	1	1	0.40
Ghimpaţi	3	2	1	1	1	2	0.52
Grădinari	2	2	2	3	2	3	0.82
Iepureşti	1	1	1	1	1	1	0.33
Mănăstirea	3	3	1	3	1	3	0.80
Mitoc	3	3	3	3	3	3	1.00
Prundu	2	2	2	2	3	3	0.78
Răchiţi	1	3	2	1	1	1	0.48

Source: own calculations based on field survey data

Thus, the hierarchy of rural communities according to the results of the agriculture development index is the following:

- commune Mitoc that obtained maximum scores (3) for all the components of the final index;
- commune Grădinari that obtained maximum scores (3) for the indices: Icc and Idp, scores 2 for the other indices and no score 1;
- commune Mănăstirea with score 3 for the indices: Isa, Iusa, Icc and Idp and scores 1 for the indices Iuvm and Isp;
- commune Prundu that obtained score 3 for the indices Isp and Idp and score 2 for the other indices;
- commune Ghimpaţi that obtained score 3 only for the index Isa, two scores 2 for Iusa and Idp and three scores 1 for Iuvm, Icc and Isp;
- commune Răchiţi that obtained score 3 only for the index Iusa, score 2 for Iuvm and score 1 for Isa, Icc, Isp, Idp;
- commune Chirnogi that obtained score 3 only for the index Isa and scores 1 for the other indices;
- commune Iepureşti that obtained scores 1 for all the calculated indices.

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EVALUATION OF TERRITORIAL COMPETITIVENESS. CASE STUDY: SOUTH – EAST REGION AND TULCEA COUNTY

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Abstract

The concept of competitiveness still represents an important debate subject for the academic and economic environment. Differences of opinion regarding its nature, of macro or micro economic, continue to motivate the identification of common elements that can constitute a widely accepted framework. The common point of these approaches seams to be represented by productivity, regardless of the aggregation level. The different ways of expressing productivity, thou, lead to different models for evaluating competitiveness, of which, the best known are applied at national and regional level. For the evaluation of local competitiveness, specific models have been elaborated, at international and European level, based on representative indices for the investigating areas. The present paper aims to evaluate the competitiveness at county level, compared to the upper aggregation level, namely the Tulcea County and South-East development region, based on a model adapted to the local specifics, represented by the available data sources and structure of relevant indices for this level. The initial hypothesis is that the competitiveness at county level is strongly influenced by the dominant economic character and available resources, both of human and knowledge nature.

Key words**:** *regional competitiveness, models, competitiveness indices*

INTRODUCTION

The concept of competitiveness has been an important debate subject both at academic and economic level, with supporters and contesters with regard to its utilization opportunity and nature. Depending on the level at which it is expressed, the conceptual framework, the evaluation methods and the understanding of the competitiveness concept significance has a series of specific particularities.

As regards the *competitiveness at regional level*, two types of approaches have been prefigured: one that considers regional competitiveness as the sum of individual competitiveness of firms and the other that considers it as deriving from the macro-economic competitiveness. The first requires the existence, at regional level, of certain firms that can constantly and efficiently produce goods and services that comply with the free market price and quality requirements, etc. In this case, the hypothesis is that both the interests of the firms and the interests of the region are parallel; this is difficult to achieve, as long as the regional competitiveness must include several aspects, not only productivity. Certain organizations are in favour of the idea of enlarging the concept framework, in the sense that this should reveal that in the region there are a series of common factors affecting the productivity of firms that operate on the territory of that region. Summarizing, other authors consider that "the prosperity of a region is determined, firstly, by the power of its export base meaning….all those activities that bring incomes into the region by ensuring goods and services for the outside world"[5]. A similar approach to regional competitiveness has been also taken at European level: "[Competitiveness is defined] as the ability to produce goods and services

that stand the test of international markets ensuring, at the same time, high and sustainable income levels, or, more generally, the ability (of regions) to generate, while exposed to external competition, high levels of incomes and employment…in other words, for a region to be competitive it is important to ensure both quality and quantity of jobs"[6].

In this context, productivity appears as a key element of competitiveness [4]: "*Competitiveness remains a concept that has not been fully understood, despite the wide recognition of its importance. In order to understand competitiveness, the starting point should be the source of a nation's prosperity. The living standard of a nation is determined by the productivity of its economy, measured by the value of the goods and services produced by unit of labour, natural and capital resources. Productivity depends both on the value of the goods and services of a nation, measured through the prices that can be obtained on the free markets, and on the efficiency of producing these goods and services. The real competitiveness is thus measured by productivity*".

The second type of approach, which considers competitiveness as derivate or of macro-economic nature, has a series of limitations generated by the laws governing the international trade economy, which does not operate at regional level – for instance, the exchange rate movements and the price-wages ratio flexibility – these either do not exist or do not operate appropriately at the level of the region. There is also the idea that a different mechanism operates at this level, much more efficient and penalizing, namely the inter-regional migration of mobile factors, of capital and labour, which may represent a real danger for the regions. In the absence of such an economic adjustment mechanism, the macro-economic competitiveness concept cannot be fully applied at regional level either [2].

As regards the evaluation of local/zonal competitiveness, there are generally adapted models, designed by teams of researchers, for assessing the competitiveness of certain specific zones of interest for them; these models have common elements with the models from the higher aggregation level, and also elements specific to the investigated zones and aggregation level. We shall next present a few evaluation models of local/zonal competitiveness:

-model developed by Mara Balestrieri [1], from the Agriculture Department of the University of Sassari, Italy, for the evaluation of municipalities from the region Sardinia. This classifies the municipalities on the basis of the relationship between the existing rurality/urbanization levels and competitiveness in order to evaluate the similarities and differences. The study uses the multivariate analysis of two sets of indicators that are grouped into three macro-categories: activities, persons and practices. The municipalities from Sardinia were classified according to their rurality level, using a set of rurality specific variables that correspond to certain areas with low population and residential density where the agricultural sector has played an important role in local economy. On the basis of this model, the 377 municipalities in the region were divided into 5 competitiveness and welfare classes: very high, high, medium, low and very low.

- model for local competitiveness assessment – Croatia – O. Mikuš, R. Franić and I. Grgić [3]. The model was developed in order to evaluate the rural area competitiveness from Zagreb County, located near the capital; afterwards, Zagreb County was compared to the national average on the basis of the rural competitiveness index. The selection of indicators for measuring the rural competitiveness was based on the sustainable rural development concept and the indicators were grouped into four categories: human resources, situation of the non-agricultural sector economy, situation of the agricultural sector economy, and other income-gaining activities on the agricultural household farms. At the level of each category, the selected indicators were assigned an identical specific weight; the same procedure was applied in the case of the categories of indicators. Finally, the value resulting from the application of the calculation algorithm represented the rural

competitiveness index of the county Zagreb; the conclusion of the study was that the rural area from Zagreb County was by almost 9% less competitive than the rural area at national level.

To sum up, for each aggregation level there are several evaluation possibilities/models, and the choice of a certain model for competitiveness assessment should be correlated with the goal of the investigation and the investigated area specificity.

The present paper attempts to adapt such a competitiveness evaluation model to the local conditions from our country and to investigate the competitiveness of the county Tulcea compared to the competitiveness of the development region South-East where it is located. The initial hypothesis is that both territorial units have a relatively similar competitiveness level, influenced by the prevailing economic character and by the available human and knowledge resources.

MATERIALS AND METHODS

In order to evaluate the competitiveness of Tulcea county compared to that of the development region South-East, the present paper uses the model developed by O. Mikuš, R. Franić and I. Grgić (2012) to evaluate the county Zagreb, compared to the national level; the model was adapted to Romania's conditions, as regards the available data sources necessary for the investigation (table 1).

The adaptation had in view the identification of the largest number of indicators possible from the original model for which official data are available and the completion/replacement of those for which there are no appropriately structured data.

The four groups of indicators from the original model were the following: human resources, situation of the non-agricultural sector economy, situation of the agricultural sector economy and other income gaining activities on the agricultural household farms. Following the process of identification of data corresponding to the county level in Romania, the last group of indicators from the original model was replaced by the group *Specialization and innovation*.

For the model adapted to the county level in Romania, the data were extracted at the level of the year 2012, having in view the limitations imposed by certain indicators for which the last year available was 2012. The only indicators for which the data were extracted at the level of the year 2010 are the *population with higher education* and the average farm size [8], [9].

Table 1. Adapted pattern for competitiveness assessment at county level

Variable – Original pattern Croatia	Variable – Adapted pattern
Human resources	
Employed population in the rural zone (pers)	Employed population, thousand persons
Population with higher education (pers)	Population with higher education (pers)
The young population in the rural zone (pers)	The young population (pers)
The population density - pers/sq km	The population density– pers/sq km
The situation of the non-agricultural sector's economy	
GVA(Euro)	Turn -over rate– thousands euros
Exports' value Euro)	Exports' value- thousand euros
Investments in long term goods (Euro)	Density of local active units no/1000inhab.
The net average wage (Euro)	The net average wage (Euro)
The situation of the agricultural sector's economy	
The farm's average size - ha/farm	The farm's average size– ha/farm
GVA (Euro)	The turn-over rate–thousand euros
The exports' value (Euro)	The exports' value– thousand euros
Investments in long term goods (Euros)	The density of the local active units
The net average wage (Euro)	The net average wage (Euro)
Other generating incomes activities at agricultural farms' level	**Specialization and innovation**
The share of touristic farms	The share of employed population in non-agricultural sectors
The share of krafts' cooperatives	The salary workers in CDI at 10000 civil occupied persons
The share of processing farms	% crop production in total value of the production in agricultural branch
The share of farms gaining from other incomes' generating activities	

Source: adaptation after the pattern elaborated by O. Mikuš, R. Franić şi I. Grgić, 2012

The calculation formula of the competitiveness indicators (components of the competitiveness index) was the following:

$$X_i = 100(x_i/X)/(p_i/P)$$

where:

- the small letters represent the county values

and the capital letters represent the values at regional level;
- X_i represents the selected variable for the county and X for the region;
- p_i represents the population at county level and P the population at regional level.
Each indicator was assigned a specific weight equal to that of the other indicators from the group, and for each group an intermediary value of the index was calculated (shortly SUB IND), using the arithmetic mean; thus, the values resulting for each group of indicators (SUB IND) were used for the calculation of the competitiveness index value at county level, resulting from the calculation of the arithmetic mean of the SUB IND values – it was considered that all the components are equally important in expressing competitiveness. The turnover indicators, the value of exports and the net average wage were calculated in euro at the average exchange rate of the year 2012.

RESULTS AND DISCUSSIONS

Before proceeding to the calculation of the competitiveness index at county level, compared to that of the region, we shall briefly present the main characteristics of the development region South-East and of the county Tulcea.
The development region South – East is located in the south-eastern part of Romania; its area is 35,762 km^2, i.e. about 15% of Romania's total area and it ranks on the second place as regards its size, among the 8 regions of Romania.
Its relief forms include the Danube river plain, Bărăganului plain, Dobrogea Plateau with Măcinului Mountains, while the north-western part of the region covers a part of the Curvature Carpathians and Sub-Carpathians. At the same time, the region is crossed by the Danube river, it includes the Danube Delta and in its eastern part it borders on the entire Romanian Black Sea coast. The plain is the main relief unit, with continental climate [11].
In the year 2012, the population of the region totalled 2,538,949 persons, accounting for 12.6% of Romania's total population, with a population density of 70.9 pers/km^2, under the national average of 84.3 persons/km^2. The network of localities consisted of 35 towns (out of which 11 municipalities) and 1448 villages organized into 355 communes – out of which 63 villages belonged to municipalities and towns. The most important towns of the region are Constanta, Galati, Brăila, Buzău, Focsani and Tulcea.
As regards the job supply, it is mostly represented by the tertiary sector, which concentrated 58.4% of the employed population, followed by the primary sector (agriculture, forestry and fisheries) with 33.7% and the secondary sector (industry+constructions), with 26.4% [7].

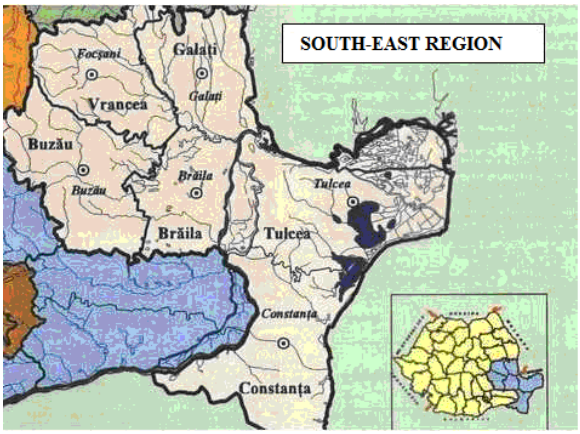

Photo 1. Map of the South-East development region
Source: www.vaslui.insse.ro

It is worth mentioning the high share of the population employed in the sector of services in the counties Constanţa and Galaţi, due to the development of tourism resorts alongside the sea coast and the presence of the ports Constanţa, Mangalia and Galaţi [11]. As regards the transport network, the region has a good connection to the national and European road transport network, being crossed by important corridors (E60, E85, E87, E70) and by an extended river/sea transport infrastructure favoured by the Danube river and the Black Sea: the port Constanta, the largest port at the Black Sea and the fourth in size from Europe and the river ports Brăila, Galati and Tulcea.
From the administrative point of view, the region South-East consists of 6 counties, namely: Constanta, Tulcea, Brăila, Galati, Buzău and Vrancea. The county Tulcea is

located in the eastern, south-eastern extremity of Romania, in the central-northern part of Dobrudgea at the Danube river mouth and has exit to the Black Sea. It borders on the county Galati in the north-west, on the county Brăila in the west and on the county Constanta in the south. The eastern point of Romania is also found in this county, i.e. the town Sulina [10].

Photo 2. Emblem of the Tulcea county
Source: www.cjtulcea.ro

In terms of area, the county Tulcea has the highest share in the area of the region South-East, with 8,499 km^2, accounting for 23.7% of the total area and 3.56% of the country's area. It is the fourth county as regards its size, after the counties Timiș, Suceava and Caraș-Severin. In its total area, the area covered by the wet areas of the Danube Delta and the lagoon complex Razim Sinoie account for about 3500 km^2. The relief is characterized by the presence of two distinct physical-geographic units: a higher relief unit, in the central-western part, and a lower relief unit in its northern, north-eastern and eastern part represented by the Danube Delta and the northern part of the complex Razim Sinoie.

As regards the areas by relief units, the county Tulcea is structured as follows: hills and plateaus (3,722.4 km^2) – 43.8%, mountain areas (433.4 km^2) – 5.1% and river plain and the Danube Delta (4343.2 km^2) – 51.1%.

The economy of the county Tulcea is characterized by:

-a diversified industry – shipbuilding and ship repair, ores, textile confections, magnesia products, construction materials, civil and industrial constructions, food industry products, furniture;

-a developed agriculture – benefits from soil and weather conditions that are favourable for the cultivation of cereal crops, legumes, industrial crops, vegetables and fodder crops and for the appropriate development of the livestock sector; at the same time, the soil nature, the weather conditions and the plentiful sunshine favour vine farming, mainly in the areas of the localities Niculițel, Babadag, Tulcea, Isaccea, Dăeni; other very important activities are the following – river, lake and sea fishing, hunting and sportive fishing;

-a well-developed tourism sector, favoured by the extremely important natural endowment both for the county Tulcea, as well as at national, European and international level – the Danube Delta, the youngest territory of Europe; the huge tourism potential is completed by the presence of numerous historical and archaeological sites and remains, monuments, museums, as well as by the existing traditions, traditional houses and customs – all these ensuring conditions for a prolonged tourism season, thus generating significant incomes for the local economy.

We shall next evaluate the competitiveness of Tulcea county compared to that of the development region in which it is located, the South-East region.

The four groups of indicators from the model, their values calculated for the year 2012, reveal both the strengths and the weaknesses of the county Tulcea, compared to the level of the region South-East. With the calculation of the individual values for each group in part, we can calculate the Competitiveness Index value of the county Tulcea (table 2).

The competitiveness index calculated on the basis of the adapted evaluation model reveals the existence of a competitiveness level of Tulcea county equal to that of the South-East development region. However, a series of important particularities contributed to this result in the direction of increasing or, by contrast, decreasing the competitiveness level.

Two of the four groups of indicators included in the evaluation model acted in the direction of limiting the competitiveness level versus

the regional one, being in their turn influenced by the levels of specific indicators. In the first place, we refer here to the group *Human resources* where we can notice the very low value of the indicator *population density* – by almost 3 times lower than that at regional level, which can be also explained by the presence of vast wetland areas and of the Danube Delta, hardly accessible territories, with low population number. In the same sense, yet with a much higher value, we have the effect of the indicator *population with higher education,* with a significantly lower value than that of that at regional level. The effect of the other two indicators from this group is neutral, with values that are almost identical to those at regional level.

Table 2. The local competitiveness Index – the Tulcea County vs South-East Region, year 2012

Variables	Tulcea County pi = 212,012	Region S-E P=2,538,949	Indicator (X_i) of county Braila competitiveness Region S-E=100
	p_1/P = 0.083503		
Human resources			
Employed Population, 2012 (thousand persons.)[1]	84.4	1,011	99.97
Higher education population (no.pers.)[1]	17,097	268,348	76.30
The young population 0-20 y.o (no.pers.)[1]	45,546	540,895	100.84
The population density (no.pers./sq. km)[2]	24.8	70.8	35.03
The mean of indicators in the first component (sub-index 1)			**SI_1 =78.03**
The non-agricultural sector's indicator			
The turnover rate (thousand euro) [1]	1,064,954.024	21,982,843.28	58.02
The exports' value (thousand euro) [1]	279,897	4,129,817	81.16
The local active units' density /1,000 inhab.) [2]	19.08	21.34	89.42
The net average wage (euro) [2]	360.64	329.67	109.39
The average of the indicators in the second component (sub-index 2)			**SI_2** = 84.50
The agricultural sector's Economy			
The average size of the agricultural farm (ha/farm) [2]	7.88	4.94	159.51
The turn over rate (thousand euro) [1]	123,577.85	1,305,892.82	113.33
The exports' value (thousand euro) [1]	37,784	542,293	83.44
Local active units density (active units /1,000inhab.) [2]	2.19	1.17	187.05
The net average wage (euro) [2]	246.41	233.17	105.68
The indicators' mean in the third component (sub-index 3)			**SI_3 = 129.80**
Specialization and innovation			
% of the employed population in the non-agricultural sectors [2]	62.6	66.3	94.39
The salary workers employed in RDI per 1,000 civil employed persons [2]	20.7	16.4	126.22
% of crop production in total value of production of the agricultural branch (2012) [2]	67.33	65.67	102.53
The mean of indicators in the fourth component (sub-index 4)			**SI_4 = 107.71**
The local competitiveness index – county Brăila			***ICL_{BR} = 100.01***

Source: own calculations based on NIS data
Note: [1] – variable calculated with the formula: X=100*(xi/Xi)/(pi/Pi); [2]– variable calculated with the formula: X=xi/Xi*100

The second group of indicators that influence the competitiveness of the county Tulcea, in the direction of limiting competitiveness, is the group *economy of the non-agricultural sector*. Although benefiting from a diversified industry, a special archaeological and cultural capital – materialized into a huge tourism potential, which should represent strengths in the non-agricultural sector development, this cannot equal the very good performances of the polarizing industrial and services centers represented by the sea and river ports Constanța, Mangalia, Galați, Brăila, and also of the towns Buzău and Focșani, which have an essential contribution to the non-agricultural economy of the development region South-East. In these conditions, most indicators from this group had significantly lower values in the county Tulcea versus those at regional level, the poorest performance being noticed in the case of the *turnover* of the units from the non-agricultural sector – by about 42% lower than its value at regional level.

If these had been the only groups of indicators from the model, it is certainly that the competitiveness level of the county Tulcea would have been much lower that that of the region South-East. Fortunately, this was not the case. The following groups of indicators had as effect the increase of the competitiveness level, covering almost the

entire difference generated by the sector of the human resources and the non-agricultural sector.

We must mention here the *economy of the agricultural sector* of the county Tulcea, whose competitiveness level was obviously higher than the regional level, by almost 30% higher. This was mainly determined by the *density of local active units* in the agricultural sector and by the *average farm size,* both representing the benchmarks of a well-developed agricultural sector, based on a land structure that contributes to obtaining good results in the farming activities. Besides these two indicators, we also have a good effect of the *turnover* of the agricultural units, by about 13 % higher than that at regional level and the *net average wage*. The only indicator in this group whose value was lower that that at regional level was the *value of the exports* of the agricultural sector.

The group of indicators *specialization and innovation* also contributed to competitiveness increase. The main contribution was brought by the indicator *employees in RDI in 10000 employed persons,* the value of which is by about 26% higher than that at regional level, which reveals the existence of higher innovating potential of the county Tulcea; this potential, in the conditions in which it is well used, can bring an important competitive advantage in the region.

CONCLUSIONS

Considering all these aspects, the initial hypothesis of the present paper has been confirmed: both territorial units had a similar competitiveness level in the year 2012, which was strongly influenced by the prevailing economic character, as well as by the human resources and their knowledge and skills. In the case of Tulcea county, we can speak about a strong farming sector, which by its organization structure, dynamics of local active units and the obtained outputs has significantly contributed to the competitiveness level; besides this, the characteristics included in the group of indicators Specialization and innovation also have the same effect, which provides an important competitive potential to the investigated territory.

In spite of the limitations regarding the measurement and analysis of competitiveness at this level, coming both from the insufficiently developed conceptual framework and from those derived from the selection of indicators and availability of appropriately structured data, this model / quantitative analysis, besides revealing, at least partially, the competitiveness at county level, turns to be an inspiration source for the development of research activity both for the measurement of competitiveness and for the enlargement of the base of indicators.

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THE ANALYSE OF VALUE STRUCTURE OF AGRICULTURAL PRODUCTION FOR CONVENTIONAL AGRICULTURE

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Abstract

The value structure of agricultural production reflects the extensive character of Romanian agriculture and low economic efficiency of use of agricultural resources. Analytical research that formed the basis of this work has followed developments in agricultural production and structure of branches and vegetable crops. Were analyzed the correlations between volume indices of intermediate consumption and physical agricultural production indices, following the development trend of chronological series for years 2004-2014. Also, the dynamic costs to consumers was analyzed in correlation with price growth of agricultural production for vegetable crops representative Romanian agricultural sector.

Key words**:** *agricultural production, price, consumption, correlation, regression*

INTRODUCTION

In order to calculate and interpret the many aspects of the relationship that forms objectively between efforts and results achieved in agricultural production was necessary to develop and use a system of technical indicators and economic with which to be able to address systemic activities specific agriculture.[9]
The use of indicators in economic analysis has a number of advantages such as:
-suggestively presents the evolution of a phenomenon (fixed base indices);
-presents annual growth of phenomena or factors (chain indices);
-can be done comparing indicators across time and space;
-provides some independence from value indicators, in terms of variation of prices;
-in the analysis they give an "alarm signal" showing the analyzed phenomenon's trend;
-can be used in both ways in retrospective analysis and in forward-looking analysis.[6]

MATERIALS AND METHODS

The economic function is the concrete - in the form of algebraic equations - correlations (technical, or economic power) is established between a dependent variable (eg production volume) and the factors that contribute to achieving its (independent variable).
In theory and statistical practice appears increasingly more often the question to use statistical data to determine the trend of development of phenomena in the subsequent step. In the social and economic phenomena generally acts the statistical laws, which manifests itself as a trend that can be traced only for a period of time. This means that the development trend of events in a limited probability can be known and thus be used in future calculations.[7]
To highlight the law which is manifested in the link between the phenomena it is necessary to express the law into the form of analytical function corresponding to the relationship between the factor and the resultant feature. This feature is known as regression function and its graphic

representation is through line (curve) regression. Choosing the right regression function that best expresses the connection between the two features is particularly important for determining the statistical value of the correlation indicators. [5]

Regression function expresses statistically the way that the resutaltive feature of y is changing due to the change of the factorial feature of the x factor when the variation of y is in correlation only with the variation of x. For this, it is necessary that the other characteristics to be considered non-essential and with constant action on all units on which is measured the ratio of interdependence and whose influence is summed up in a single value that has the character of average. If the polynom of approximation has the degree p = 2, the application of the criterion of least squares leads to the *quadratic regression* that has the form :

$$Y = a + bx + cx^2$$

where a, b and c are coefficients

* a is a constant

* when b<0, the variation of the resultative feature of y decreases due to the increase variation of x;

*when b>0, the resultative feature of y increases due to the increasing of x;

* when c <0, the variations of the resultative feature of y in response to variation x (time/year of production) are becoming smaller (if b> 0 characteristic outcome y will drop due to increased x if c> 0);

* when c> 0, the variations of the resultative feature of y as a result of variation of x are increasingly higher.[10]

RESULTS AND DISCUSSIONS

From the direct analysis of chronological data series for the years 2004-2014 it can be observed that the physical production in agriculture has stagnated in 2005-2007, and since 2008 the productions have increased.[4]

The volume indices of the intermediate consumptions (fertilizers etc.) were correlated with those of physical production in 2006-2007 (table 1), after which exceeded output growth in the coming years. Because of the unfavorable weather conditions (drought, floods), the effects of the growth of those consumptions were not found in the growth of the physical production.[2]

Table 1. Dynamics of the value of agricultural production, the specific consumption and fixed capital formation at current prices

Specification	2004*		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
	Absolute values	(%)										
Agriculture production	52,527	0	-17.1	-11.2	-16.2	18.3	3.6	13	35.6	11.4	36.8	27.2
Intermediate consumption, by:	26,178	0	-7.8	-1	2.7	38.3	25.4	40.1	60.9	39.7	70.5	66.5
-energy and lubricants	2,692	0	14.1	24.7	18.5	90.5	71.3	127.9	187.8	151.3	216.1	234.6
-chemical fertilizers	1,574	0	-3	-17.9	-33.6	57.5	24.7	60.4	103.9	83.7	112.3	113
-maintenance of equipment	2,203	0	-15.8	-8.7	-18.7	16.2	11	4.7	33.6	4.9	21.1	30.4
-maintenance of buildings	296	0	16.2	73.6	14.2	9.8	6.8	-15.2	50.3	41.9	50	48.6
-agriculture services	392	0	0.8	20.9	74.7	82.7	91.6	42.1	39	36.5	89.8	137.5
-consumption of fixed capital	5,254	0	7.2	36.9	43.4	40.9	55.5	86.5	121.7	121.9	153.8	134.4

Source*:* Calculations based on data series TEMPO-ONLINE, years 2004-2014, INS * 2004 = 100 (absolute values – mil. lei)

The dynamics of intermediate consumption prices continues to outpace the dynamics of agricultural production prices and as a result, farmers' incomes are declining.[1]

The intermediate consumptions have superior values than the production value since 2007, largely due to increasing energy prices and material maintenance of machinery and buildings. Intermediate consumption during 2007-2014 grew up without showing a production value corresponding to this growth, which contributed to increased costs and as a result of the reduced capitalization prices, the gross added value decreased. Consumption of fixed capital expressed at current prices, presents the annual variations due to price changes in equipment and does not correlate with the value of production whose dynamic is inferior.[8]

Increased consumption of fixed capital

exceeds the increase in value of production during the period 2004-2014 and thereby decreases net added value in agriculture.

Table 2. The structure of agricultural output at basic prices

Specification	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Agriculture production*	52,527.3	43,570.3	46,635.9	43,998.9	62,153.3	54,420.0	59,359.8	71,211.4	58,508.6	71,855.6	66,815.5
Vegetal production (%)	72.5	64.2	67.2	65.3	73.6	65.7	73.3	76.1	68.7	74.9	72.7
Animal production (%)	26.7	34.9	31.8	33.2	25.3	33.0	25.8	23.2	30.4	24.0	25.9
Agriculture services (%)	0.7	0.9	1.0	1.6	1.2	1.4	0.9	0.8	0.9	1.0	1,4

Source*:* Calculations based on data series TEMPO-ONLINE, years 2004-2014, INS * 2004 = 100 (absolute values – mil. lei, current prices)

The value of crop production has a relevant share in the structure of agricultural production value, ranging from 64.2% (due to floods) in 2005 to 74.9% in 2013 (due to higher yields obtained).

Table 3. The dynamics of crop production value of intermediate consumption and specific, current prices

Specification	2004*		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
	Absolute values	(%)										
Vegetal production	38,097.2	0	-26.6	-17.8	-24.6	20.1	-6.2	14.2	42.2	5.4	41.3	27.6
Intermediate consumption:	26,178.3	0	-7.8	-1	2.7	38.3	25.4	40.1	60.9	39.7	70.5	66.5
- seeds	2,114.6	0	-18.6	15.2	13.9	61.6	23.1	65.6	92.4	47.4	105.9	91.3
- energy and lubricants	2,692.1	0	14.1	24.7	18.5	90.5	71.3	127.9	187.8	151.3	216.1	234.6
- chemical fertilizers	1,574.0	0	-3.1	-17.9	-33.6	57.5	24.7	60.4	103.9	83.7	112.3	113
- pesticides	737.1	0	-2.9	-23.5	-28.4	22.8	1.3	44.5	74.2	47.7	93.7	111.5

Source*:* Calculations based on data series TEMPO-ONLINE, years 2004-2014, INS * 2004 = 100

The volume indices of intermediate consumptions (seeds, energy, fertilizers, pesticides) are correlated with those of crop production in 2005-2007, after which exceeded the dynamics of crop production in the coming years. The effects of this growth of consumption were not found in physical production growth due to increasing input prices.

This discrepancy highlights the difference between the prices of agricultural and industrial (scisors priceing) with a reduction in farmers' income and the possibility of purchasing inputs.[3] In table 4 it is shown the changes made by vegetable crops studied compared to the base year 2004 in terms of production value obtained.

Table 4. Evolution of crop production value (culture) and current prices

Specification	2004*		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
	Absolute values (%)											
GRAIN	14,579.4	0	-52.3	-60.5	-62.7	-3.5	-40.6	-26.1	35.4	-14.1	36.4	19.3
Wheat	4,060.9	0	-37.8	-55.6	-54.9	16	-41.6	-19.6	50.5	16	47	40.1
Barley	781.1	0	-49.9	-62.4	-56.3	21.6	-16.7	-4.2	52.7	25.7	101.7	107.5
Maize	9,457,2	0	-59.5	-63.1	-68.5	-16.6	-43.7	-32.4	24.7	-34.2	23.3	0.3
Rice	5.1	0	60.7	-90.4	536	868.4	893.7	914.1	1,428.1	1,192.5	1,241.8	818.5
Oleaginous	1,531.1	0	-14.2	-4.5	-43.4	50	5.1	91.6	183.8	102.9	224.8	192.9
Rapeseed	66.0	0	33.9	95.9	307.3	1,122.9	736.7	1,683.8	1,712.2	336.1	1,641.5	X
Sunflower	1,192.1	0	-14.6	-6.6	-59.8	16.7	-19	29.2	146	120.2	196.3	X
Soybeans	235.2	0	-12.3	-7.7	-50.2	-62.8	-65.7	-21.8	-20.7	-24.7	17.1	X
Tobacco	29.0	0	-60.1	-82.2	-89.2	-70.6	-83.7	-59.2	-56.6	-72.9	-75.2	-77.2
Sugar beet	56.8	0	-11.1	80.9	19.2	35.7	85.4	75.3	96.2	114.2	206.4	311.9
Textile plants	0.8	0	41	47	-75.9	-85.5	-99.9	-97.6	-98.8	-97.6	-94	X
Hop	0.5	0	365.3	987.8	1,014.3	902	700	900	538.8	1,018.4	906.1	X
Potatoes	4,419.1	0	-29.7	13.1	4.7	-6.2	8.2	-1.4	49.3	-31.5	28.8	14.4

Source*:* Calculations based on data series TEMPO-ONLINE, years 2004-2014, INS * 2004 = 100

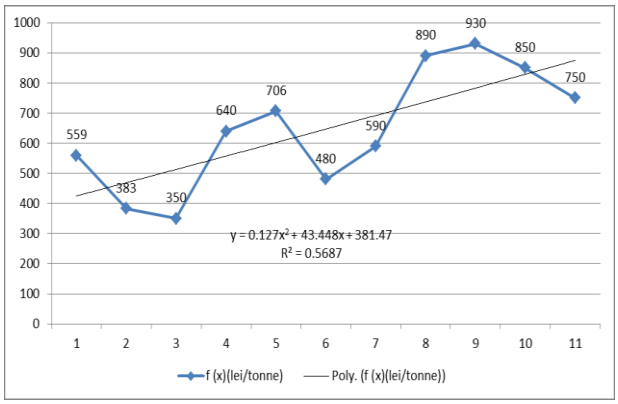

Fig. 1. The dynamic of basic price at wheat (lei/tonne)
Source: Own calculation.

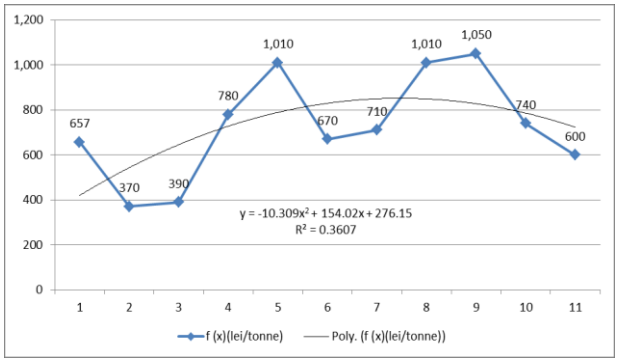

Fig. 2. The dynamic of basic price at maize (lei/tonne)
Source: Own calculation.

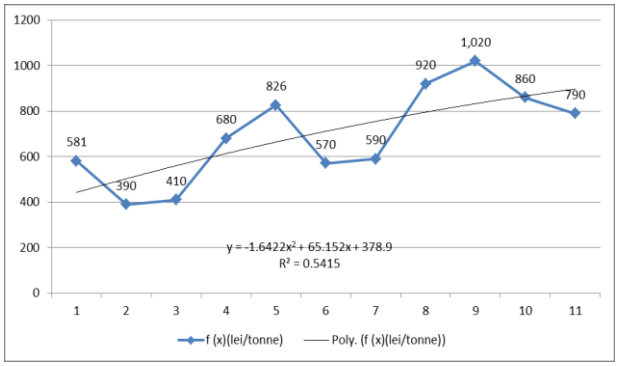

Fig. 3. The dynamic of basic price at barley (lei/tonne)
Source: Own calculation.

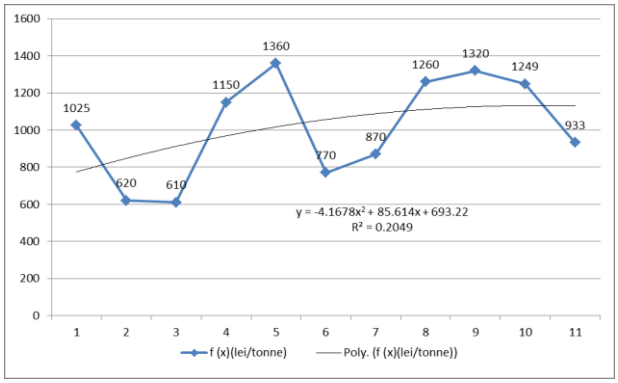

Fig. 4. The dynamic of basic price at rice (lei/tonne)
Source: Own calculation.

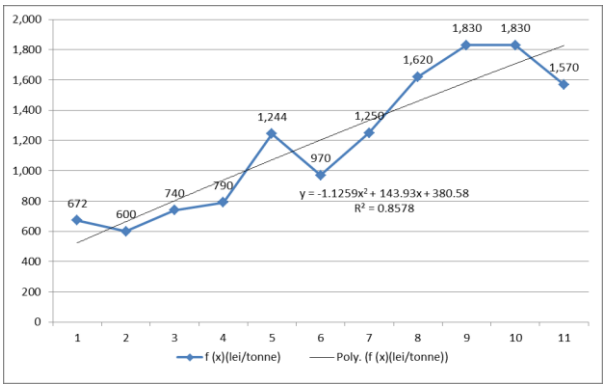

Fig. 5. The dynamic of basic price at rapeseed (lei/tonne)
Source: Own calculation.

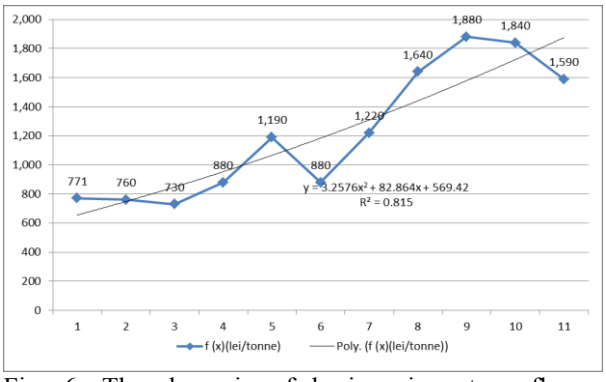

Fig. 6. The dynamic of basic price at sunflower (lei/tonne)
Source: Own calculation.

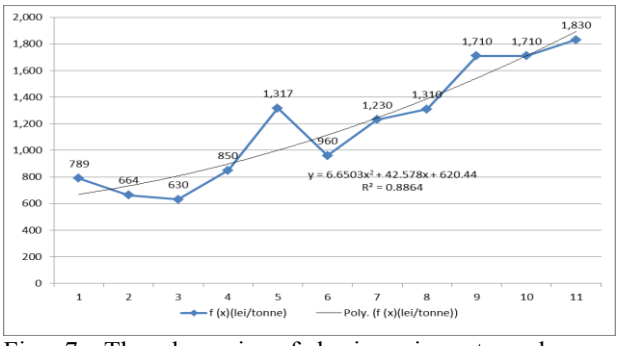

Fig. 7. The dynamic of basic price at soybeans (lei/tonne)
Source: Own calculation.

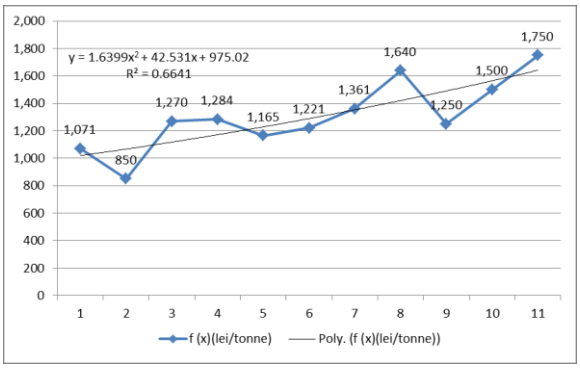

Fig. 8. The dynamic of basic price at potatoes (lei/tonne)
Source: Own calculation.

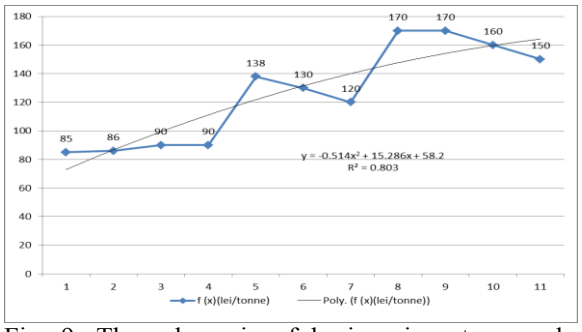

Fig. 9. The dynamic of basic price at sugar beet (lei/tonne)
Source: Own calculation.

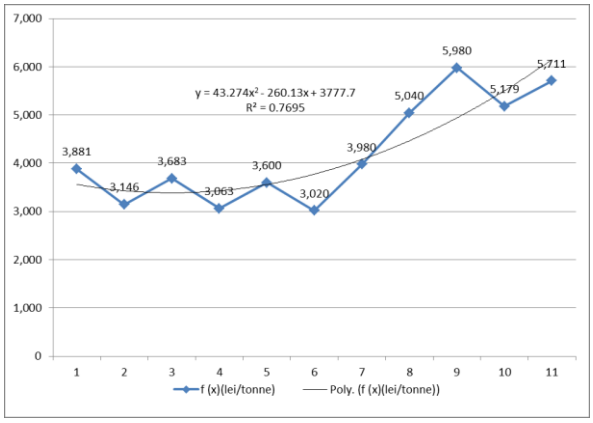

Fig. 10. The dynamic of basic price at tobacco (lei/tonne)
Source: Own calculation.

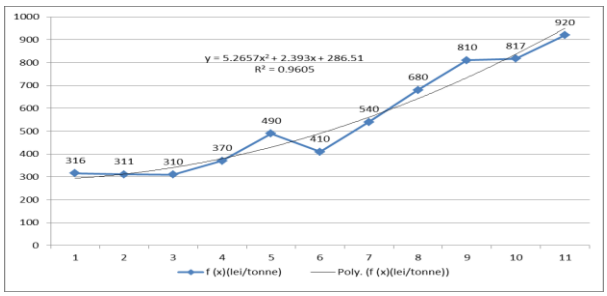

Fig. 11. The dynamic of basic price at textile plants (lei/tonne)
Source: Own calculation.

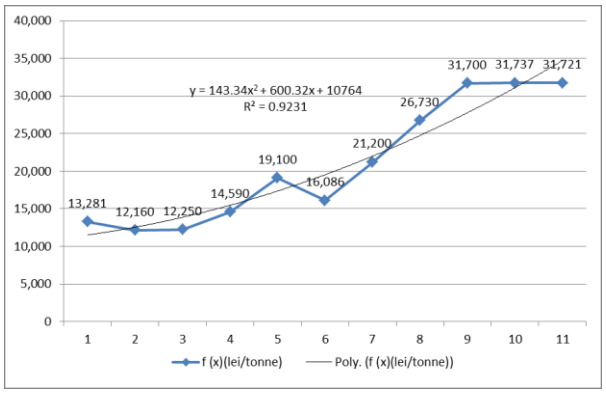

Fig. 12. The dynamic of basic price at hop (lei/tonne)
Source: Own calculation.

Next it is presented the dynamic of the evolution at basic prices of the chronological series 2004-2014, through graphs that highlight both the average annual values of prices, and correlation indicators by the line (curve) of regression for every crop that we have analised (figures1-12).

In the period 2004-2014 the main conclusions drawn by analyzing the value of the agricultural production are [11]:

- Across entire agriculture there were no essential changes in the structure of production value. Predominant remains the crop production (72.7% in 2014), animal production stays low (25.9% in 2014) and services hold an insignificant share; noticeable changes took place in branches and cultures between years 2004-20014, main crop production value structure recorded significant changes due to lowering of the corn wheat and barley acreage, and the fall in prices; average yields in 2014 compared to same period in previous years, registered increases, as follows: 35.9 q/ha wheat, 47.7 q/ha for maize, 21.8 q/ha sunflower, 25.4 q/ha soybeans, 26.1 q/ha rapeseed, 447 q/ha for sugar beet 175 q/ha for potatoes, 59.13 q/ha to hemp, 16.4 q/ha tobacco and 11.3 q/ha to hop);
- The proportion of technical plants in production value maintains as a result of increased areas cultivated with rapeseed and sunflower and sunflower average yields (the oleaginous plants held 9.2% of the value of agricultural production in 2014);
- Textile plants (hemp) is still cultivated on small areas (318 ha (0.005%) in 2014) and yields tend to rise (59.13 q ha) and the prices are low;
- The sugar beet increased share of production value (0.48% in 2014) due to rising prices and subsidies;
- The area planted with tobacco was reduced from about 5,892 hectares in 2004 to 1,681 ha in 2011 and to 855 ha in 2014, and as a result the production of cigarettes is based on imports;
- Potatoes are maintained with a high share in the structure of agricultural production value (11.6 in 2014) due to the large areas planted, average yields (17 tons in 2014) and prices tend to rise, etc.

CONCLUSIONS

Agricultural production evolution and its structure of branches and cultures does not reflect an efficient use of human and natural resources of agriculture. Dominant are the cereals, oilseeds and potato plants, and some products are produced in insufficient quantities (eg sugar beet, etc.) and therefore they are imported. The composition of agricultural production reflects the extensive character of Romanian agriculture and the low economic efficiency of using the agricultural resources. The comparative advantages offered by soil conditions have not yet turned into competitive advantages due to lack of adequate technical infrastructure and mismanagement of production and the environment. In Romania it's maintained a simplified production structure, into holdings which fail to respond to the consumption needs of the population and therefore results an imports increase (eg sugar, tobacco, hop, etc.)

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THE EVALUATION OF THE ROLE OF THE VARIOUS TYPES OF FERTILIZERS ON THE PROCESS OF THE ACCUMULATION OF CONTENT OF NITRATES IN FORAGE CROPS

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Abstract

The purpose of the conducted researches ascertained in the evaluation of the influence of worm compost and ammonium nitrate on the accumulation of the content of nitrate in forage crops on cultivation of which these fertilizers were used. The article presents results of studies regarding to the role of worm compost and ammonium nitrate in the process of accumulation of nitrates in maize, alfalfa and fodder beet in different phenological stages of development. It was found that the use of worm compost and nitrate, as fertilizers influenced the process of accumulation of the content of nitrate, thus modifying the quality of forage crops. In samples of maize, alfalfa and fodder beet, cultivated by the using of worm compost, this indicator decreased respectively with 2.75% - 23.24%, in comparison with its value in plants of control lot. In the plants cultivated with the fund of the ammonium nitrate the content of these increased by 1.15-4.15 times, in comparison with its value in plants of control lot. Thus, it was evaluated the role of worm compost in the process of obtaining the qualitative forage crops by reduction the content of nitrate in them.

Key words**:** *alfalfa, ammonium nitrate, fodder beet, maize, worm compost*

INTRODUCTION

The development of the intensive agricultural technologies in XX century aimed a broad use of various chemical substances (fertilizers, herbicides and pesticides), which consequently destroyed the micro flora and fauna in the soil, diminishing the amount of humus, one of the main indicators of soil fertility. The humus has a multilateral influence on the hydrophysical activity, thermal, technological and biological of the soil. In the humus are concentrated up to 98% reserves of nitrogen, 60% phosphorus, 80% sulphur, essential amounts of the other micro - and macronutrients.

Scientists pedologists [3, 7] found that the annual losses of humus in the soil is 0.5-0.7 t/ha. To maintain the balance of the humus on the level (zero) without deficit it is necessary to be incorporated into the soil annually, about 6.3 t/ha of conventional compost (regular).

In natural conditions the accumulation of humus in the soil flows very slowly. For the formation of a layer of one centimetre of the soil it is necessary to pass a period of 100 years. Under the influence of anthropogenic factor this process may take only 3-5 years [9].

In order for the degraded soil to give increased crops it is necessary to use new technologies to improve soil fertility and obtaining organic agricultural production. One of these technologies is the bioconversion of organic waste by using worm compost called worm cultivation technology, in the result of which it is obtained an ecological organic fertilizer –worm compost which possesses enhanced biological activity. This technology is widely practiced in some countries of the world (Italy, Netherlands, Germany, Romania, Estonia, Ukraine, Russia, Bulgaria, Slovakia, Japan, a.) [4, 6].

However, the use, of considerable quantities of manure, mineral fertilizers (synthetic) and various pesticides and herbicides in agriculture in the last decades of the twentieth century, has led to the accumulation in the soil

of increased quantities of toxic substances for humans and animals.

One of the actions that can solve these problems of the environment, in order to ensure the human and animal health, is the implementation of bioconversion technology (processing) of organic waste of diverse sources, including those of animal [2, 3].

The presence of significant amounts of manure that can be used in the quality of organic fertilizer, has determined the researchers to elaborate a complex system of measures to improve the ecological situation in the republic, including measures to ensure the veterinary, zoo hygienic and epidemiological health welfare [4].

The incorporation into the soil of the conventional compost is ineffective and expensive because from a ton of this compost is formed only 20 kg of humus. Instead in a ton of worm compost is contained 270-300 kg of humus. Therefore the use of worm compost allows the essential reducing of the completing period of the deficit of humus in the soil, reanimating the soil fertility and increasing there sistance of this to wards the alluvial and aeolian erosion [7; 9].

Worm cultivation technology contributes to solving of some important problems in the zootechnical sector: improving the sanitary status at farms, veterinary welfare and the production of worm compost - organic fertilizer that improves the soil fertility and allows to obtain qualitative agricultural products [1].

Worm cultivation opens new perspectives and opportunities for the technology implementation of obtaining forage with high protein content. It can become the foundation of the effective production of the organic feedingstuffs.

In the result of the conducted investigations it was found that in agricultural crops fertilized with worm compost total nitrogen and crude protein content has increased that of the control lot plants and the nitrosocompounds content has decreased [1;5].

According to the obtained results, it was found that a characteristic property of worm compost is the increased content of organic matter, which constitutes 22.00% - 30.00%, and also in its composition are present beneficial micro organisms, total nitrogen, ferments, micro-and microelements. The ingoing amount of worm compost in the soil is ten times smaller than that of conventional compost. The content of nitrosocompounds in cultivated crops, using the worm compost is smaller than those cultivated with mineral fertilizers fund.

Scientific novelty of the research consisted in examining the possibility of the application of worm compost in the process of obtaining green forage crops with a low content of nitrosocompounds. The studies also have focused on obtaining qualitative animal feedingstuffs.

MATERIALS AND METHODS

In order to assess the influence of worm compost and ammonium nitrate on the accumulation of nitrates content in the forage crops, on the cultivation of which these fertilizers were used, in the field conditions of the Technological- Experimental Section "Maximovca", was organized an experiment. In the experiment were included the mentioned fertilizers and three types of fodder crops: maize, alfalfa and fodder beet. For the cultivation of fodder crops were used 7 lots with an area of 3.0 acres, six - experimental, inclusive three – with worm compost fund (experimental I), three – with the ammonium nitrate (experimental II) and 3 control lots with natural background (without fertilizers).

Before the incorporation of fertilizers, it was performed the soil preparation (autumn plowing to a depth of 30-40 cm and spring harrowing). The used dose of fertilizers was different: worm compost was incorporated into the soil in recital 4 t/ha and ammonium nitrate - 285 kg/ha. The fertilization was done in the early spring after the snow melting, on the autumn plowing to a depth of 5-7 cm. Fertilizers were incorporated manually in accordance with the scheme of the experiment (Table 1).

During the test period, were made observations on the development of plants in dependence on the phenological phases and on the different stages of the growing season.

Table 1. The experimental scheme

No	Types of forage crops	Variant of the experiment and the dose of fertilizers t / ha			Investigations during the experiment
		Control	Experimental		
			Worm compost, t/ha	Ammonium nitrate kg/ha	
1	Maize	Nnatural fund	4.0	285.0	- Observations on phisiological development of plant; - evolution of the nitrate content
2	Alfalfa	Nnatural fund	4.0	285.0	
3	Foder beet	Nnatural fund	4,0	285.0	

In collected samples it was determined the nitrates content, using the method of the electro colorimetric [4]. The analysis of the results was performed by comparing the maximum permissible concentration (MPC) of nitrates with that found in the samples of grown forage crops. Also, the nitrate concentrations in plants of experimental groups were compared with those found in plants of the control lot.

For research, maize sampling was carried out in four phases of the vegetation those of the alfalfa – in two phenological phases and three periods of collection and fodder beet - in three phenological phases.

The experiment duration depended on the vegetation period of each forage crop.

RESULTS AND DISCUSSIONS

The evaluating of the quality of forage cultures was carried out by analyzing the results obtained at the determination of the amount of nitrates in plants, depending on the phase of vegetation and the type of the studied material. In the maize, the nitrate content was determined in samples consisting of stems, leaves and cobs, in alfalfa - in green mass and dried (in accordance with periods of collection), and in fodder beet - in the root and in the leaves.

According to the results shown in Table 2 it was found that the amount of nitrate content in maize samples (in all phenological phases) exceeded the maximum permissible concentration (MPC = 200 mg / kg). In cobs in the wax phase the nitrates were not been detected, and in samples of stems and leaves their content exceeded the MPC.

Table 2. The nitrates content in the maize samples

Phenological phases	Variants of the experiment and the quantity of nitrates (mg/kg)		
	Control	Worm compost	Ammonium nitrate
I	1,011.0 ± 2.94	776.0±11.76	1,320.0±12.65
II	960.0±0.42	750.0±1,68	1,240.0±1.26
III	344.6±0.46	302.0±0.52	1,136.0±0.48
IV	257.8±0.42	250.7±0.46	926.4±0.46

Note: I - The formation of ear (stems and leaves);
II - Forming cobs (stalks, leaves and cobs);
III - Cobs in milk stage (stalks, leaves and cobs);
IV - Cobs in the phase of wax (stems, leaves)

Thus, in the maize samples, collected from the control lot (in all phases), the amount of nitrate exceeded the maximum permissible concentration by 1.29 - 5.06 times, in that collected from the lot with fund of worm compost, the value of the concentration of nitrate esexceeded the MPC by 1.25 - 3.88 times, and in that cultivated with fund of the ammonium nitrate, this indicator exceeded the maximum permissible concentration by 4.63 to 6.60 times.

The content of nitrates in forage crops depended not only on the phase of vegetation and on the type of used fertilizers. In all phenological phases of the maize development cultivated with the fund of ammonium nitrate was found a high nitrate content. In maize samples, collected in the I, II, III and IV phases, from the lot with fund of the ammonium nitrate, the nitrate content surpassed, respectively by 1.31; 1.30; 3.30 and 3.59 times that of maize samples of the control lot and with 1.70; 1.65; 3.76 and 3.69 times that of corn cultivated with worm compost fund.

In maize samples collected from the lot with fund of worm compost in that 4 phases, the nitrate content was with 23.25% (phase I); 21.87% (phase II); 12.36% (phase III) and 2.75% (phase IV) lower than in the control lot and respectively with 41.21%; 39.52%;

73.42% and 72.94% lower than in those cultivated with the fund of the ammonium nitrate. This demonstrates that the process of the accumulation of nitrates in plants cultivated with worm compost fund was lower than in those cultivated with the ammonium nitrate fund.

Therefore, analyzing the obtained results it was found that nitrate accumulation in maize depended on phenological phase and on the type of fertilizers used in the experiment. As maturing crops in all samples constituted of stems and leaves, the amount of nitrate decreased, and in the cobs in a full ripening phase, these were not been found.

Analyzing the concentration of nitrates accumulated in the most samples of alfalfa (green mass and hay obtained from it) it is noticed the same regularity as in case of the maize cultivation.

The evaluating results of the alfalfa quality concerning the nitrate concentration in dependence on the phenological phases the period of the collection and type of fertilizers are presented in Table 3.

Table 3. The content of nitrates in alfalfa (green mass)

The mowing period	Variants of the experiment, phenological phases and the quantity of nitrates (mg / kg)		
	Control	Worm compost	Ammonium nitrate
The burgeoning phase			
I	132.5 ± 1.21	207.0 ± 0.84	550.0 ± 1.68
II	140.0 ± 1.02	186.5 ± 1.21	220.5 ± 0.34
III	178.0 ± 2.10	174.0 ± 2.10	431.0 ± 1.54
The flowering phase			
I	129.0 ± 1.10	200.5 ± 0.86	457.0 ± 1.74
II	123.0 ± 1.22	148.0 ± 0.93	186.0 ± 0.91
III	91.4 ± 1.04	99. 9 ± 0.88	131.1 ± 1.02

Analyzing the exposed results in the table it has been ascertained that the value of nitrates in alfalfa (green mass) cultivated on the control lot and on that with the fund of worm compost in all three rounds of mowing and that two phenological phases did not exceed the MPC, excepting the sample collected from the lot with worm compost fund, in burgeoning phase (mowing I), in which the amount of nitrates exceeded the maximum permissible concentration with 3.5% in the other samples collected from the lot with worm compost fund in both phenological phases, and in the three rounds of mowing, the amount of the accumulated nitrates did not exceed the MPC.

The use of the ammonium nitrate determined the accumulation of increased quantities of nitrates in alfalfa (green mass). The alfalfa samples collected from this lot in the butonization stage, in the time of mowing I, II and III, the nitrate content exceeded the maximum permissible concentration, respectively by 2.8; 1.1 and 2,2times. In the alfalfa samples collected on this lot in the phase of blooming, it was ascertained an accumulation of a greater quantity of nitrates, only in the period of mowing I. The nitrate cconcentration accumulated in these samples exceeded the MPC by 2.2 times.

For the evaluation of the influence of the various types of fertilizers on the nitrate content in the roughage, the alfalfa collected from experimental lots were subjected to the drying process (under natural conditions) thus obtaining the alfalfa hay. In the obtained hay was determined the amount of nitrates (Table 4).

The analysis of the results exposed in the table reveals that the amount of nitrates in samples of hay obtained from alfalfa collected from experimental sectors has increased significantly in comparison with that in samples of green mass. In samples of hay obtained from alfalfa of the control lot and that with fund of worm compost, nitrate concentration was lower than of those cultivated with the ammonium nitrate fund.

But in all samples of hay, the nitrate concentration exceeded essentially the MPC, which constitues for roughage 500mg / kg.

In the samples of hay obtained from the control lot in the burgeoning and blooming phase the nitrate concentrations exceeded the MPC in all three rounds of mowing, respectively by 2.61; 1.74; 2.07 times and 2.46 times; 1.66; 1.40 times.

The same regularity was found and in samples of hay obtained from alfalfa, in the same phenological phase and in the same rounds of mowing, cultivated with the worm compost fund.

Table 4. The content of nitrates in the hay of alfalfa

The mowing period	Variants of the experiment, phenological phases and the quantity of nitrates (mg / kg)		
	Control	Worm compost	Ammonium nitrate
The burgeoning phase			
I	1,305.0 ± 2.12	1,380.0 ± 2.68	1,643.0 ± 2.88
II	871.0 ± 1.08	960.0 ± 1.42	1,259.0 ± 2.06
III	1,036.5 ± 118	1,230.0 ± 2.56	1,420.0 ± 2.62
The flowering phase			
I	1,230.0 ± 2.92	1,318.0 ± 2.78	1,549.0 ± 2.75
II	832.0 ± 1.22	933.0 ± 1.15	1,175.0 ± 1.93
III	701.0 ± 1.17	750.0 ± 1.02	989.0 ± 1.62

In them the amount of nitrates exceeded the MPC respectively by 2.76; 1.92 and 2.46 times, and in the blooming phase this indicator exceeded the MPC by 2.64; 1.87 and 1.50 times. In the hay samples obtained from the lot with ammonium nitrate fund in the burgeoning phase the nitrate concentrations exceeded the MPC, in that three rounds of the mowing respectively by 3.29; 2.52 and 2.84 times. In the hay obtained from alfalfa in the blooming phase in the same rounds of mowing the nitrate concentrations exceeded the value of MPC respectively by 3.10; 2.35 and 1.98 times. It is obvious that as in the green mass as and in the hay obtained from the lot with ammonium nitrate fund (in all three rounds of mowing and in that two phenological phases) the amount of nitrates accumulated in forage crops exceeded the MPC, which diminished the quality of forage.
The analysis of the obtained results found that the ammonium nitrate contributed to the accumulation in the alfalfa and the hay obtained from it, of a greater quantities of nitrates in comparison to that of plants cultivated with the worm compost fund.
The analyzes were made on the samples of cultivated fodder beet (the roots and leaves) using two types of fertilizers. The results of the analysis of nitrates content in fodder beet cultivated with worm compost fund and ammonium nitrate are shown in Table 5.
The study of the amount of nitrates in samples of fodder beet, collected in different phenological phases, demonstrated that their value is in direct connections with the type of sample, as and with the used fertilizer.

Table 5. The content of nitrates in the roots and in the leaves of fodder beet

Mowing period	Variants of the experiment and the amount of nitrates (mg / kg)		
	Control	Worm compost	Aammonium nitrate
The root crops			
I	1,320.0 ± 7.08	1,137.0 ± 5.31	2,113.0 ± 3.54
II	508.0 ± 3.54	513.5 ± 5.94	1,183.0 ± 5.10
III	540.0 ± 7.08	523.0 ± 5.31	845.0 ± 8.85
The leaves			
I	1,336.0 ± 7.10	1,336.0 ± 7.08	2,450.0 ± 3.40
II	584.5 ± 4.96	576.0 ± 5.31	1,065.0 ± 1.77
III	583.5±6.19	531.0 ± 7.07	919.0 ± 5.31

Note: I - the beginning of the formation of root crops;
II - the period of formation of root crops;
III - the maturing of root crops;

The analysis of the results in the table demonstrates, that in the phase the beginning of the formation of root crops, in plants collected from all lots the amount of nitrates exceeded the MPC (800 mg/kg). In samples of root crops and the leaves, collected from the control lot, the amount of nitrates exceeded the MPC, respectively by 65.00% and 67.00%, in those from the lot with the fund of worm compost, respectively by 42.13% and 67.00%. An essential increase of nitrates content was detected in fodder beet collected from the lot with fund of ammonium nitrate. The amount of nitrates in the root crops exceeded the MPC by 2.64 times and in the leaves by 3.06 times. In samples of the root crops and in the leaves of beet fodder, collected from the control lot and the with the fund of worm compost in the other two phenological phases, the nitrate content did not exceed the MPC, but in samples collected from the lot, with the fund of ammonium nitrate, this amount exceeded the MPC by 5. 63% - 47.88%.
Therefore, it has been found that the mineral fertilizer contributed to the accumulation of nitrates in forage crops, which decreases the quality of forage.

CONCLUSIONS

In the results of the investigations, it was found that the accumulation of nitrates in

maize depended on the phenological stage and type of fertilizers used in the experiment. As maturity in all samples consisted of stems and leaves, the amount of nitrate decreased, and in the cobs in the fully ripe phase, they were not been found.

The using of the ammonium nitrate determined the accumulation of an increased quantity of nitrates in alfalfa (green mass) and hay obtained from it. The alfalfa samples collected from this lot in the butonization and flowering phase in all three rounds of mowing, the nitrate content exceeded the maximum permitted concentration, respectively by 1.1 - 2.75 times and 2.20 times. In samples of hay obtained from alfalfa, from the control lot, with worm compost fund and with fund of the ammonium nitrate, the amount of nitrate exceeded the MPC, respectively by 1.66 - 2.61 times, 1.50 - 2.76 times and 1.98 - 3.29 times

In the fodder beet the amount of nitrates that exceeded MPC occurred in all the variants of the experiment, in the first phenological phase, but keeping it high in all phenological phases in plants of the lot with the fund of the ammonium nitrate.

So, the using of worm compost, in a quality of organic fertilizer, contributed to obtaining the qualitative fodder crops and the mineral fertilizer (ammonium nitrate) directly influenced the accumulation of nitrates in forage crops, which led to the diminishing of its quality.

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THE SCOPE OF FARMS SUSTAINABILITY TOOLS BASED ON FADN DATA

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Abstract

This paper reviews recent reports on the farm sustainability assessment, in particular, the farm sustainability assessments based on EU Farm Accountancy Data Network (FADN). The most commonly-used data source for evaluation of farms economic, social and environment sustainability is farmers' survey, employing structured questionnaire or/and in-depth interview. Therefore, recently the available databases as information sources such as EU FADN have been employed. As FADN originally was developed for measuring farms' income and economic performance, the developed farms' sustainability tools based on FADN data should be verified in the new context. The analysis is presented in two steps. First, an analytical overview of farm sustainability tools in terms of their research purpose, subject, developed indicators by economic, environmental and social dimensions of sustainability and the key elements of the methodology is presented. In a second step, the economic, environmental and social subthemes of the Sustainability Assessment in Food and Agriculture Systems (SAFA) Guidelines were employed. The results of analysis revealed, that tools differ and this limits the possibilities to compare the research results. FADN data in terms of coverage the SAFA developed subthemes revealed medium coverage of the SAFA economic and environmental subthemes, and low coverage of social SAFA subthemes. The presented analysis opens the scientific discussion about the need and possibilities to develop a tool for farm sustainability assessments using FADN data and to assess sustainability of farms across Europe.

Key words**:** *FADN data, SAFA guidelines*, *sustainability assessment tools*

INTRODUCTION

Over the past four decades interest in conceptualization of the sustainable development and methodological issues of its assessment has been increasing. Over the past ten year period sustainability has been frequently mentioned in the governmental, non-profit organizations, corporate objectives. International, national and local governmental institutions as well as business enterprises more often use triple bottom line (3Ps: people, planet and profits) system as decision making and quality control measures. Farm case analysis shows that the societal demand for this kind of assessment is increasing [22].

In Chapter 40 of the Agenda 21, governments have in 1992 introduced the development of sustainability indicators as a key approach to provide a basis for sustainability-related decision-making processes [14]. This initiated the development of first sets of indicators focusing on the integration of environmental aspects into agricultural policy such as IRENA [5], SEAMLESS [20] and others.

In addition, after 1990, an outbreak of sustainability indicators for agriculture at micro level was monitored. One of the most frequently used methods of farm sustainability studies is based on sustainability indicators ([4], [16], [18], [21], [24], and others).

The original farm sustainability assessment phase dominated by research conducted in farmer surveys/interviews (e.g., [24], [4], and others). Meanwhile, it is possible to identify the subsequent farm sustainability research phase, some estimates were based on existing data, such as the case of the EU - FADN ([2], [12], [15], and others) [22]. The concept of FADN was launched in 1965, when Council Regulation 79/65 of the Commission of the European Communities established the legal basis for the organization of the network. The objective of FADN is to provide micro-economic data in determining the income of family farms and agricultural holdings and the impacts of Common Agricultural Policy for Member States of the EU. The structural and

accountancy data on farms is collected annually for FADN from a sample of agricultural family farms and holdings across the EU. Standard Results consist of 150 variables on farm structure and yield, output, costs, subsidies and taxes, income, balance sheet, and financial indicators. The survey of FADN refers to farms that due to their size are defined as commercial. The yearly FADN sample covers approximately 80 thousand farms that represent a population of about 5 million farms, covering around 90 per cent of the total utilized agricultural area (UAA), and accounting for more than 90 per cent of the total agricultural production of the EU.

Marchand et al. [13] introduced two working definitions of sustainability assessment tools at farm level, i.e. full sustainability assessment and rapid sustainability assessment. Rapid sustainability assessment is focused on the farmer's knowledge and readily available data as sources of information. As emphasized by Andreoli, Tellarini [1], Gerrard et al. [8], Ryan et al. [15] to justify continued financial support for agriculture in the EU it is necessary to have a practical tool to monitor intervention results and impact of the farm to provide a comparative analysis across the EU.

A number of articles ([3], [7], [13], [14], [17]) perform a review or comparative analysis of sustainability assessment tools. Though, the little attention is paid for farm sustainability assessment tools based on FADN data.

MATERIALS AND METHODS

The main aim of the study is to build a general understanding about how researchers propose assessing the farm sustainability using FADN data. In addition, to analyse developed sustainability tools in terms of their scope. The analysis was performed in two steps. First, an analytical overview of farm sustainability tools in terms of their research purpose, subject, developed indicators by economic, environmental and social dimensions of sustainability and the key elements of the methodology are presented. In a second step, the methodology presented by Schader et al. [17] is employed. The authors used the environmental, social, and economic subthemes of the Sustainability Assessment in Food and Agriculture Systems (SAFA) Guidelines [6] as a reference to analyse the thematic scope of the sustainability assessment tools in terms of impact assessment categories covered in each sustainability dimension.

RESULTS AND DISCUSSIONS

An analytical overview of farms sustainability tools

The 8 farm sustainability tools ([2], [8], [12], [15], [19], [21], [22], [23]) that can be applied at a farm level and address at least the environmental dimension based on FADN data were selected for the assessment of scope (Table 1). One of the attempts to employ FADN data presented by Westbury et al. [23], where the environmental sustainability of English arable and livestock holdings were examined. The aim of the research was to measure the environmental impact of three different types of agriculture (arable, lowland livestock and upland livestock) in England and to identify differences in Agri-Environmental Footprint Index due to participation in agri-environment schemes. In addition, authors tested whether FADN as established data source usage could be extended for the routine surveillance of environmental performance of farming systems. The data of 1995, 2000 and 2005 were chosen. Two sets of indictors were developed. To assess environmental performance for arable farms thirteen indicators were developed: fertiliser units (tonnes) per ha UAA; crop protection costs per ha UAA; per cent of UAA that is irrigated; electricity costs and machinery, heating and vehicle fuels and oil per ha UAA; fertiliser units (tonnes) per ha UAA; crop protection costs per ha UAA; crop diversity; per cent of spring crops; land use diversity; per cent of total farm area that is woodland; per cent of total farm as uncropped land; land use diversity. Eight livestock farms' environmental performance assessment indicators were developed: fertiliser units (tonnes) per ha UAA; average number of

grazing livestock units per ha of forage; water units per ha UAA; electricity costs and machinery, heating and vehicle fuels and oil per ha UAA; percentage of grassland area that is temporary grassland; percentage of UAA that is classified as rough grazing; land use diversity; per cent of total farm area that is woodland. In order to aggregate the developed indicators to Agri-Environmental Footprint Index the equal weights were given. All indicators and constructed index were scored on a scale of 0 to 10 where 0 represented the lowest farm score for environmental performance and 10 was the maximum.

In their paper, Gerrard et al. [8] used the Farm Business Survey data to compare the environmental performance of organic and conventional farms. As explained by authors, in England and Wales the FADN data is collected through The Farm Business Survey (FBS). The aim of the research was to explore the possibilities to use Farm Business Survey data to derive well-established environmental indicators. In addition, authors analysed developed indicators in terms of ability to provide a reasonable comparison of the environmental performance of organic and conventional farms. The environmental performance of organic and conventional farms was the subject of the study. The FBS data from 2008–2010 was employed for the research. The indicators were identified on the basis of the literature study. The indicators used for assessment included cost of fertiliser per ha UAA and per output, cost of pesticide per ha UAA and per output, purchased feed per UAA and per livestock units, an intensification indicator, monetary receipts from agri-environmental schemes per ha UAA, average number of grazing livestock units per ha of forage area, crop diversity index. Authors presented a statistical analysis of each indicator across farm types (cereals, general cropping, horticulture, pigs, poultry, dairy, less favoured area grazing livestock, lowland grazing livestock, mixed) detecting statistically significant differences between farms managed under organic or conventional methods.

One of the farm sustainability assessments was presented by Longhitano et al. [12]. Authors employed the FADN sample for the accounting year 2009 of the Veneto region. The aim of the study was to assess the sustainability at farm level through the calculation of a composite index, using FADN database as the main source of information. The stakeholders were involved in identifying the final list of indicators. The final set of twenty six indicators were chosen under an assessment criteria matrix: nitrogen content, phosphorus content, irrigation area, irrigation system, pesticide expenditure, land use limitations, livestock unit, organic farming, grassland, agri-environmental schemes, economic return to labour, economic return to land, utilized agricultural area, expenditure for service to thirds, expenditure for energy, altitude, other gainful activities, family labour, farmer age, farmer gender, farmer education, distance from inhabited centre, networking, labour supply. After the identification of indicators, the normalization of indicators was made according to the relationships between indicators values and level of sustainability. The different weights to indicators were assigned by stakeholders. This allowed the aggregation of selected indicators into Sustainable Farm Index (SuFI), index which scored on a scale of 0 to 10. Three levels of SuFI sustainability were identified, that were low with SuFI score less than 5, medium from 5 to 6, and high with SuFi greater than 6. The sensitivity analysis was performed to consider different four scenarios: one, when the importance of matrix elements was assigned equally; and the other three, when one of sustainability dimensions got 80 per cent, while the other two dimensions shared the remaining 20 per cent.

Van Passel, Meul [21] combined the sustainable value approach (SVA) and Monitoring Tool for Integrated Farm Sustainability (MOTIFS) to perform a sustainability evaluation of farming systems in Flanders (Belgium). SVA was used to evaluate sustainability at sector level, while MOTIFS was proposed to measure the progress towards sustainability at farm level. FADN data from specialized dairy (14) and arable (14) farms in Flanders were used for research. For the specialized dairy farms, the

following indicators were calculated: nitrogen surplus, nitrogen use efficiency, direct and indirect energy use efficiency, labour productivity, capital productivity, land productivity, labour profitability, return on equity, and return on assets. The lowest, highest and average values of indicators values were converted into a score between 0 and 100 for each indicator, employing the results of the lowest-performing and best performing case-study farm as benchmark values. The main results of the research were presented in Radar graph and the discussion of farmers and an expert was involved.

Van der Meulen et al. [19] used the FADN data to quantify the economic, environmental and societal performance for 160 Dutch specialized dairy farms in the year 2011. To provide information on the economic, environmental and social sustainability of farm the indicators included labour productivity, net farm income, solvency, energy use, GHG emissions, phosphorus surplus, pesticides use, somatic cell count, cow lifetime, grazing hours. These indicators were normalized on a scale from 0 through 100, whereby a score of 100 per indicator was assumed to be sustainable. To explore the impact of farm size on integrated economic, environmental and societal performance the results of 15 per cent of largest farms were compared with the rest of the group.

In their paper, Barnes, Thomson [2] provided a methodology for assessing sustainable intensification over time using FADN data. Authors used the data of 42 beef farms over the period 2000–2010. In the paper, thirteen indicators capturing sustainability intensification aspects were developed: interest cover to total debt, total subsidies to farm gross margins, total rent and interest paid to farm gross margin, total costs of paid labour to gross margin, total costs of contracting to total variable costs, total output value to total fixed and variable costs, total rough grazing area to total area, total (farmed) woodland area to total area, ratio of permanent to temporary grass area, total output value to total area, value of livestock output to total output, total farmer hours to total hours worked and total hired labour to total hours worked. These indicators were weighted using positive matrix factorisation. In order to calculate an overall index of sustainable intensification the geometric mean of individual weightings was chosen.

In their study, Ryan et al. [15] presented the development of Irish farm-level indicators for economic, environmental, social and innovation indicators using National Farm Survey (the NFS is part of the FADN) data in the year 2012. Economic, environmental and social sets of indicators included productivity of labour, income per unpaid labour unit, productivity of land, profitability, market orientation, farm viability, GHG emissions per farm, GHG emissions per kg of output, nitrogen balance, emissions from fuel and electricity, household vulnerability, education level, isolation risk, demographic viability, work life balance. In addition, these developed indicators are employed by Jane Dillon et al. [10] for assessing dairy farms sustainability in the milk quota abolition context. In capturing farms innovation aspects appropriate indicators to each of the farm systems (dairy, cattle and sheep, tillage) were developed. The indicators were normalized using min-max approach and then scaled from 0 to 100, where 0 indicated the poorest performance and 100 indicated the best performance.

Vitunskienė, Dabkienė [22] presented an analytical tool to assess relative sustainability of family farms using FADN data. The tool consists of a farm relative sustainability index (FRSI), three sub-indices and twenty three indicators related to the economic, environmental and social dimensions of sustainability. The economic indicators include labour productivity, capital productivity, land productivity, solvency, family farm income per family work unit, fixed capital formation, farm diversification, farm risk management. The environmental indicators include the following: use of chemical fertilizers, use of pesticides, GHG emissions, energy intensity, biodiversity, meadows and pastures, livestock density, environment-friendly farming.

Table 1. Details of the farms sustainability tools based on FADN data

Authors	Country, surveyed year	Subject	Sustainability dimension	Developed indicators	Output form
Westbury et al. [23]	England, 1995, 2000 and 2005	64 arable 43 lowland livestock 23 upland livestock holdings	Environmental	*Indicators for arable farms:* fertiliser units (tonnes) per UAA; crop protection costs per ha UAA; per cent of UAA that is irrigated; electricity costs and machinery, heating and vehicle fuels and oil per ha UAA; crop diversity (Shannon diversity); per cent of spring crops; land use diversity (Shannon diversity); per cent of total farm area that is woodland; per cent of total farm as uncropped land (including fallow and set-aside). *Indicators for livestock farms:* fertiliser units (tonnes) per ha UAA; average number of grazing livestock units per ha of forage; water units per ha UAA; electricity costs and machinery, heating and vehicle fuels and oil per ha UAA; percentage of grassland area that is temporary grassland; percentage of UAA that is classified as rough grazing; land use diversity (Shannon Diversity); per cent of total farm area that is woodland.	Differences in calculated index values according to education, region and participation in agri-environment schemes were analysed. Indicators were weighted equally for index construction.
Gerrard et al. [8]	England, Wales, 2008-2010	Organic Conventional farms	Environmental	Cost of fertilizer per ha UAA and per output; cost of pesticide per ha UAA and per output; purchased feed per UAA and per livestock units; an intensification indicator, monetary receipts from agri-environmental schemes per ha UAA; average number of grazing livestock units per ha of forage area; Shannon crop diversity index.	Indicators comparisons across analysed farm types detecting statistically significant differences between farms managed under organic or conventional methods are presented.
Longhitano et al. [12].	Italy, Veneto region, 2009	853 farms: intensive arable, other crops, viticulture, permanent crops, mixed crops, bovine, other livestock, mixed farms	Environmental	Nitrogen content; phosphorus content; irrigation area; irrigation system; pesticide expenditure; land use limitations; livestock unit; organic farming; grassland; agri-environmental schemes.	Index values according to farm type and developed scenario are presented. Stakeholders were involved in selecting indicators and assigning weights to them. Three levels of index value were identified.
			Economic	Economic return to labour; economic return to land; utilized agricultural area; expenditure for service to thirds; expenditure for energy; altitude; other gainful activities; distance from inhabited centre.	
			Social	Family labour; farmer age; farmer gender; farmer education; altitude; distance from inhabited centre, networking, labour supply.	
Van Passel, Meul [21]	Belgium, 2000	14 specialized dairy 14 arable farms	Environmental	Nitrogen surplus, nitrogen use efficiency, direct and indirect energy use efficiency.	Results of developed indicators are presented using radar graphs.
			Economic	Labour productivity, capital productivity, land productivity, labour profitability, return on equity, return on assets.	
Van der Meulen et al. [10]	Netherlands, 2011	160 specialized dairy farms	Environmental	Energy use, GHG emissions, phosphorus surplus, pesticides use.	Results of developed indicators are presented using radar graphs.
			Economic	Labour productivity, net farm income, solvency.	
			Social	Somatic cell count, cow lifetime, grazing hours	
Barnes, Thomson [2]	Scotland, 2000-2010	42 beef farms	Environmental	Total rough grazing area to total area, total (farmed) woodland area to total area, ratio of permanent to temporary grass area, total output value to total area, value of livestock output to total output.	Index values for analysed years are presented. The indicators were weighted using positive matrix factorisation. Weights for indicators were assigned using the geometric mean of individual weightings.
			Economic	Interest cover to total debt, total subsidies to farm gross margins, total rent and interest paid to farm gross margin, total costs of paid labour to gross margin, total costs of contracting to total variable costs, total output value to total fixed and variable costs	
			Social	Total farmer hours to total hours worked and total hired labour to total hours worked	
Ryan et al. [15]	Ireland, 2012	Dairy, cattle, sheep, tillage farms	Environmental	GHG emissions per farm, GHG emissions per kg of output, nitrogen balance, emissions from fuel and electricity.	Results of developed environmental, economic and social indicators are presented using radar graphs.
			Economic	Productivity of labour, income per unpaid labour unit, productivity of land, profitability, market orientation, farm viability.	
			Social	Household vulnerability, education level, isolation risk, demographic viability, work life balance	
			Innovation	*Indicators for dairy farms:* participation in a milk recording programme; membership of a dairy discussion/knowledge transfer group; farmers who have changed the timing of slurry spreading to avail of greater uptake of nutrients during the early growing season. *Indicators for cattle and sheep farms:* membership of a beef or sheep Quality Assurance Scheme; undertaking of reseeding to improve grassland within the last three years; the undertaking of soil testing within the last three years. *Indicators for tillage farms:* availing of forward selling of tillage crops; usage of Information and Communication Technology on the farm; the undertaking of soil testing within the last three years.	
Vitunskienė, Dabkienė [22]	Lithuania, 2012	450 family farms	Environmental	Use of chemical fertilizers, use of pesticides, GHG emissions, energy intensity, biodiversity, meadows and pastures, livestock density, environment-friendly farming.	The results at the indicator, sub-index and index level across counties are presented.
			Economic	Labour productivity, capital productivity, land productivity, solvency, family farm income per family work unit, fixed capital formation, farm diversification, farm risk management.	
			Social	Family work, jobs on farm, wage ratio on farm, pluriactivity, workload exceeded, continuity of farming, farmer's age.	

The social indicators include family work, jobs on farm, wage ratio on farm, pluriactivity, workload exceeded, continuity of farming, farmer's age. The indicators to be used and the rationale behind their selection are presented. The min-max approach was employed to normalise the selected indicators. The factor analysis was used to estimate weights for the developed indicators to construct sub-indices. Then assignments of the weights to the sub-indices were based on the triple bottom line approach. The FRSI and sub-indices ranged from 0 to 1. Three levels of family farm sustainability were suggested, that were low with FRSI score less than 0.33, medium sustainability from 0.34 to 0.66, and

high with index greater than 0.67.

Overview of the scope of sustainability tools

SAFA is a globally applicable guiding framework for the food and agricultural sector sustainability assessments at micro level. Binder et al. [3] noticed, there is little consensus on how sustainable development in agriculture should be defined and pursued. SAFA guidelines provide a standard set of sustainability themes and goals that all enterprises in the sector should pursue, they allow for flexibility in selecting indicators for measuring sustainability performance. In this way, the SAFA [6] guidelines establish a comprehensive, widely accepted language for sustainability in agriculture and food [17]. SAFA framework becomes widely accepted tool as the basis for sustainability assessments used in scientific studies presented by Hřebíček, Trenz, Vernerova [9], Jawtrusch et al. [11] and others. SAFA framework is characterized by four dimensions of sustainability: good governance, environmental integrity, economic resilience and social well-being [6]. The second level of the SAFA framework contains a set of 21 core sustainability goals or universal themes. On the third level of the SAFA framework 58 objectives or sub-themes are presented and within each sub-theme 116 indicators are identified. As noticed by Schader et al. [17], the themes of the governance dimension refer to companies rather than farms, therefore the base of the thematic scope of the sustainability assessment tools analysis is based on the tree main sustainability dimensions.

Scope of economic subthemes

Comparing the scope of the tools in assessing the economic dimension of farm sustainability tools based on FADN data, it revealed that tools presented by Ryan et al. [15] and Dabkienė, Vitunskienė [22] covered the most of economic SAFA subthemes. Whereas tools presented by Longhitano et al. [12], Van Passel, Meul [21], Van der Meulen et al. [19], Barnes, Thompson [2] covered from 20.0 per cent to 6.7 per cent of the economic subthemes defined in the SAFA. It should be noted, that originally some indicators are developed by their authors to assess another dimension of sustainability (Table 2).

Table 2. Coverage of economic subthemes of the SAFA Guidelines by sustainability tools based on FADN data

Theme	Sub-theme	Longhitano et al. [12]	Van Passel, Meul [21]	Van der Meulen et al. [19]	Barnes, Thompson [2]	Ryan et al. [15]	Vitunskienė, Dabkienė [22]
Investment	Internal investment						
	Community investment						
	Long-ranging investment						x
	Profitability	x	x	x	x	x	x
Vulnerability	Stability of production						
	Stability of supply					x	
	Stability of market						x
	Liquidity			x	x	x	x
	Employment						x
	Risk management	x					x
Product safety and quality	Food safety						
	Food quality			**x**		**x**	
	Product information						
Local economy	Value creation				**x**		x
	Local procurement						
	Number of topics covered	2	1	3	3	4	7
	Per cent of topics covered	13.3	6.7	20.0	20.0	26.7	46.7

Note: In bold indicators originally developed for another dimension of sustainability.

The environmental dimension of sustainability is covered by 6 themes in the SAFA guidelines. The analysis revealed that three of analysed sustainability tools cover 50 per cent of proposed SAFA subthemes and the other tools cover less than half of the SAFA subthemes. Barnes, Thompson [2], Ryan et al. [15], Van Passel, Meul [21] tools have a least extent of covering SAFA environmental subthemes (Table 3). Though Ryan et al. [15] presented a deep analysis of GHG emissions, Van Passel, Meul [21] focussed on nitrogen and energy use and Barnes, Thompson [2] concentrated on biodiversity analysis on farms.

Social indicators were not included by Van Passel, Meul [20] due to limited availability of data. Van der Meulen et al. [19] proposed three social indicators related to animal health and welfare. In this analysis these indicators were attributed to economic (food quality) and environmental (animal health, freedom from stress) subthemes of the SAFA guidelines (Table 4).

Table 3. Coverage of environmental subthemes of the SAFA Guidelines by sustainability tools based on FADN data

Theme	Sub-theme	Westburry et al. [23] Gerrard et al. [8]	Longhitano et al. [12]	Van Passel, Meul [21]	Van der Meulen et al. [19]	Barnes, Thompson [2]	Ryan et al. [14]	Vitunskienė, Dabkienė [22]
Atmosphere	GHG				x		x	X
	Air quality							
Freshwater	Water withdrawal	x x	x					
	Water quality	x x	x	x	x		x	X
Land	Soil quality	x	x	x	x	x	**x**	X
	Land degradation							
Biodiversity	Ecosystem integrity	x	x			x		X
	Species diversity	x x	x			x		X
	Genetic diversity							
Materials and energy	Material use	x						
	Energy use	x	**x**	x	x			X
	Waste reduction and disposal							
Animal welfare	Animal health	x x	x		**x**			X
	Freedom from stress				**x**			
	Number of topics covered	7 5	7	3	6	3	3	7
	Per cent of topics covered	50.0 35.7	50.0	21.4	42.9	21.4	21.4	50.0

Note: In bold indicators originally developed for another dimension of sustainability.

The tool developed by Ryan et al. [15] covered the most of the social SAFA subthemes. The possibility to assess the educational level of farm household members' within NFS extended the coverage of the social SAFA subthemes.

Shader et al. [17] analysed the coverage of the six sustainability approaches of food systems by the SAFA Guidelines subthemes. The results revealed that the highest coverage of economic subthemes reached 50 per cent, of environmental subthemes the highest coverage was equal to 100 per cent and of social subthemes highest coverage was achieved at 75 per cent. Comparing the coverage of economic SAFA subthemes of analysed tools based on FADN data and obtained research results by Shader et al. [17] it can be stated that farm sustainability tools based on FADN data achieved medium coverage of the SAFA economic and environmental subthemes, and low coverage of social SAFA subthemes.

Table 4. Coverage of social subthemes of the SAFA Guidelines by sustainability tools based on FADN data

Theme	Sub-theme	Longhitano et al. [12]	Barnes, Thompson [2]	Ryan et al. [15]	Vitunskienė, Dabkienė [2]
Decent livelihood	Quality of life			x	x
	Capacity development	x		x	
	Fair Access to means of production				
Labours rights	Employment relations				
	Forced labour				
	Child labour				
	Freedom of association and right to bargaining				
	Working hours	x	x	x	x
Equity	Non discrimination				
	Gender equality				
	Support to vulnerable people				
Human safety and health	Physical and psycho-social health			x	x
	Public health				
Cultural diversity	Indigenous knowledge				
	Food sovereignty				
	Number of topics covered	3	1	4	3
	Per cent of topics covered	20.0	6.7	26.7	20.0

CONCLUSIONS

Analysis of literature research on application of FADN data to farms sustainability assessment revealed that they differ by their purpose and subject of research, their methods, and the final sets of indicators. These multiple differences limit possibilities to compare results of conducted studies.

The analysis of the thematic scope of the sustainability assessment tools based on FADN data in terms of coverage the SAFA developed subthemes revealed medium coverage of the SAFA economic and environmental subthemes, and low coverage of social SAFA subthemes.

The CAP reforms shift towards an agricultural policy more attuned to the need to promote sustainability of agriculture. The FADN data proved to be valuable source of readily available information to assess sustainability of farms in analysed research papers. The extension of collected variables, i.e. the collection of additional variables or/and calculation of proxy indicators, related to environmental and social concerns by FADN is necessary within farm sustainability assessment. The improved data network could be used for farms sustainability assessment and for monitoring the impact of policy decisions across Europe.

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AWARENESS ON THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTs) AMONG AGRICULTURAL EXTENSION AGENTS IN NORTH - EASTERN NIGERIA

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Abstract

The study assessed the awareness on the use of ICTs by agricultural extension agents in North east, Nigeria. The specific objectives include describe the socio-economic characteristics of the agricultural extension agents and ascertain agricultural extension agents' awareness of ICTs use in their works Primary data was used for the study and were collected through the administration of questionnaires. A multistage-stage random sampling technique was employed to select 254 agricultural extension agents from north eastern Nigeria proportionately using Taro Yamane's formula. Data collected were analyzed using descriptive. The results of the analysis revealed that majority of agricultural extension agents were between the ages of 41 – 50 years and non below the age of 20 years. A large proportion of the agricultural extension agents about 70% were male with only 30.71% female. Majority (91.34%) were married all (100%) of the agricultural extension agents in the study area had one form of formal education or the other with 45.7% and 1.57% of them had Degree/Higher National Diploma (HND) and Masters Degrees respective. Majority (77%) of the agricultural extension agents have been in service above 21 years with a mean working experience of 6.5 years was. 61.42% had grade levels of between 10 and 15 with 67.71% had an estimated average annual income of between ₦20, 000.00 – ₦ 60, 000.00 only. All (100%) of agricultural extension agents were aware in the use of one form of ICTs or another in performance of their duties. As a matter of policy, all agricultural scientists and extension agents must possess proven skills in the utilization of ICT facilities like computer and Internet.

Key words**:** *agricultural extension agents, awareness, information and communication technologies*

INTRODUCTION

Agricultural Extension is the most important public service with the widest range of responsibilities for agricultural and rural development (Adeyanju *et al.*, (2015) [1]. Therefore, availability of agricultural information among its users for agricultural and rural development cannot be over emphasized. Agricultural information creates awareness among farmers about agricultural technologies for adoption which is needed for overall development of agriculture and for the improvement of living standard of farmers (Bello *et al.*, 2012) [6].

However, according to Ozowa, (1999) cited in Uganneya *et al.* (2012) [17] the extents to which information services actually satisfy users and contribute to agricultural development are subject of controversy and debate. This is so because the diffusion and adoption of any given information to a large extent depends on the means through which the information is disseminated and invariably the perception, knowledge and understanding of the users on the channels through which the information is disseminated. Adequate awareness on any given innovation or technology is a key to the success in adoption and utilization of the technology. With regards to this, Ekumankma *et al.,* (2002) [8] in Agwu *et al* (2009) [4] note that poor awareness or exposure of farmers to appropriate agricultural information and channels of communicating this information is one of the major reasons for low yield recorded by many Nigerian farmers as well as performance of agricultural extension agents in their duties. Therefore, for human performance to be effective and efficient some

knowledge is needed on how, why and when certain things have to be done. The provision or availability of such knowledge is as important as its application to daily life. Agricultural extension agents as well as farmers need to get aware of the necessary information in order to improve methods in activities, increase productivity and performance. However, awareness to effective channels of acquiring information can improve and enable individuals in knowledge which would also enable them to confront their predicaments. Agriculture being a discipline requires the awareness and access for information that its users would adopt in anticipation of the improvement in its various activities. Kwadwo *et al.*, (2012) reported that "the advent of ICTs namely personal computers, the internet and mobile telephone during the last two decades has provided a much wider choice in collection, storage**,** processing, transmission and presentation of information in multiple formats to meet the diverse requirement and skills of people". Similarly, Durojaiye *et al.* (2013) [7] reported that, the awareness creation and availability of an ICT-enabled agriculture centre (IAC) in villages (e.g. adopted villages) in Nigeria by NAERLS using internet, made farmers to be more informed on the development made through the utilization of the internet and other related ICT facilities in in the country. Consequently, Seepersad (2003) [16] reported that cell phones are fairly common among extension employees in Trinidad and Tobago, but added that cell phones have not been used in an organized way by agricultural organizations. However Agwu *et al*. (2008) [5] cited in Mabe *et al.*, (2012) [12] that, agricultural extension agents in Enugu State, Nigeria had high level of awareness of the major ICT tools. This finding is similar to Adesope *et al.* (2007) [3]who noted that in the Niger Delta area of Nigeria, about 98 percent of the extension agents in the region indicated they were aware of information communication technologies.This means that most of the agricultural extension agents in the southeast and south- south of the country are aware of information technologies especially as they concern Agricultural Extension work but In North–East Nigeria however, little of such work was conducted..

It is in this regards that this study is intended to fill this gap and answer the following research questions:(i)What are the socio-economic characteristics of the agricultural extension agents? (ii)Are the agricultural extension agents aware of use of ICTs in their activities?

MATERIALS AND METHODS

The Study Area

The study was conducted in North-Eastern Nigeria. This comprises of six states namely; Adamawa, Bauchi, Borno, Gombe, Taraba and Yobe states respectively. The area is located between latitude 6º 20" to 13º 00'' from the north and longitude 9º 00" to 14º 00'' east of the Greenwich Meridian. The area has an annual rainfall of between 700 mm and 1550 mm and has between three and six months of rainfall a year, with August and September as the wettest months, while the driest months are February and March with relative humidity of about 13 percent (Adebayo and Umar, 1999) [2].

Sources of Data

Primary data was used for the study. These were collected through the administration of questionnaires to sampled agricultural extension agents in the study area.

Sampling Procedure and Sample Size

Multistage-stage random sampling technique was employed to select respondents for the study thus:

Stage I:Three out of the six states in the region were purposely selected for the study.

Stage II:All the agricultural extension agents in the three states were eligible to be included in the sample for study. A list was obtained from the headquarters of the various state ADPs. In all, a total of 323 agricultural extension agents from the three states served as the sample frame (Table 1).

Stage III: A total of 254 agricultural extension agents which served as the sample size was proportionately selected from the sample frame using Taro Yamane's formula as adopted from Kalpana (2011) [10]and used by Usman (2014) [18]. The formula is given by

the formula:

$$n = \frac{N}{1 + N\,(e)^2} \quad (1)$$

where,
n = Number of respondents
N = Population Size
e = Error (5%)

Table 1. Distribution and Selection of Respondents

S/No	State	No. of AEAs	No. of AEAs Sampled
1.	Adamawa	123	94
2.	Gombe	106	84
3.	Taraba	94	76
	Total	323	254

Source: Field Survey, 2015

Analytical Tool

Descriptive was employed in the analysis of data. The descriptive statistics involved the use of mean, frequency distribution and percentage.

Mean: For grouped data,

$$\ddot{x} = \frac{\sum fx1}{N}$$

where: $\ddot{x}$= mean
$\sum FX1$=sum of variance
N=sample size

RESULTS AND DISCUSSIONS

Socio-economic characteristics

The socio-economic characteristics of respondents studied include, age, gender, marital status, educational status and duration in service. Estimated income and grade level of the respondents was also considered (Table 2).

Age of the respondents

Age according to Ndahgu (2011) [13] is an important factor in the study of individuals' use or non-use of ICTs because it reflects the physical strength to perform a task and the psychological disposition for imbibing behavioural change or otherwise. The results shows that, majority of the agricultural extension agents were between the ages of 41 – 50 years and non below the age of 20 years. About 1.2% of the agricultural extension agents were between the ages of 20 – 30 years, 7.5% were within the age range of 31 – 40 years while 7.1% were above 60 years of age (Table 2). The results is in line with the findings of Kehinde *et al.*, (2015) [11], who reported that, none of the agricultural extension agents is below the age of 20 and majority (41 – 50 years) constituting the active work force in study conducted on the training needs assessment on the use of social media among extension agents in Oyo state, Nigeria. Age may influence the use of ICTs because older persons including agricultural extension agents especially those living in rural areas may have the tendency of adhering to their already practiced old methods.

Gender of the respondents

Gender is the society's constructions of men and women. According to World Bank (2011) [20] it is the socio-cultural differences or ascribed roles between men and women in a given society. The results of gender in Table 2 reveals that, majority (69.69%) of the composition of agricultural extension agents in the study area consist of male with about 30.31% female. The results is in consonance with the findings of Purnomo *et al.* (2010) [15] in their study on the assessment of readiness and barriers towards ICT programme implementation: perceptions of agricultural extension officers in Indonesia Kehinde *et al.* (2015) [11] further noted that, the dominance of agricultural extension service work by male gender is not good for gender equality in extension services.

Marital status of the respondents

Marriage is a respected institution; it bestows on people social status, recognition and makes persons to be considered responsible (Ahmed, 2000). Marital status of agricultural extension agents in Table 2 indicates that, majority (91.34%) of agricultural extension agents were married, 5.51% single and 3.15% widowed. This findings lends credence to the works of Yakubu, *et al.,* (2013) in their study on use of information and communication technologies among extension agents in Kano state, Nigeria who reported that the entire (100%) agricultural extension agents in the area were married implying that most of them are responsible and can be respected, trusted and be committed to their duties especially on the genueity of the information they would

provide on the course of their extension service provision.

Educational status of the respondents

Education has been identified as a catalyst in agricultural and other productive activities this is because it a variable that broadens the mental horizon, influences the totality of the mind and predisposes individuals to new ideas (Ndaghu, 2011) [13]. Adequate education therefore could enhance agricultural extension agents' understanding of use of ICTs and sources of information on improved innovation for agricultural practises. Table 2 indicates that majority about 45.7% and 1.57% constituting 47.27% of agricultural extension agents had Degree/Higher National Diploma (HND) and Masters Degrees respectively. The finding of this study is in line with that of Strong *et al.* (2014) in their study on exploring the use of information communication technologies by selected Caribbean extension officers, they reported that education levels of extension officers played a part in technology acceptance.

Duration of service of the respondents

Duration in service is the length of time measured in years that an individual had been in a particular profession or related activity that lead to his/her increase in knowledge or skill. In other words, it is the active involvement of an individual in an activity or exposure to events or people over a period of time that leads to an increase in knowledge or skill. Duration in service of agricultural extension agents in years is presented in Table 2. It shows that, majority (76.8%) of the agricultural extension agents have been in service above 21 years with mean years of 6.5 years. About 1.96% falls between the age range of 0 and 5 years, 4.7% between the age range of 6 and 10, 9.44% between the age range of 11 and 15 while those between the age bracket of 16 and 18 had 7.1%. Idrisa *et al.* (2013) in their study on use of information and communication technology (ICT) among extension workers in Borno state, Nigeria who reported that majority of agricultural extension agents in the area had above 20 years' experience in service therefore such years of experience could enable the extension agent to save enough money to purchase the ICT facilities for their own personal use and also to enhance their performance in their duties.

Table 2. Socio -economic characteristics of respondents

Variable	Frequency	Percentage
Age (in years)		
20 – 30	3	1.2
31 – 40	19	7.5
41 – 50	214	84.2
51 – 60	0	0.0
60 Above	18	7.1
Total	254	100
Mean	27	
Gender		
Male	177	69.69
Female	77	30.31
Total	254	100
Marital Status		
Single	14	5.51
Married	232	91.34
Widow	8	3.15
Divorce	0	0.0
Total	254	100
Educational Status		
Primary Education	8	3.13
Secondary Education	4	1.57
Certificate	26	10.23
Diploma	96	37.8
Degree/HND	116	45.7
M.Sc.	4	1.57
Total	254	100
Duration in Service (Years)		
0 – 5	5	1.96
6 – 10	12	4.7
11 – 15	24	9.44
16 – 20	18	7.1
21 Above	195	76.8
Total	254	100
Mean	6.5	
Grade Level		
3 – 5	17	6.7
6 – 10	76	29.92
11 – 15	156	61.42
16 Above	5	1.96
Total	254	100
Income (₦)		
20000 - 40000	87	34.25
41000 - 60000	85	33.46
61000 - 80000	51	20.08
81000 - 100000	10	3.94
101000 and Above	21	8.27
Total	254	100

Source: Field Survey, 2015

Grade level of the respondents

Based on Table 2, shows the grade level of agricultural extension agents in the study area. It reveals that majority about 61.42% had grade levels between 11 and 15 with only 1.96% falls between the grade levels of 16 and above. Also, about 6.7% and 29.92% had grade levels between 3 and 5 as well as 6 and 10 respectively. The grade level in any structure of service determine the amount of wage/salary and individual gets as reward for services rendered, it therefore implied that, agricultural extension agents with high grade levels would receive high salaries than those with lower grade levels. However, Omotesho, *et al.* (2012) [14]reported low annual income of agricultural extension agents would affect their ability to afford information and commination technologies.

Income of the respondents

The distribution of the income of agricultural extension agents is shown in Table 2. The results reveals that about 67.71% of the agricultural extension agents in the study area who are the majority had an average monthly income of between ₦20, 000.00 to ₦ 60, 000.00 only. 20.08% fall within the average monthly income range of between ₦ 61, 000. 00 and ₦ 80, 000.00, about 3.94% fall within an income bracket of ₦ 81, 000.00 and ₦ 100, 000.00 while only few 8.27% had above N100, 000.00 as their average monthly income. The implication of these results is that agricultural extension agents were not comfortable enough financially to acquire and maintain most of the ICTs, especially computers and their accessories.

Agricultural extension agents' awareness of ICTs use in their performance of duties

Awareness of ICTs use in performance of agricultural extension activities by agricultural extension agents could instigate the desire and decision for use of ICTs in their activities. Table 3 shows that all the agricultural extension agents were aware of use of ICTs in performance of their duties. The table 4 further reveals that, 100% of the agricultural extension agents in the study area show awareness of use of GSM mobile phone in their activities.

Table 4 further reveals the distribution of agricultural extension agents on the basis of awareness of specific ICTs; it shows that, all (100%) of the agricultural extension agents in the study area show awareness of use of GSM mobile phone in their activities, 46% were aware of the use of computer and about 32% shows awareness for the use of internet in performance of their duties Similarly, majority about (92%), 85% and 92% showed unawareness for the use of CD-ROM, GIS and webcam respective in performance of their duties. The result is in line with the findings of Umar *et al.,* (2015) and Yakubu *et al.* (2013) [19] in their separate studies.

Table 3. Distribution of respondents' by awareness of use of ICTs in performance of duty

ICTs	Frequency	Percentage
Aware	254	100
Not aware	0	0.0
Total	254	100

Source: Field Survey, 2015

Table 4. Distribution of respondents' by awareness on specific ICTs

ICTs	Frequency		Percentage		
	Aware	Not aware	Aware	Not aware	Total %
Computer	117	137	46.06	53.94	100
Internet	80	174	31.49	68.51	
GSM-phone	254	0	100	0.0	
CD – Rom	21	233	8.26	91.74	
GIS (geographical information system)	38	216	14.96	85.04	
Webcam	21	233	8.26	91.74	
Others (specify)	7	247	2.75	97.25	

Source: Field Survey, 2015

CONCLUSIONS

Based on the empirical evidence of the study, the following conclusions were drawn.

Majority of agricultural extension agents were young and active and non below the age of 20 years. A large proportion of the agricultural extension agents in the study area were male. Majority were married with almost all of them having one form of education or another. Working experience of above 21 years is observed among the majority of agricultural extension agents, with more than half had grade levels of between 11 and 15 years. All of the agricultural extension agents were

aware of the use of one form of ICTs or another in performance of their duties. Based on these findings, the study recommends; as a matter of policy, all agricultural scientists and extension agents must possess proven skills in the utilization of ICT facilities like computer and Internet. This calls for in-service training on ICTs applications for all staff in agricultural organizations; Agricultural institutions should establish their websites and link up with others for sharing of information and tailor-made in-service trainings on the use of ICTs for agricultural extension agents should be encouraged.

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DISTRIBUTION OF 1ST LEVEL MONITORING SITES PER EVALUATION CLASSES OF SOME PHYSICAL FEATURES OF THE SOILS WITHIN THE COMMUNE OF SAG, TIMIŞ COUNTY, ROMANIA

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Abstract

Located in South-Western Timiş County (45°39' Northern latitude and 21°10' Eastern longitude), on the European route E 70, Şag, the seat of the commune by the same name, is 14 km from the city of Timişoara and 3 km from Parţa, a locality that used to be part of the commune until 2004, when it became itself a commune. The Commune of Şag covers 8,664 ha, of which 8,419 ha is agricultural land. The micro-relief of the field is an alternation of negative and positive forms of which negative forms share the most. The latter are represented by a set of micro-depressions (closed or open) that are elongated (ex abandoned meanders of the rivers Bega and Timiş and of their tributaries) and, most often by smaller depressions of different shapes and size. Due to its geographical location, the territory is part of the field climate at the border between the western sub-type with ocean influences and the Banat sub-type, with Mediterranean influences; mean multi-annual temperature is 10.9°C for the interval 1943-2004 (Meteorological Station of Timişoara); mean multi-annual precipitations is 585.8 mm for the interval 1871-1975 (Meteorological Station of Răuţi), with 631.0 mm for the interval 1871-1975 and 591.9 mm for the interval 1955-2004 (Meteorological Station of Timişoara), which points to a process of aridity.

Key words: *characteristics, coefficient, soil indicators*

INTRODUCTION

Of the physical features of the soils in the 1st level monitoring sites, we monitored the following:
-the textural class of the soil in the upper horizon and in the intermediary horizon, structural instability;
-settlement degree (% v/v);
-saturated hydraulic conductivity (mm/h);
-resistance to penetration (kgf/cm^2) and edaphic volume (unit fractions). [6]
The soil types within the Commune of Şag that we have monitored are:
-vertic-salty chernozem;
-entic aluviosol.

MATERIALS AND METHODS

By grouping the land units in the map below, w see the following prevalent soil types:
-Aluviosols, 1-8 (eutric, gleyc, distric, molic, molic-salty), 1,539.83 ha, 18.37%;
-Entiantrosols, 9 (mixed), 11.71 ha, 0.14%;
-Chernozems, 10-15 (typical, cambic, cambic-alkalised, vertic-salty), 513.76 ha, 6.13%;
-Faeozioms, 16-20 (cambic, cambic-gleyc), 956.92 ha, 11.41%;
-Eutricambosols, 21-46 (typical, molic, alluvial, gleyc, molic-alluvial, pelic, alluvial-gleyc, molic-alkalised, molic-gleyc, gleyc-alkalised, pelic-gleyc), 46.23 ha, 55.15%;
-Pelosols, 47-48 (gleyc, gleyc-alkalised), 167.25 ha, 2.00%;
-Solonetzs, 49-50 (gleyc-salty), 6.60 ha, 0.08%;
-Soil associations, 701-704, 563.82 ha, 6.73%.
The agricultural land of the commune measuring 8,419 ha has the following uses: -arable 7,693 ha (91.4%),
-grassland 636 ha (7.5%),
-haymaking fields 39 ha (0.5%), orchards 1 ha and vineyards 50 ha (0.6%).

RESULTS AND DISCUSSIONS

Soil Texture

Texture or granulometric composition of the mineral part of the soil is defined by the content percentage of the different mineral

fine fractions, mainly: sand, dust, clay with specific size and features. [5]
Depending on the prevalence of a component, they have established texture classes and sub-classes. [3]
In practice, soils are currently grouped into five major classes; however, there are also soil studied that use a more detailed scale.
Soil granulometric composition or soil texture is an intrinsic feature with a relatively high level of stability and of major importance in soil characterisation, in general, and in agricultural soil characterisation, in particular.
Texture is the main limiting factor in implementing different agricultural systems since it cannot be changed through current technological works. [1]
This is why different sequences of agricultural systems, particularly soil works and irrigation regimes, but also fertilisation an crop need to be done only depending on soil texture.
The most favourable conditions are on medium texture soils (clayey-sandy and clayey) that ensure an optimum water holding, release and movement regime in the soil, nutrient holding and release regime, and optimum cation exchange. [6]
Soils with fine (clayey) texture ensure minimum conditions, while soils with coarse texture rank second.
Soil texture plays a fundamental role compare to other soil features, affecting the latter. Thus, for instance, sandy and sandy-clayey soils are excessively water permeable; they have a low water and nutrient holding capacity, a low cation exchange capacity, while clayey and clayey-clayey soils are the opposite, with low water permeability and high water holding capacity, which favours excess water processes (gleysation and pseudo-gleysation). [2]
Soils with fine texture have certain features: they are considered moist soils because colloidal clay has a high water holding capacity and they cannot release it for the plants. [4]
On such agricultural lands, traffic and work conditions are poor; hence, the short period of good working conditions.
Improper agricultural works lead to soil degradation, particularly soil physical degradation.

Table 1. Vertic-salty chernozem

HORIZONS	UM	1	2	3
Depths	cm	26	45	55
Coarse sand (2.0-0.2 mm)	%	0.7	2.3	2.2
Fine sand (0.2-0.02 mm)	%	22.2	23.6	23.8
Dust (I + II) (0.02-0.002 mm)	%	31.6	33.3	31.2
Colloidal clay (below 0.002 mm)	%	45.5	38.8	42.8
Physical clay (dust II + colloidal clay)	%	61.2	55.6	58.2

The texture is:
-clayey-clayey (AL) 0-26 cm;
-clayey-clayey-dusty (TF) 26-45 cm;
-clayey-clayey (TT) 45-55 cm;

Table 2. Entic luviosol

HORIZONS	UM	1	2	3	4
Depths	cm	0-5	18	33	55
Coarse sand (2.0-0.2 mm)	%	17.6	20.7	22.4	79.7
Fine sand (0.2-0.02 mm)	%	58.7	52.0	55.3	16.0
Dust (1 + II) (0.02-0.002 mm)	%	15.4	17.0	15.1	4.1
Colloidal clay (sub 0.002)	%	8.3	10.3	7.2	0.2
Physical clay (dust II + colloidal clay)	%	16.6	18.7	15.1	3.4

The texture is:
-medium sandy-clayey (UM) 0-33 cm;
-coarse sandy (NG) 33-55 cm.
Settlement Degree (% v/v)
This is a complex indicator characterising the soil settlement state depending on total porosity and soil texture.
It is also used in establishing the need for aeration in excessively settled soils.
Settlement degree, besides its use as a general indicator of the settlement state, is used in practice to establish the need for aeration in excessively settled soils.
Negative values of the settlement degree, particularly those below -17, point to an excessively aerated soil: the value 0 separates aerated soils from settled ones, while positive values, particularly those above 18, point to a strongly settled soil.

Table 3. Vertic-salty chernozem

HORIZONS	UM	1	2	3
Depths	cm	26	45	55
Settlement degree	%	20.1	16	16.4

Vertic-salty chernozems with settlement degree values above 18 need deep aeration works.
On settled soils, they recommend deep ploughing on optimum moisture soils.

Table 4. Entic aluviosoil

HORIZONS	UM	1	2	3	4
Depths	cm	0-5	18	33	55
Settlement degree	%	-24.47	-6.71	-1.08	-19.74

Negative values of the settlement degree, particularly those below -17, point an excessively aerated soil.
Aerated soil is the result of soil works. Ploughing increases soil volume with 20-30%, while apparent density decreases to 0.8-1 g/cm^3. Temporary aeration is useful for water holding.
It is not desirable to have an excessively aerated soil because water leaks below the root system and seed germination and plant growth conditions are improper.

CONCLUSIONS

Quality Classes
According to the main eco-pedological features and yielding capacity expressed as valuation marks, the arable land within the Commune of Şag can be classified as follows:
-1st class – 378.02 ha (4.49%);
-2nd class – 3438.32 ha (40.84%);
-3rd class – 3328.87 ha (39.54%);
-4th class – 1126.46 ha (13.38%);
-5th class – 147.33 ha (1.78%).
Analysis of Limiting Factors
The main limiting factors affecting the quality of the soil cover within the Commune of Şag are:
-phreatic moisture excess (moderate 28%, strong 13%);
-rain moisture excess (moderate 36%, strong 19%);
-high level of compactness (strong and very strong 78%);
-salinisation (moderate and very strong 12.96%);
-low portance (8.36%), humus supply (12%);
-reaction (moderate and strongly acid 28%);
For sustainable soil use, it is important to ensure proper understanding of soil quality and of the interaction with soil management by establishing the relation between cause and effect.
The diversity and great complexity of criteria in the establishment of soil agricultural quality and in the evaluation of the multiple types of damage lead to the idea that there is no universal criterion in defining soil quality.
We need to develop and diversify multidisciplinary, systemic and specific investigations.
Each type of degradation needs specific solutions.
Thus, measures meant to prevent soil degradation and to rehabilitate soils that are affected are numerous and varied.
This is why we need to increase awareness in decision-makers and in the public: broader and more efficient policy regarding the protection, improvement and sustainable use of soil need proper legislation.
The criteria and standards for soil quality protection and improvement measures need to rely on scientific research to allow proper measures depending on local conditions and restore soil quality at acceptable levels.

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DISTRIBUTION OF 1ST LEVEL MONITORING SITES PER EVALUATION CLASSES OF SOME HYDRO-PHYSICAL FEATURES OF THE SOILS WITHIN THE COMMUNE OF SAG, TIMIŞ COUNTY, ROMANIA

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Abstract

The purpose of the paper was to analyze the distribution of the 1st level monitoring sites by evaluation class of some hydro-physical features of the soil within the Commune of Sag, Timis County, Romania. Geomorphologically, the commune is located in the Banat-Crişană Plain, as part of the Western Romanian Plain, at the eastern extremity of the Tisei Plain, in the Timiş-Bega Interfluve, a unit formed exclusively by the cumulative action of the Timiş River. The area of the commune is mainly in the alluvial plain of the Timiş River and, partially, in the Bega River Plain. Positive forms, slight bumps of land (hills) are irregular in shape and are dispersed within the territory, more frequently near the ex-menders of next to the Timişul Mort River. As part of the vast Tisa Plain, the low plain where the commune is located ha a relatively low lithological evolution over the sand and gravel formations from the Pleistocene pushed by the rivers of Mureş, Timiş and Bega; during the lacustrine period, clays were deposited here: nowadays, they appear in varied situations generating a wide variety of soil types.

Key words**:** *soils, hidro-physical, indicators, values*

INTRODUCTION

In the same type of soil, suction (i.e., water holding force) and, therefore, water mobility and accessibility for the plants changes depending on moisture. [3]
Moisture values expressed as water percentage or as pF units in which occur obvious changes from the perspective of water holding, mobility and accessibility are known nowadays as hydro-physical indicators. [2]
Hydro-physical indicators are moisture values expressed as water percentage and suction units (pF or atmospheres) at which water changes mobility and plant accessibility. [5]

MATERIALS AND METHODS

Part of the Timiş-Bega hydrographic area, the territory is located in lower Timiş River basin that it crosses from East to West and drains most of the year. The role of the Timiş River in supplying surface water is obvious only during excessively rainy periods (end of winter and beginning of spring and, more rarely, end of spring). In the southern part of the area, there is the Timişul Mort, an ex-course of the Timiş River, polluted over a long period by wastes from the pig farm in Pădureni. Sustainable use of the soil supposes measures for the maintenance of potential productivity of resources and monitoring their evolution based on parameters and indicators of the changes in the soil quality. Such quality indicators are pressure on soil resources, changes in soil quality, and societal response to these changes. Some economic parameters and indicators of soil quality are already used. They are meeting edaphic crop and other human activity requirements, soil behaviour as an environment for biomass production, soil suitability for different uses, soil role in recycling urban and home wastes, wastes, and residues. [4]

RESULTS AND DISCUSSIONS

The main hydro-physical features of the soils in the 1st level monitoring site are:

-wilting coefficient (%),
-water holding capacity in the field (%),
-useful water holding capacity (%),
-total water holding capacity (%),
-maximum water release capacity (%).
Wilting Coefficient (%)
Wilting coefficient (% g/g) is the soil water content at which plants wilt irreversibly. It is calculated based on the wettability coefficient. The numeric value of the wilting coefficient is the lower limit of the water content available for the plants. Moisture in wilting coefficient characterised the soil type and depends on the plant and on soil texture mainly, together with some effects of the matter content. [1

Table 1. Vertic-salty chernozem

HORIZONS	UM	1	2	3
Depths	cm	26	45	55
Wilting coefficient	%	17.70	15.15	16.05

Wilting coefficient has high values between 0-55 cm.

Table 2. Entic aluviosol

HORIZONS	UM	1	2	3
Depths	cm	0-5	18	33
Wilting coefficient	%	2.96	3.66	2.57

Wilting coefficient has very low values between 0-33 cm.
Water Holding Capacity in the Field (% g/g)
Water holding capacity in the field (% g/g) is the water content that the soil has on a sustainable basis.
It depends mainly on soil texture and apparent density.
Water holding capacity in the field is the upper limit of water content available for the plants; above this value, water is no longer hold sustainably in the soil.

Table 3. Vertic-salty chernozem

HORIZONS	UM	1	2	3
Depths	cm	26	45	55
Water holding capacity in the field	%	23.65	26.55	26.77

Water holding capacity in the field has high values between 0-55 cm.

Table 4. Entic aluviosol

HORIZONS	UM	1	2	3
Depths	Cm	0-5	18	33
Water holding capacity in the field	%	12.08	14.34	10.84

Water holding capacity in the field has low values between 0-33 cm.
Useful water holding capacity (% g/g)
Useful water holding capacity (% g/g) is the interval between wilting coefficient and field capacity and it represents the amount of water available for the plants and hold in the soil sustainably for the plants.

Table 5. Vertic-salty chernozem

HORIZONS	UM	1	2	3
Depths	Cm	26	45	55
Useful water holding capacity	%	7.95	11.4	10.72

In the horizon 0-55 cm, useful water holding capacity varies between very low values and medium values.

Table 6. Entic aluviosol

HORIZONS	UM	1	2	3
Depths	cm	0-5	18	33
Useful water holding capacity	%	9.12	10.68	8.27

Water holding capacity in the field has low values between 0-33 cm.
Useful water holding capacity (% g/g)
Useful water holding capacity (% g/g) is the interval between wilting coefficient and field capacity and it represents the amount of water available for the plants and hold in the soil sustainably for the plants.

Table 7. Vertic-salty chernozem

HORIZONS	UM	1	2	3
Depths	cm	26	45	55
Useful water holding capacity	%	7.95	11.4	10.72

In the horizon 0-55 cm, useful water holding capacity varies between very low values and medium values.

Table 8. Entic aluviosol

HORIZONS	UM	1	2	3
Depths	cm	0-5	18	33
Useful water holding capacity	%	9.12	10.68	8.27

In the horizon 0-33 cm, useful water holding capacity has low values.
Total Water Holding Capacity (% g/g)
Total water holding capacity (% g/g) is the amount of water that the soil can hold to keep the porous soil layer full of water.

Total water holding capacity is determined by the soil settlement state, which depends on clay content and organic matter content.

Table 9. Vertic-salty chernozem

HORIZONS	UM	1	2	3
Depths	cm	26	45	55
Total water holding capacity	%	26.08	27.91	27.76

In the horizon 0-35 cm, Total water holding capacity has medium values.

Table 10. Entic aluviosol

HORIZONS	UM	1	2	3
Depths	cm	0-5	18	33
Total water holding capacity	%	52.45	37.73	30.70

In the horizon 0-5 cm, Total water holding capacity has very high values.

Analysis of Limiting Factors

To eliminate or reduce these limitations, we need to apply works to prevent phreatic and rain moisture excess (soil works under optimum moisture conditions, proper crop rotation that include improving crops, etc.) on about 34.31% of the area, lime treatment periodically on about 30% of the area, land improvement works that aim at improving salty soils or moisture excess soils on about 28% of the area, capital levelling and modelling on about 8.8% of the area, and remedying and maintaining the exiting drainage system.

We also need to improve the physical state of the soils on areas affected by surface degradation processes (crustification, dusting, warping of porous area, etc.) to reduce the number of soil works, to introduce long-run crop rotation with protective crops, to control diseases and pests in an integrated way, to apply improving fertilisers, etc.

As for improving fertilisation, we need to pay proper attention to the use of demi-liquid and liquid animal waste on poorly drained, frozen soils, on lands located in the near vicinity of water courses and to avoid applying excessive amounts of fertilisers or to choose improperly the time of application.

Special attention should be paid to nitrogen fertilisation because of the complexity of this nutrient and of the ease in losing it as nitrates through infiltration water and surface leakage.

The amount of mineral and organic fertilisers applied per area unit should not exceed 170-210 kg of N/ha/year.

For exploitations in vulnerable areas, it is forbidden to apply amounts above these limits.

CONCLUSIONS

A policy meant to protect soil quality at national level should not rely on criteria specific to a given area only.

Thus, we should use generic criteria when making up strategies and planning protection measures, while aspects related to specific locations or areas should be part of a special soil quality monitoring system.

Any change of soil quality, before and after applying protection and improvement measures should be part of a special soil quality monitoring system.

This is necessary because we need to check any damage sign cause by humans or by nature and capture evolution trends.

In order to detect trends of soil quality deterioration in advance, soil quality control should be repeated at regular intervals of time.

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STUDY ON THE TRANSPORT SYSTEM OF FEEDSTOCK IN AGRICULTURAL BIOGAS PLANTS

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Abstract

The human energetic necessities are frequently exceeded by the energetic potential of plants, but the present technologies use only a small part of biomass to be used for transforming it in energy. Even so, the energy obtained from biomass obtained from agriculture, forests and waste can be significant. In this respect, biogas is an important biofuel and biogas plants represent a good resource of energy, which can be used both in rural and urban communities. The paper refers to the first stage of an agricultural biogas plant, transport, delivery and storage of feedstock. Thus, stackable feedstock like grass, maize silage, manure with high straw content, vegetable residues, must be transported from a storage facility, such as a bunker silo to the digester feeding system. This is usually done by loaders or tractors and the feedstock is fed into the digester using different transporting systems, which are analysed in this paper.

Key words**:** *biogas plant, feeding system, feedstock, transport*

INTRODUCTION

Biofuels are fuels produced from biomass. This is the biodegradable mass from products, waste from agriculture, including vegetal and animal substances, the forest sector and industrial and urban waste [11].

The European Union adopted in 2003 a provision in order to impose the using of biofuels and other alternative fuels. Thus, the provision 2003/30/EC imposes that European countries must reach a certain target of using biofuels in the transport section.

In Table 1 are presented the shares of some alternative fuels which are and must be used in future years in European Union.

Table 1. Planned ponderance of alternative fuels

	2005	**2010**	**2015**	**2020**
Biofuels	2 %	6 %	7 %	8 %
Natural gas	0 %	2 %	5 %	7 %
Hydrogen	0 %	0 %	2 %	5 %
TOTAL	2 %	8 %	14 %	20 %

Source: [6]

The most effective way of producing biogas is through biogas plants, which are more and more used in all countries of Europe.

Agricultural biogas plants operate with four different process stages:

1.Transport, delivery and storage of feedstock

2.Biogas production

3.Storage of digestate, eventual conditioning and utilisation

4.Storage of biogas, conditioning and utilisation [4]

From these 4 stages which operate a biogas plant, in this paper we will study the first stage: transport, delivery and storage of feedstock. Stackable feedstock like grass, maize silage, manure with high straw content, vegetable residues must to be transported from a storage facility such as a bunker silo to the digester feeding system [3]. This is usually done by loaders or tractors (Figure 1, 2 and 5) and the feedstock is fed into the digester using a screw pipe transporting system, like the one shown in Figure 3.

The feed-in system includes a container, where stackable feedstock is poured by tractor, and a transport system, which feeds the digester. The transport system is controlled automatically and consists of scraper floors, walking floors, pushing rods and conveyor screws.

MATERIALS AND METHODS

In this study we analysed the transport devices and machines which are used in a biogas plant. These are loaders, conveyor screws and

feed-in systems. Scraper floors and overhead push rods are used to transport feedstock to the conveyor screws. They are capable of transporting nearly all stackable feedstock, either horizontally or with a slight degree of inclination, and are therefore used in very large, temporary storage containers.

Photo 1. Loader with maize silage
Source: [10]

RESULTS AND DISCUSSIONS

In the transport system of a biogas plant, beside loaders are very often used conveyor screws (Photo 3 and Fig.1.), because they can transport feedstock in nearly all directions. The only condition for using these screws is the absence of large stones and other physical impurities.

Photo 2. Loader feeding maize silage into a container
Source: [10]

The conveyors screws assure a continuously movement, so that the feeding of the digester can be done easily and continuously. In order to improve its functioning, it is recommended that coarse feedstock should be crushed, in order to be gripped by the screw and to fit into the screw windings.

Photo 3. Conveyor screws, ready for installation
Source: [10]

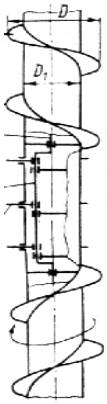

Fig. 1. Conveyor screw
Source: [7]

Beside conveyors screws presented above, in biogas plants are also much used wash-in shafts for feeding the digesters.
Feeding solids to the digester through wash-in shafts or sluices, using front or wheel loaders, allows large quantities of solids to be delivered any time, directly to the digester (Fig.2.).

Photo 4. Frontal loader
Source: [7]

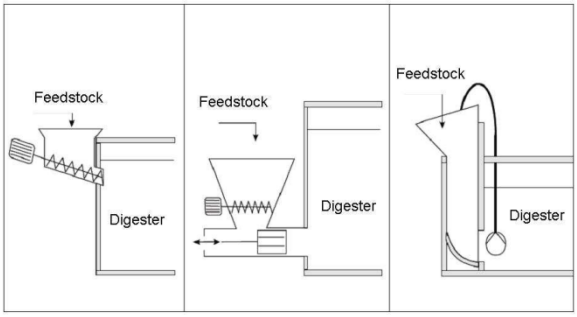

Fig. 2. Wash-in shaft, feed pistons and feed conveyors system for feedstock insertion into the digester
Source: [2]

In Fig. 2 are presented 3 cases of feeding the digester, through wash–in shaft, feed pistons and feed conveyors.
In the case of using feed pistons (Fig.2.), the feedstock is inserted directly into the digester by hydraulic cylinders, which push the feedstock through an opening in the wall of the digester. This ground level insertion means that the feedstock is soaked in the liquid content of the digester, reducing the risk of floating layer formation. This system is equipped with counter rotating mixing rollers, which transport co-substrates to the lower horizontal cylinders and, at the same time, crush long fibre materials [2].
Feeding co-substrates to the digester can be done by using feed screws or conveyor screws (Photo 5).

Photo 5. Feed-in system for silage
Source: [1]

In this case, the material is pressed under the level of the liquid in the digester, using plug screws. The method has the advantage of preventing gas leaking during feeding. The simplest way to do it is to position a dozer on the digester, so that only one insertion screw is necessary. For feeding the screw, temporary storage containers, with and without crushing tools, are used [4].
From the components of the transport systems in a biogas plant presented above: front or wheel loaders, conveyor screws, wash-in shafts, feed pistons and feed conveyors, each of them has its importance and place to be used, depending on the circumstances, because each of them has its own advantage. Thus, the loaders are used for transporting feedstock to the conveyor screws, conveyor screws are very often used because they can transport feedstock in nearly all directions and wash-in shafts allows large quantities of waste to be delivered any time, directly to the digester.

CONCLUSIONS

A biogas plant is a complex installation, which is more and more used in rural areas as an alternative of classic energy.
From all the components of a biogas plant: transport, delivery, storage and pre-treatment of feedstock, biogas production and storage of digestate, we concentrated in this paper over the transport of feedstock, because this stage has a big importance in functioning of a biogas plant.
We analysed the transport of vegetable residues from a storage facility to the digester feeding system. This is usually done by loaders or tractors. It was also analysed the feed pistons, feed conveyors screws and wash-in shafts, showing the importance and advantages presented by each of them.
All these systems of transport used in biogas plants are finally meant to improve the efficiency of obtaining biogas.

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MOLDOVAN ANTI-EVASION AND ANTI-AVOIDANCE MEASURES: 25 YERS OF CHANGES

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Abstract

The economic system of socialist command economy admitted no possibility for tax evasion. Moreover, socialist types of enterprises, institutions and organizations not only had the opportunity but, more importantly, neither were interested in tax evasion. Nevertheless, in the mid of 80s, as a result of political and economic change, the individual and cooperative work, has been widespread all over. Since that time, the individuals and subsequently businesses were given the opportunity to generate an extra income, the attitude towards private property has changed, and as a result has led to tax evasion. Data shows a steady trend of increase in cases of tax evasion, *thus in 1994 tax evasion correlation to GDP was 4.5%, in 1997 this number increased more than 3 times, in 1999 five times and in 2008 more than nine times. As result, the Moldovan anti-evasion and anti-avoidance legal and institutional framework suffered a lot of changes during its transformation for the last 25 years. However, the tax system, after 20 years of implementation, was still characterized by oversize, the austerity and the state's inability to manage efficiently its resources. Nevertheless, many steps were taken to change things in the last 5 years. With this paper we aim to examine the anti-evoidance and anti-evasion changes in order to reveal the weaknesses of Moldovan tax system and to understand its areas of strength.*

Key words**:** *avoidance, evasion, Moldova, transfer pricing, withholding taxes*

INTRODUCTION

The economic system of socialist command economy admitted no possibility for tax evasion. The personal income was formed mainly from wages. Personal income tax (PIT) was collected in a centralized way through the enterprise, institution or organization. Thus, the possibility of avoiding non-payments of taxes was reduced to the minimum. Moreover, socialist types of enterprises, institutions and organizations not only had the opportunity but, more importantly, neither were interested in tax evasion. This can be explained by the same peculiarities of the economic system - the funds received by the state under tax form were returning back, if necessary, under subsidies form. Nevertheless, in the mid of 80s, as a result of political and economic change, the individual and cooperative work, has been widespread all over. Since that time, the individuals and subsequently businesses were given the opportunity to generate an extra income, the attitude towards private property has changed, and as a result has led to tax evasion. These reasons explain the need for State financial control and corresponding tools.

However, hoping for the best, the legal and institutional framework for the prevention and fight against tax evasion and avoidance suffered a lot of changes during its transformation for the last 25 years. Nevertheless, statistics show a steady trend of increase in cases of tax evasion. Thus, the data shows that in 1994 tax evasion correlation to GDP was 4.5%, in 1997 this number increased more than 3 times, in 1999 five times and in 2008 more than nine times [13][5][6].

Nevertheless, the improvements are made, many steps were taken to change things in the last 5 years, and the results are not expected to be late. We consider that the proposed changes represent a good start undertaken by

Moldovan Government in creating a clear legislative environment and encourage the authorities to continue this initiative and to seek support from the foreign partners in its further administration.

The present paper continued the research published in previous volume of this Journal [7] and based on authors' report for International Tax Conference: Transformation of Tax Systems in the Central and Eastern European Countries (CEE) and BRICS Countries – 25 years of experience and challenges for the future [9].

MATERIALS AND METHODS

This research is relevant for two groups of addresses: governments and policy makers, and academic stuff and researchers. Firstly, we research conceptual aspects of defining the extent of tax evasion and tax avoidance in the Republic of Moldova. Second we analyse the Moldovan statutory anti-avoidance legislation, including withholding taxes. Third we distinguish available legal instruments against tax evasion of the Moldovan tax system transformation, including administrative and criminal legal instruments. Fourth we characterize institutional framework changes, highlighting its effectivenes. Fifth we provide an analysis of the proposed changes to the Moldovan transfer price legislation, identifying some amendments to be considered. The article focuses primarily on the situation faced by Moldova in the last 25 years. A large amount of data provided by IMF, OECD, Mains State Tax Inspectorate, Ministry of Finance information and other sources of technical expertise was collected, synthesized, and analysed.

RESULTS AND DISCUSSIONS

The extent of tax evasion and tax avoidance in the Republic of Moldova

Ascertaining the extent and characteristics of evasion and avoidance immediately runs into the conceptual problem. In this regard, many scholars [12][2][23] debate the definition of terms related to anti-abuse provisions: jurists' (Francesco Tesauro, Reuven Avy-Yonah, Nicola Sartori and Omri Marian) tri-partition of strategic tax behaviours: tax evasion (illegal behaviours), tax avoidance (illegitimate, but not necessarily illegal), and licit tax savings (legitimate tax planning) vs. economists' (Joel Slemrod and Jon Bakija) two categories: tax avoidance (legal tax behaviours) and tax evasion (legal tax behaviours). The concept of strategic tax behaviours or aggressive tax planning strategies has been recognized as a starting point. Moldovan tax law splits strategic behaviours into two categories: tax evasion and tax avoidance. This partition is based on the meaning of meaning of violation of or compliance with the law.

The concept of "tax avoidance" is not expressly defined in the Moldova tax law. It contains only some general references on treaty shopping related restrictions. In other words, special conditions need to be satisfied for the tax purposes of applying Double Taxation Treaty (DTT) provisions. By contrast the administrative and criminal law, stipulated in a wide manner, defines "tax evasion" in existing secondary tax legislation, which is used for tax purposes. Under Moldovan legislation the concept of "tax evasion" is set up in Arts.244 (Tax evasion by enterprises, institutions and organizations) and 244^1 (Tax evasion by individuals) of the Criminal Code and Art.301 (Tax evasion by individuals) of the Contravention Code. According to Moldovan statutory law, tax evasion represents actions aimed at hiding the object of taxation by failure to submit an income declaration or including distorted data or illegal use of tax benefits provided under the legislation.

On efficiency of tax system, we can make conclusions by analyzing data on fiscal control (Table 1). Fiscal control is a logical consequence of the tax administration tasks, because tax audits allow verification of whether all taxpayers meet their correct, complete and timely tax obligations. The share of annual audited taxpayers out of total number registered shows a decrease from 32 to 10% within 1994-2014 periods. In absolute terms it is almost three times more from 22.8 to 61 thousands.

Table 1. Evolution of tax audits in the Republic of Moldova, 1994–2014

Year	Nr. of businesses registered at the end of the period	Including (thousands)			Results of controls (mill. MDL)	
		Nr of audited taxpayers	No. of violations	Detection, %	additional calculated payments (mil MDL)	**Incl. penalties**
1994	70,536	22,766	7,637	33,55	89,9592	**53,8813**
1995	96,984	25,211	10,012	39,7	222,872	**98,776**
2001	-	31,765	20,715	65,23	213,819	**112,842**
2002	593,1	22,889	11,138	48,66	268,6987	**131,061**
2003	618,2	24,544	13,362	54,44	367,0833	**144,805**
2004	641,7	29,830	17,674	59,25	304,4021	**85,3547**
2005	645,4	43,3	32,5	75,1	321,4	**135**
2006	659,4	62,0	45,1	82,7	349,1	**139,1**
2007	674,7	42,1	25,3	60,1	237,7	**60,0**
2008	679,6	38,4	21,1	54,9	201,1	**94,7**
2009	683,8	53,5	36,3	67,9	449,5	**185,4**
2010	686,2	66,8	41,9	62,7	498,0	**253,1**
2011	702,3	71,9	45,7	63,7	517,0	**256,4**
2012	688,117	63,527	43,670	68,7	595,96	**344,7**
2013	289,284	74,029	40,118	54,2	653,0	**362,1**
2014	**689,580**	**60,523**	**-**	**53.0**	**743,4**	**457,9**

Source: [8].

Additionally calculated amounts of taxes, fees and other payments as result of controls increase also, with more than 9 times from MDL 89.96 million in 1994 to 743.4 million in 2014, mainly because of penalties that are applied on one to one ratio, which means that for each additional calculated EURO is added another EURO as penalty.

Improvement and tax audit system development resulted in an increase of outcomes derived from tax audits from 33.55% in 1994 to 53% in 2014 (the highest rate of 83% was registered in 2006). The tax audit activity was strongly influenced by: reorganization of controlling bodies in 2002 and 2014; implementation of preselection methods based on risk assessment since 2003 and contraposition of tax audits since 2004; implementation of a new method of estimating the taxable income of the wealthiest individuals in 2012. The indirect estimation method provides the Moldovan tax authority with possibilities for gathering information about taxable income of individuals from any sources. However this does not demonstrate a positive impact on the share of tax violators and taxpayer compliance. The increase in tax violations is more a result of growing tax evasion and tax avoidance phenomenon, legislative changes, and political and economical instability' [8].

Improvement of the tax law procedure is one of the main tasks of MTA. Thus, with the 2007 fiscal amnesty were observed measures regarding to discipline the taxpayer, increasing the fines and penalities for tax evasion, insistent tracing of tax debts, including the requirements for financial institutions allowing access to the confidential information about their clients. According to the Law on amending and completing some legislative acts No.177-XVI of 20.07.2007, a tougher sanctions system was approved, including pooling a number of fines, while at the same time increasing them and introducing some new.

Although tax fraud are widespread cases, the criminal liability for these illegal acts are extremely rare. Statistics demonstrate (Table 2) that the current system of selecting, transfering, and investigatigating potential tax fraud does not seem to produce prosecutions and convinctions.

From total of 263 cases referred in 2014, 67 were accepted for investigation, and only 4 was placed for prosecution. The situation is similar in previous years. Moreover, we were not able to document any tax fraud convictions during the last six years. Mostly, this state of affairs is conditioned by imperfection of criminal law, the contradictions in the extra-criminal law and criminal liability for the tax fraud. Another factor is a lack of administrative liability of

the public authorities, which was adopted only in 2000 [1].

Table 2. Moldova: Tax Fraud Cases, 1998-2014

	1998	1999	2000	2001	2002	2009	2010	2011	2013	2014
Case refered	262	139	275	335	125	365	290	437	252	263
Investigations	...	...	...	...	...	...	66	134	13	67
Prosecutions	...	...	...	...	...	2	4	1	4	4
Convictions	10	12	9	12	9	...	...	...	...	...

Source: [25] for 1998-2002 period, [19] for 2009-2010 period and STI data for 2013-2014 period.

Moreover, only in 2008 [17] did the administrative and disciplinary liability of public servants begin to be regulated. Also in 2008, particular attention begins to be paid to the role of prosecutors [16] and judges ensuring this way, the recovery of damages caused to the state (i.e. the procedure of their appointment, introduction of the concepts of financial liability and disciplinary violation, judicial error, gross negligence, resignation, etc.).

Nevertheless, many national scholars [4][11][6] have identified the negative impacts on Moldovan tax revenue that are due to corruption and tax fraud. It is obvious that corruption, as a condition for tax evasion, creates the optimal circumstances [3] (Table 3).

No region or country in the world is immune to the damages of public-sector corruption; the vast majority of the 183 countries and territories assessed score below five on a scale of 0 (highly corrupt) to 10 (very clean). Moldova's averaged a score below 3 during the available data period, indicating a serious corruption problem (EU-28 – score average 6, in 2014)[2]. Table 3 shows an increasing trend in the Corruption Perception Index is observed between 2007 and 2013: while this is promising, but not enough to reduce the damages of public-sector corruption.

„Many academic papers study relationships between corruption and shadow economies, viewing them as complements and highlighting different mechanisms of how they can interact.

The corruption often appears to be compared with an extra tax added to the regulatory burden of the official economy.

Table 3. Moldova: Revenue structure by Percent of GDP, 1991-2014

Year	CPI*	Shadow Economy	Total tax revenue as % of GDP
1989			41.0
1990	-	-	-
1991	-	-	-
1992	-	44.25	22.8
1993	-	43.36	31.3
1994	-	42.87	28.8
1995	-	43.11	27.4
1996	-	43.57	29.9
1997	-	43.80	28.3
1998	-	44.24	21.8
1999	2.6	44.87	24.8
2000	2.6	45.35	25.0
2001	3.1	45.65	24.4
2002	2.1	45.76	25.8
2003	2.4	45.76	27.5
2004	2.3	45.61	29.8
2005	2.9	45.20	31,6
2006	3.2	44.98	33.3
2007	2.8	44.50	34.0
2008	2.9	43.94	33.4
2009	3.3	-	32.0
2010	2.9	44.3	31.0
2011	2.9	-	30.5
2012	3.6	-	31.8
2013	3.5	-	31.4
2014	3.5	-	32.7

Source: developed by the authors based on [7][9] data.
CPI* - Corruption Perception Index

Consequently, the increase in demand of bribes lead to more activities in the shadow economy. Corruption is among the greatest causes of the shadow economy's size and impact. This means that anticorruption measures may be ineffective if the reciprocal relationship between corruption and the shadow economy is not addressed"[6]. Moreover, numerous studies have identified the negative impacts on tax revenue that are

[2] For more info see: http://cpi.transparency.org

due to corruption in revenue administration. According to our previous reseach [6] Moldova is loosing up to 20% of its tax revenue. It was estimated that improving its tax efforts, Moldova could reach up to 40% of tax revenue as % of GDP. Thus, recognizing the impact and breadth of "corruption's damaging effects" is critical. "The OECD has highlighted the role of tax auditors in combating corrupt practices of the private and public officials. In this context, the OECD Bribery and Corruption Awareness Handbook for Tax Examiners and Tax Auditors emphasizes that the role of tax auditors appears to be essential in order to assure the effective and vigorous application of laws. The recommendation made by OECD provides guidance to tax examiners and auditors to detect, deter, and prosecute all forms of corruption" [6].

In this regard, we can conclude that by fighting corruption phenomenon we will decrease the shadow economy and taxpayers evasion behaviours and increase tax revenue collection.

Statutory anti-avoidance framework

The implementation of an anti-abuse measure does not automatically increase tax revenue. However, the anti-avoidance legislation appears to be one of the best practices. Applying withholding and exit taxes or thin capitalisation and Controlled Foreign Corporation (CFC) rules, tax authorities try to combat tax evasion and challenge fictitious or artificial transactions. From an anti-avoidance legislation perspective, all mechanisms mentioned above prevent and prohibit transactions that are solely carried out to obtain a tax benefit. In case a certain transaction falls under the scope of anti-avoidance legislation, "the tax liability is determined without taking benefits resulting from the abuse into consideration. In other words, the tax burden is as high as it would have been if the abuse had not occurred"[14].

Unfortunately, Moldova does not have specific anti-avoidance provisions such as exit taxes, CFC or thin capitalisation rules. Nevertheless, deduction rules of interest between legal entities (other than those paid between a company and financial institution) is allowed only up to the refinancing rate established by the National Bank of Moldova, which is established in November of each year, and is in force for the following one [20]. A few other provisions should also be considered, namely:

-The case of interest related to an investment activity. The interest expenses are deductible for Corporate Income Tax (CIT) purposes within the limit of the income derived from the investment [20];

-The case of interest related to acquiring/building of the fixed assets based on the loan. The interest expenses should be capitalized to the initial fiscal value of assets. The deductibility of this expense is capped at the above limit. The excess difference is treated as non-deductible expense for that fiscal year [20];

-The case of interest related to operational or day-by-day activities. The interest expenses are deductible for CIT purposes and should be justified by adequate backup documentation [20].

The Moldovan Tax Code provides for the tax authorities' rights to initiate annulment of some transactions in the courts [20]. Still, no specific measures are provided in this sense under the tax law, and general provisions of the civil legislation concerning the nullity of contracts are applicable. According to the Civil Code, Art.221, contracts concluded without intention to produce legal effects (fictive transactions) and those concluded with the purpose to hide another legal act (simulated transactions) are null and void. Even the case law of the Moldovan court does not provide clear criteria to be taken into account upon qualification of a transaction as fictive or simulated [22]. Nevertheless the Moldovan Supreme Court of Justice explains (even though merely) in the case of a fictive transaction the lack of both parties' intention should be established based on the evidence brought. However, although tax administration has the legal right to claim annulment of fictive and simulated transactions, they seem to ignore such right in practice[3].

[3] For more info see: http://cauta.csj.md/legy/ac-admin/#/app

The analysis of the publicly available case law of the Moldovan Supreme Court of Justice demonstrated that out of more than 25,000 litigation cases examined in 2008 – 2015 in which the Art.221 of the Civil Code was invoked, tax authorities participated in less than 1% cases, having the position of defendants. Furthermore the application of this article by the tax authorities seems to be increasingly less (e.g. during the last 3 years the tax authorities participated in 2 cases only).

In this regard, the authors do strongly encourage the MTA to use at the maximum their law enforcement possibilities available at the moment and recommend rethinking current tax law structure, by reconsidering future legislative development of Specific Anti-Avoidance Rules, characteristic for civil law countries.

(i)**Institutional framework**

In order to counter tax evasion, the Council of Ministers of former MSSR adopted the Decision nr.68 on the creating of state tax inspectorates for each administrative and territorial unit at the district and city level on March 7th, 1990. In addition, a special department – the Financial Guard, was created in 1991, being empowered with control of tax violations and sanction functions as well. With over 20 years of transformation, this department suffered several changes. First, after 11 years of activity, its functions were taken over by the Centre for Combating Economic Crimes and Corruption, in 27.06.2002. Second, later in 2012, after another 10 years, the institution was transformed into National Anti-Corruption Centre and the responsibilities for the examination of cases on tax violations and application of the penalties on behalf of the tax authorities had been transmitted to the Ministry of Internal Affairs [20]. However, the changes continued, and powers granted to the Ministry of Internal Affairs were cancelled. As a result, the responsibilities for the examination of cases on tax violations and application of the penalties are remaining duties of tax authorities by amending the Tax Code, with entry going into effect from 01.01.2014 [15].

Hoping for the best, the institutional framework for the prevention and fight against tax evasion suffered a lot of changes during its transformation for the last 25 years. Nevertheless, statistics show a steady trend of increase in cases of tax evasion. Thus, the data shows that in 1994 tax evasion correlation to GDP was 4.5%, in 1997 this number increased more than 3 times, in 1999 five times and in 2008 more than nine times [13] [5][6].

However the improvements are made and the results are not expected to be late. The main reasons for good returns are based on assumption that the current structure will eliminate duplication of the functions of control. Duplication of the functions of control has made the actual system much more expensive from a tax authorities point of view and more burdensome from taxpayers' perspectives.

The trial of offenders who commited tax evasion crimes is put in the competence of the common court, which examines the case in accordance to Moldovan law.

Obviously, some controversial aspects, in particularly the time of consumption related crime, the object of the violation and its subjective side, leaves the field open to debate. In this respect, and from future accession perspective of Moldova to the European Union, we can mention that some community standards will be effectively implemented only if the national legislation in this area will contain, or at least, will work only with an absolute minimum of normative inconsistencies. In this context, we believe that the tax culture will have to bear changes dictated by the necessities of life and ensure sustainable economic development in Moldova.

(ii)Transfer pricing

The Moldovan Transfer Pricing (TP) legislation is still in its stage of development. The “arm’s length” principle has been set forth in Moldovan tax law since 1998 requiring that transactions between related parties are carried out at market price [20]. According to Art.5 of the Tax Code, a related party is the taxpayer’s family member or a legal person that controls the taxpayer, is controlled by the taxpayer or is under joint

control along with the taxpayer. The term "taxpayer's family member" includes spouses, direct relatives (children, parents and grandparents of the individual or his spouse) and spouses of direct relatives. The term "control" means the holding (directly or through one or more related parties) of at least 50% of the capital or the voting rights in a legal person. For an individual, the total holding is determined as the total sum of the corporate rights that belong to the individual and directly or indirectly to his family members. Also, the low provides that losses incurred in dealings between related parties carried out directly or through intermediaries are treated as non-deductible for corporate income purposes [20]. The Tax Code entitles the Moldovan Tax Authorities (MTA) to determine if a related party's dealings were carried out with the aim to decrease the taxable base. However, as it currently stands, the law does not provide for a mechanism allowing both the MTA and the Moldovan taxpayers to asses and prove that the transactions were carried out at "arm's length". Moreover, taking into account that Moldova is not currently an OECD member, there is no possibility of enforcing the OECD Transfer Pricing Guidelines.

Nevertheless, in 2016, the Moldovan Government is set to approve new transfer pricing legislation covering related party transactions undertaken by Moldovan taxpayers. The new transfer pricing legislation was supposed to be approved in 2014. However the deadline for new proposals implementation (draft law of 29.04.09) was postponed due to stakeholders' rejection of the proposed changes. In this respect, we will analyse only the second draft of transfer pricing legislation of 20.03.2014. The aim of new amendments is the harmonization of national tax legislation with relevant international provisions. Current text of the draft law does provide for specific provisions in respect to the applicability of transfer pricing rules (Table 4).

Table 4. New provisions related to transfer pricing rules

No.	Area	Peculiarities
1.	*Related party definition*	Under the proposed amendments, related parties will be considered legal entities with a direct holding or an indirect holding (through one or more related parties) that exceeds 25% (down from 50 according to the current legislation) of the capital or the voting rights in a legal person. Additionally, the law provides that family members are considered to be related parties for purposes of application of the TP legislation.
2.	*Dealings entered into by "permanent establishments"*	According to new proposals the art.5, para.12, letter d) determines whether a permanent establishment is considered a related-party, which ultimately can be treated for purposes of applying Moldovan TP rules.
3.	*Materiality threshold for documentation purposes*	Under the proposed legislation, new Art.226 of the Tax Code, taxpayers will be required to document all related party transaction.
4.	*Penalties for the infringements*	According to new para.6 of the Art.260 the failure to submit TP file within the deadline set by the tax authorities or its incomplete presentation by the taxpayer, is considered as related-party transactions without justifying the amount of TP practiced and is sanctioned by a fine of MDL 20,000.
5.	*Methods*	Under the proposed amendments of new Art. 21^1 all five transfer pricing methods set up by OECD TP Guidelines are provided
6.	*OECD Transfer Pricing Guidelines*	OECD Transfer Pricing Guidelines for multinational enterprises and tax administrations will be taken into account under provisions of Art. 21^1 of Tax Code

Source: elaborated by the authors.

However, according to the authors' opinion, there are still some amendments to be considered:

-Provisions, which will allow both MTA and taxpayers to enter into Advance Pricing Agreement (APA). APA can be a valuable alternative in solving TP disputes, because: First, APAs provide taxpayers with a certain

degree of certainty in respect to the expectations of the tax authorities in terms of the arrangements to be agreed in related party transactions, which in turn will decrease the risk of future TP adjustments; Second, while an APA does require certain administrative procedures, it will ensure that in a medium to long term, the company's administrative burden in terms of the preparation of TP documentation is required.

-Review of the enforcement rules and penalties for the infringements. MDL 20,000 (currently, less than EUR 1,000) does not reflect the principle of equity (e.g. the TP documentation will have to be equally prepared for transaction for which the amount does not exceed for example EUR 1,000, as well as for a transaction which materially affects the company's operations). Moreover, Moldova could use the experience of other countries (Table 5).

Table 5. List of CEE countries with implemented TP legislation

No.	Countries	Year
1.	Republic of Poland	2001
2.	Republic of Hungary	2003
3.	Republic of Lithuania	2004
4.	Republic of Slovenia	2005
5.	Czech Republic	2006
6.	Romania	2006
7.	Republic of Croatia	2006
8.	Republic of Estonia	2007
9.	Russian Federation	2012

Source: elaborated by the authors.

A guidance regarding methodology in choosing comparable data for certain related-party transactions are expected to occur in Moldova (e.g. logistic activities, low-value adding services, manufacturing activities and financing transactions).

-The extension for some concepts (e.g. concept of "control" related to the cases with same administrators in two or more entities, which is a very usual situation for Moldova).

(iii)**Anti-avoidance measures – International aspects.**

The approach to tax avoidance is currently high on the tax policy agenda throughout the world. There are many ways countries reduce tax avoidance: (a) Enacting general anti-avoidance rules (i.e. substance over form and step transaction) and specific legislation targeting areas that are more vulnerable or exposed to tax evasion (i.e. CFC, beneficial ownership, and thin capitalization rules), in their domestic legislation; and (b) by adding an anti-abuse rule in a treaty (i.e. beneficial ownership, exchange of information, limitation on benefits and transfer pricing). According to Oz Halabi 'all those provisions are structured to reduce double taxation, distribute revenues between the treaty partners, and help combat tax avoidance' [21]. However, it has been recognized [24] that, it is preferable to deal with international tax abuse by specific anti-abuse rules that will be added in the treaty.

In this order, we are agreeing with Oz Halabi that 'consideration must be given to international law and good faith compliance by the contracting states' [21].

Moreover, due to its stabilitiy and clear rules, a tax treaty is very often one of the pre-conditions of an increase of foreign investment.

As Table 6 shows the ten biggest countries participating in the investment process of Moldova (in 25 years of transformation of the tax system), the capital invested in domestic companies that represent 78%, only two countries (USA and British Virgin Islands) have not concluded DTT yet and the capital invested by them represents only 8% of total capital.

Comparing with the situation after 15 years, the capital invested by the ten biggest participating countries first ten biggest countries participants to the investment process in Moldova, represented 79% and only four countries (Netherlands, Romania, Russia and Germany) have concluded DTT with our state and the capital invested by them represented around one third of total capital.

Statistics demonstrate eloquently that the growing number of DTT have a positive impact on foreign investment growth in the Republic of Moldova (Lei Mil.3,663 capital investment in 15 years vs. Lei Mil. 11,635 capital investment in 25 years).

Table 6. The main countries (with / without DTT concluded) investing in economy of the Moldova and capital invested in 25 years vs. 15 years

01.01.1990 - 01.01.2015						01.01.1992 - 31.12.2006					
Nr.	Country	Nr. of Comp.	Cap. invested (Lei Mil.)	(%)	DTT	Nr.	Country	Nr. of Comp	Cap. invested (mil. lei)	(%)	DTT
1	The Netherlands	156	2,033	17	Yes	1	Spain	45	895	24	No
2	Italy	1,162	1,630	14	Yes	2	The Netherlands	73	583	16	Yes
3	Cyprus	302	1,367	12	Yes	3	Great Britain	126	299	8	No
4	Russia	911	1,108	9	Yes	4	USA	306	289	8	No
5	Germany	401	665	6	Yes	5	Romania	690	195	5	Yes
6	USA	382	546	5	No	6	Russia	544	167	5	Yes
7	Romania	1,547	478	4	Yes	7	Cyprus	122	157	4	No
8	Great Britain	221	473	4	Yes	8	France	113	121	3	No
9	Austria	92	438	4	Yes	9	British Virgin Islands	44	108	3	No
10	British Virgin Islands	76	323	3	No	10	Germany	263	105	3	Yes
11	Spain	64	313	3	Yes	11	Italy	459	95	3	Yes
	Others	4,451	2,561	19	-		Others	2,330	554	18	-
	TOTAL	9,765	11,635	100	-		TOTAL	5,142	3,663	100	-

Source: Based on Moldovan State Registration Chamber, Ministry of Finance data and D. Criclivaia PhD thesis.

Furthermore, for multinational enterprises, tax regimes that do not apply thin capitalization rules, CFC-legislation, or exit charges are most attractive as the allocation of debts is not restricted and the deductibility of interest is not limited. From an anti-avoidance legislation point of view, Moldova seems to be more attractive for multinational enterprises, because the withholding of taxes is the only one anti-abuse measure used. Application of this mechanism is made through the Tax Code and bilateral DTT. Moreover some researchers [18] analysing the phenomenon of treaty shopping empirically find that withholding taxes significantly increases the possibility of establishing an intermediate holding company in a third country.

CONCLUSIONS

Even is no way to completely eliminate it, countries will always attempt to limit tax evasion by enacting different provisions, structured to help combat tax avoidance. However, as the result of the performed research, we can conclude that currently the Moldovan tax law is very poor in dealing with tax-avoidance.

Nevertheless, we consider that the proposed changes of last 5 years represent a good start undertaken by Moldovan Government in creating a clear legislative environment and encourage the authorities to continue this initiative and to seek support from the foreign partners in its further administration.

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ANALYSIS OF SUBSIDIES ALLOCATED BY THE COMMON AGRICULTURAL POLICY AND CROPPING SPECIALIZATION IN ROMANIAN FARMS USING FADN DATASET

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Abstract

Romania is one of the European countries such as Italy characterized by the highest percentage incidence of small family farms with a rural population scattered predominately in less favoured areas. The objective of this paper was to assess throughout a quantitative method, impacts of funds allocated by the second pillar of the Common Agricultural Policy on cropping specialization in order to solve out migration from Romanian countryside. We used the data published by the European Union in the Farm Accountancy Data Network (FADN) dataset from 2007 to 2012. Romanian farms have pointed out a not significant impact of financial aids paid to less favoured areas in order to reduce the rural marginalization and depopulation and, by contrast, a direct correlation between Single Area Payment Scheme and farm net income.

Key words**:** *less favoured rural areas, Rural Development Plan, second pillar, Self-Organizing Maps, Single Area Payment Scheme*

INTRODUCTION

In 2007 Romania become part of the European Union pursuing its aim of joining the EU started straight the fall of Berlin's wall. This country is characterized by the highest percentage incidence of rural population and small family farms than other European nations, scattered predominately in less favoured areas [4]. Farmers in Romanian disadvantaged areas are carrying out an irreplaceable role in environmental protection by a diversification of their activities aimed at implementing multifunctionality in primary sector.

Generational turn-over in Romanian farms needs financial subsides in order to better and implement level of investments and land capital aimed at increasing the level both of technical and also of economic efficiency [5, 20]. A reshaping and shifting of traditional productive agrarian model towards new diversified activities and crops put into action in small Romanian farms managed by a newly generation of young farmers is able to implement level of investments and efficiency using both financial supports disbursed by the Common Agricultural Policy (CAP) and also by an expansion of scale of production in terms of land capital [1, 7, 17, 21].

Aftermath the collapse of communist regime in the early 1990s, there has been a significant transition from a central planned agrarian productivist model to a post communist one, which has influenced family Romanian farmers, their productive processes and policy makers strategies, fundamental to face with radical socio-economic transformation in Romanian productive fabric [14]. This transition was particularly severe in some rural areas, far away from the traditional urbanized areas, as a consequence of aging of farmers and also of a low level of investments in innovation, such as agrarian capital, new technologies and a poor level of technical efficiency with negative impacts on Romanian farms [9].

Comparing different measures in supporting rural development and rural space before the European Union enlargement in 2007, Romania seems to have put into action few measures in order to incentivate and protect stayed behind rural areas by an allocation of specific financial supports [2]. In fact,

analysing the level of financial subsidies disbursed by the European Union, such as direct payments per hectare, in some new comers member states of the EU it is possible to observe as financial payments in Romania are lower intensive than the average European value [22].

Previous studies have argued as before the MacSharry reform of the CAP, there has been a greater impact of direct payments paid by the first pillar on income distribution towards European farmers [11]. Direct payments have been more efficient than other typologies of financial aids provided by the CAP even if the amount of supports has had an unequal distribution due to the small size of farms [23].

In contrast, other scholars have underlined a direct correlation between financial subsides allocated by the second pillar of the Common Agricultural Policy, particularly towards less favoured rural areas or throughout agri-environment measures, and reduction of income inequality [18, 24].

Small farms located in disadvantages rural areas in Romania marked out by poor level of income have benefited more of agri-environmental payments than large farms reducing socio-economic marginalization and environment degradation in the countryside [8]. The direct consequence was an increase of technical efficiency in farms even if aging seems to be the bottleneck of investments in Romanian countryside and in other European rural areas as well.

The purpose of this paper was to investigate, throughout a quantitative approach, effects and relationships among funds allocated by the second pillar of the Common Agricultural Policy on cropping specialization and farm net income in Romanian farms. Some authors argued that the more specialised are farmers and regions in agricultural productions the richer are premiums and financial subsides allocated with positive effects on territorial and productive specialization in European rural territories [19]. In the same time financial supports allocated by the EU in specific agricultural and rural policies, such as payments to less favoured rural areas (LFA) have had a positive role in contrasting marginalization and out migration [2].

The European Union in 1965 by the Council Regulation number 79 established an annual analysis on a sample of farmers through the Farm Accountancy Data Network (FADN) aimed at assessing the impact of Common Agricultural Policy decisions to European farmers. FADN is an annual survey which covers approximately 80,000 European farms and a population of about 5,000,000 farmers located in all European countries able to represent more than 90% of utilized agricultural area [3].

In this quantitative analysis we have used the data published by the European Union in the Farm Accountancy Data Network (FADN) since 2007 to 2012. This paper has compared main relationships among eight different type of farming, such as fieldcrops, horticulture, wine, other permanent crops, milk, other grazing livestock, granivores, mixed, classified according the European Regulation 369 published in 2003 by the European Commission.

The main question of the research has been addresses to assess which relationships there are between subsidies allocated by National Rural Development Plan and specifically by the Single Area Payment Schemes (SAPS) and cropping specialization in Romanian farms. Furthermore, another aim of this analysis was to assess in Romanian farms the positive role of financial aid paid towards disadvantaged areas in terms of cropping specialization.

The Single Area Payment Scheme, according to the European Commission definition, is a transitional, simplified support of farmer's income, tailored specifically for the new comer states of the European Union, such as Romania, refinanced by the CAP for the next seven year time 2014-2020 as well, aimed at implementing the level of direct payments to farmers dividing annual financial envelope for the hectares of utilized agricultural area.

MATERIALS AND METHODS

In this paper we have used a quantitative approach using the Self Organizing Maps (SOM) proposed by Kohonen utilizing the

software Orange Canvas 2.7. The SOM is a methodology similar to the Principal Component Analysis. In fact, in a theoretical framework it is able to single out an unique winner neuron which underlines main relationships among all analysed variables, visualizing also in an unique map the best neuron and the main relations among variables [12].

1. The Kohonen's maps are sensitive to highlight main analyzed effects throughout an unique winner neuron, which in the map is represented by a black hexagon. General speaking, in the SOMs there are black and grayish hexagons; each of these hexagons is a zone where there is the highest level of clustering close to the winner neuron (black hexagon) and, by contrast, white ones are the opposite or rather they are neurons far away from the winner neuron [12].

In general, Self-Organizing Maps are particularly useful to estimate the structure and the evolution of detected variables obtaining an unique parameter summarizing different aspects and visualizing different clusters of interactions and similarities in investigated variables [10, 16]. One of the main positive aspects of Kohonen's maps is to obtain an homogenous classification in some clusters able to preserve their dissimilarities in investigated variables [12].

In our analysis the Self-Organizing Maps are an unsupervised learning process where in a limited sized space with topological properties inputs or stimulus come from the outside [12]. The SOM is a neural network where each artificial output neuron is arranged in grids based on a lower dimension in connection to all neurons of input [6]. Each input is connected to other neurons of the output by a weight vector assessed in order to define the position of a centroid in the space [15]. Weights assigned to neurons are initialized either as random numbers or as small values sampled uniformly from a subspace crossed by two wider eigenvectors main components hence, initial weights are a good approximation of weights in the SOM [10].

In our analysis the training in SOMs has used a competitive learning process. In this case when in the training sample one puts an input to the network, the model calculates its Euclidean distance from all weight vectors [12]. The neuron with the weight vector is the closest to the entrance or stimulus which is called Best Matching Unit (BMU). The weights of the neurons in the BMU and near SOM in this lattice are bought nearer to the input vector [12]. The intensity of the adjustment decreases over the time and in function of the distance of neurons from the BMU.

The updating of weights in each neuron (Wv) in mathematical formula is [12, 13, 25]:

$$Wv(t + 1) = Wv(t) + \Theta(v, t)\alpha(t)(D(t) - Wv(t))$$

where $\alpha(t)$ is a decreasing monotonic learning coefficient and D(t) is the doorway o stimulus vector. The function for the neighborhood or distance $\Theta(v, t)$ depends on the distance in the lattice between the BMU and the neuron v [13, 25. In the simplified form or in terms of competitive network the above mentioned function is 1 for all neurons close to the BMU and 0 otherwise, even if the most common choice uses a Gaussian function which, regardless of the function choice, decreases over time [12, 13, 25].

The network in the SOM is characterized by a pattern in two layers, one layer is made up by input and the another called Kohonen's layer is constituted by output [12]. According to this author neurons in these two layers are completely connected to each other, while neurons of the output layer are linked to different output neurons. In the layer of output neurons there is an unique winner neuron which takes all; hence, as a consequence of a system of interactions of lateral inhibitions and excitations in function of the distance from the winner neuron some neurons close to the winner are exited and other neurons, more distant from the winner neuron, are inhibited generating a function similar to a Mexican hat function of their geometrical distance between neurons on the lattice [10, 12].

RESULTS AND DISCUSSIONS

Comparing findings of the Romanian National Agricultural Census and the main results of

Eurostat database, it is possible to observe a sharply decrease of the average value of utilized agricultural areas from 2000 to 2010, which shifts from 3.5 hectare to 3.4 with more than 2.5 million of farmers out of 3.8 million having an own utilized agricultural surface under the 2 hectares.

Main results in FADN Romanian dataset have pointed out an average value of utilized agricultural area equal to 10.45 hectares even if fluctuations in minimum and maximum value are between 1.93 to 43.8 hectares (Tab.1). In general, cereal areas are predominant than permanent crops and in the same time sheep and pigs are the most diffused livestock in Romanian farms part of the FADN dataset.

Table 1. Main results in descriptive statistics in Romania farms part of FADN dataset

Variable	Mean	Standard Deviation	Min	Max
Farms (n°)	140,597.3	173,478.4	7,640	520,768
Adult Worker Unit (n°)	1.96	0.515	1.41	2.98
Utilized Agricultural Areas (ha)	10.45	13.80	1.935	43.82
Cereals area (ha)	4.83	9.76	0.41	28.89
Permanent crops (ha)	0.64	1.65	0.008	4.74
Dairy cows (n°)	0.91	1.57	0.016	4.56
Other cows (n°)	0.43	0.59	0.006	1.51
Sheep (n°)	1.38	3.41	0.007	9.81
Pigs (n°)	2.00	5.02	0.013	14.42
Farm net income (€)	6,396.41	3,098.38	2,425	11,567
Total subsidies (€)	2,737.95	2,685.36	653.5	7,414
Environmental subsidies (€)	59.31	126.02	0.67	369
Less Favoured Areas (€)	22.60	41.62	1	124.5
Single Area Payment Scheme (€)	887.38	1,239.95	143.5	3,894
Rural Development Plan subsidies (€)	156.04	190.55	41	468.66

Source: Own calculation on the basis of data from http://ec.europa.eu/agriculture/rica/

Farm net income is in average close to 6,500 euros even if it has significantly fluctuated from 11,600 to 2,400 euros over six year time of investigation. Funds allocated by the Common Agricultural Policy to Rural development measures, able to strength the multifunctionality in the primary sector or in order to protect disadvantaged rural areas at risk of marginalization (Less Favoured Areas), have had less impact than Single Area Payment Scheme.

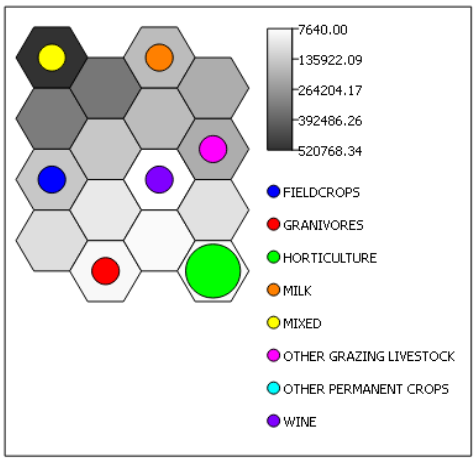


Fig. 1. Number of farms in self-organizing maps part of Romanian FADN dataset over six year time of investigation

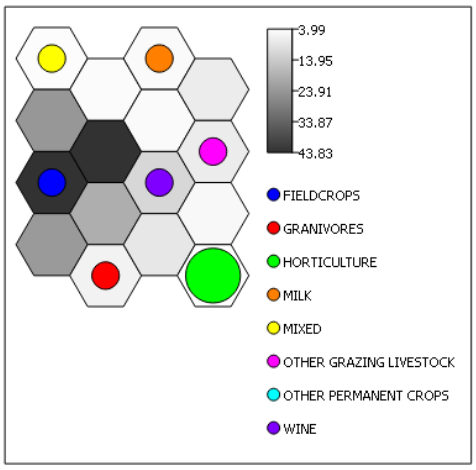


Fig. 2. Evolution of Utilized Agricultural Areas in Romanian farms investigated using Kohonen's maps

Focusing the analysis and comparing the main relationships between the most important typologies of farming in Romanian FADN dataset and the number of farms, figure 1 points out as the highest concentration of farms (black hexagon) is associated to the mixed farming system of production; in contrast, horticultural specialized productions are scattered in few Romanian farms and not so consolidated in national agricultural fabric.

Focusing the attention on relationships between typology of farming and farm net income, findings have pointed out as the highest level of income is typical of fieldcrop farms, wine, granivores, milk and horticulture enterprises (Fig. 3).

Farms specialized and ranked in fieldcrop and granivores type of production have received

the highest amount of subsidies allocated by the first pillar of the Common Agricultural Policy (Fig. 4).

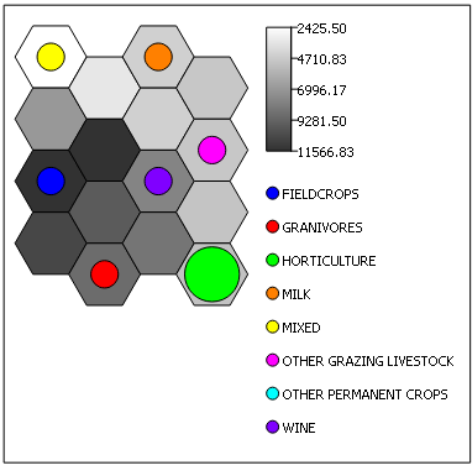
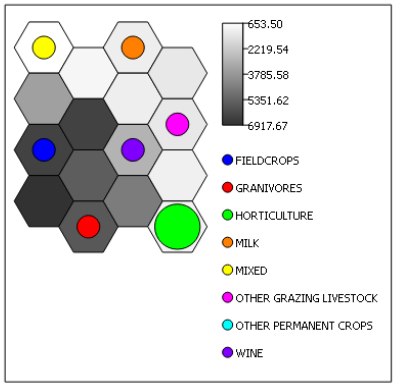


Fig.3. Relationships between farm net income and productive specialization type using Kohonen's maps



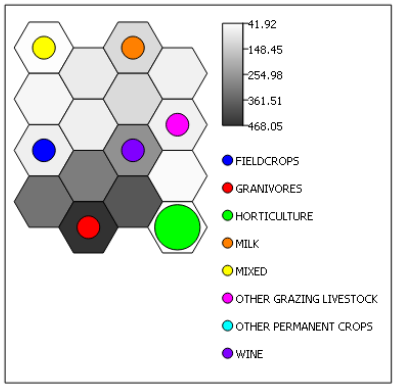
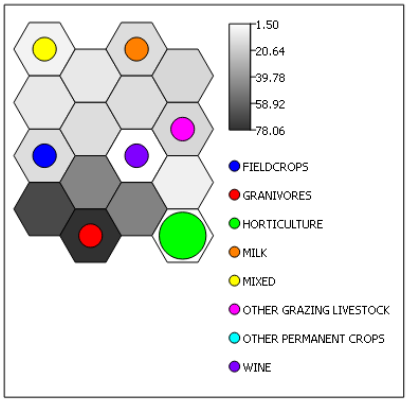


Fig. 4. Kohonen's maps comparing financial subsides allocated by the CAP in the first pillar (above) and by the second pillar of the CAP in Rural Development Plan (below).

By contrast, the total amount of financial subsidies allocated by the Rural Development Plan (second pillar of the CAP) has been lower than financial subsidies paid by the European Union to livestock and crops. Nevertheless, granivores and wine enterprises have received the highest level of aids disbursed by the Rural Development Plan, which is approximately twelve times lower than financial subsidies allocated by the first pillar of the CAP. Findings have pointed out as in Romanian fieldcrop farms subsidies on crops and livestock are more important and predominant in terms of total amount than financial subsidies allocated by the Rural Development Plan (II pillar).

Romanian farmers have benefited poorly of financial subsides allocated both in favour of disadvantaged rural areas and also towards farmers bound in putting into practice agri-environmental measures (Fig. 5).



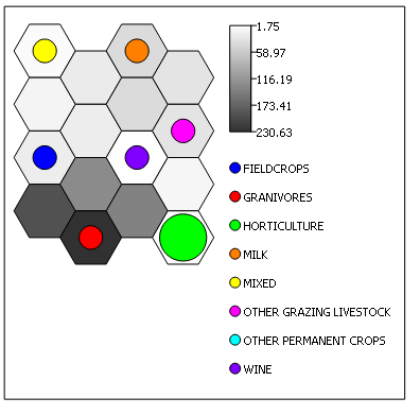


Fig. 5. Kohonen's maps comparing financial subsides allocated to less favoured Romanian rural areas (above) and as agri-environment payments (below).

Farms classified in function of type of farming as granivores have received the most significant level of financial subsidies in terms of less favoured supports and agri-environment aids.

Findings comparing farm net income and payments allocated by the SAPS have pointed out a direct correlation between these two variables (Fig. 6).

Hence, large utilized agricultural areas implying significant level of farm net income have strengthened the level of financial direct payment paid by Romanian authorities towards farmers. The Spearman's coefficients of correlation have highlighted, with a level of significance at 5%, a value of 0.74 correlating utilized agricultural areas and farm net income and 0.80 considering only variables Single Area Payment Scheme and farm net income.

Farms with a granivores productive specialization type farm net income correlates directly to SAPS even if the level of payments has been the poorest compared to other productive specialization enterprises (Fig. 7).

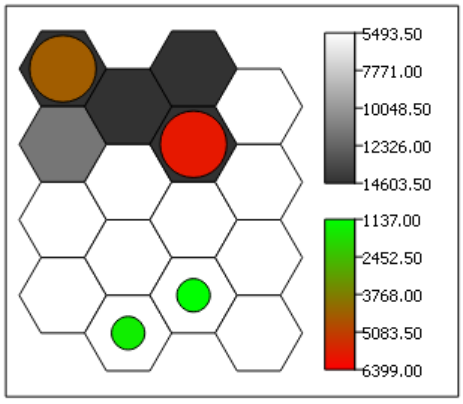


Fig. 6. Kohonen's maps comparing farm net income (grey scale) and Single Area Payment Scheme (colored scale).

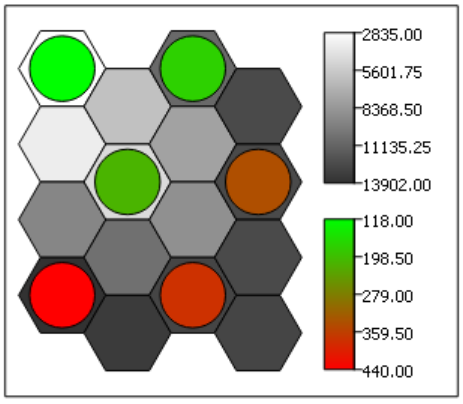


Fig. 7. Kohonen's maps comparing farm net income (grey scale) and Single Area Payment Scheme (colored scale) in farms with granivores productive specialization type.

In dairy Romanian farms findings have pointed out the highest level of Single Area Payment Scheme paid by the European Union correlated to level of farm net income which is lower than 5,000 euro (Fig. 8).

Mixed farms have underlined a direct correlation also between farm net income and SAPS, even if roughly speaking these latter enterprises have been characterized by the highest level of farm net income; by contrast, the most percentage of mixed productive farms are characterized by poor level of farm net income lower to 2,000 euros (Fig. 9).

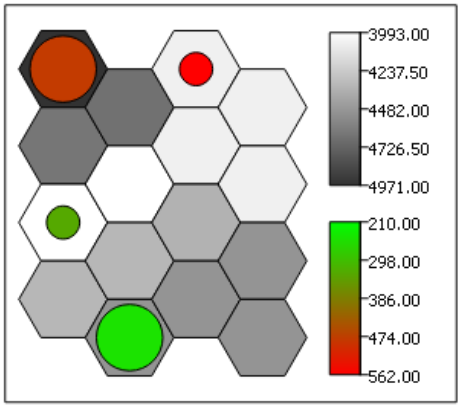


Fig. 8. Kohonen's maps comparing farm net income (grey scale) and Single Area Payment Scheme (colored scale) in farms with dairy enterprises.

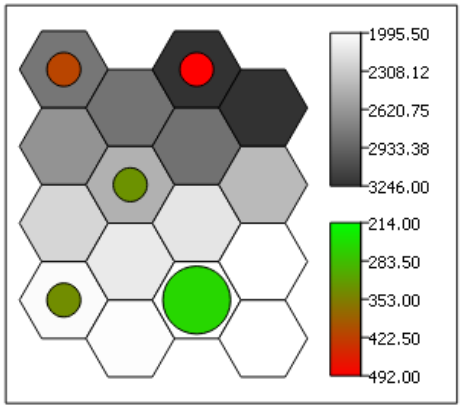


Fig. 9. Kohonen's maps comparing farm net income (grey scale) and Single Area Payment Scheme (colored scale) in dairy farms.

Summing up, field crops and granivores specialization types have been enterprises able to obtain the most significant level of farm net income correlated to the highest level of Single Area Payment Scheme, corroborating the theoretical framework of the path dependence between size of farms, level of

income and financial subsidies allocated directly by local authorities.

CONCLUSIONS

Despite lots of Romanian farms have pointed out a poor agricultural surface not using financial supports in favour of disadvantaged rural areas, findings have pinpointed a positive but differentiated role of subsidies and other financial supports disbursed by the European Union in order to solve territorial inequalities and in promoting a different territorial agricultural specialization of this country.

For the future, financial measures promoted by the National Rural Development Plan should intervene to implement land capital level in terms of size of utilized agricultural area, which is the pivotal factor in reducing and lessening rural disparities. Nevertheless, results have underlined a limited allocation of financial subsidies disbursed by the Rural Development Plan in order to stimulate rural diversification in Romanian countryside and the generational turn over throughout a younger generation of farmers, many of whom are emerging and imposing their selves in implementing technical efficiency in agrarian enterprises.

To sum up, a direct correlation has been detected between the Single Area Payments Schemes and crop specialization even if farms specialized in field crops and livestock, taking advantage from large agrarian areas have benefited of significant level of Single Area Payments. In the next seven year time 2014-2020 of National Rural Development Plan there has been a shrinking of SAPS funds hence, one of the most priority should be to address financial resources in stimulating significantly direct payments in favour of disadvantaged rural territories by LFA subsidies. These latter actions should be weighed in function of different peculiarities of Romanian farms. In fact, Romanian farms located in the north-west and in the center of the country, having the poorest level of farm net income and single area payments, are at severe risk of rural out migration.

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DEVELOPMENT OF ORGANIC FARMING IN POLAND – ECONOMIC AND LEGAL ASPECTS

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Abstract

The main aim of the article was to characterize development and legal frameworks of the organic farming in Poland. The study focuses mainly on such aspects as number and structure of organic producers, structure of lands employed in organic production, organization, productivity and profitability of organic farms in comparison to conventional farms and finally legal frameworks of organic agriculture in Poland and UE. In terms of economic aspects, it should be firstly noted that statistical data clearly shows that domestic organic agriculture sector has significantly developed since the accession of Poland to the EU. It should be also highlighted that conventional and organic farms differ in terms of productivity and profitability where all levels are higher for conventional forms. In terms of legal aspects, the study mainly focuses on analysis of complex legal provisions of both community and domestic law. The Council Regulation (EC) No 834/2007 defines basic and fundamental principles of community policy related to organic agriculture when domestic act on organic agriculture of 25th June 2009 constitutes structural system of organic agriculture's control.

Key words**:** *EU, farms, organic food, law, legal analysis, organic production, Poland, regulation*

INTRODUCTION

Adaptation of food productions levels and its development directions to consumer's expectations is one of most important aspects highlighted in modern concepts of agricultural development. Such pressure results from simple fact that desire to constantly improve food quality and tackle agricultural lands' degradation are more commonly recognized as main and strategical tasks of agricultural policy. Furthermore, better food quality is expected by majority of consumers, who expect specific directions of food and agricultural policies. Therefore, current Common Agricultural Policy introduces series of requirements related to agricultural activity, which task is to improve environmental conditions and promote environmentally-friendly technologies.

Organic production in agriculture is definitely fulfilling the idea of sustainable development. Organic methods of agricultural productions are compatible with requirements related to soil, plants and animals. Rejection of chemical production compounds connected with constant control over production processes guarantee that environment is properly protected

As it was indicated in many researches, demand for organic food has been constantly growing and consumers are willing to pay higher prices for organic products than for conventional ones [3]. These trends are stimulating development of organic food market and organic agriculture. Increase of demand for organic products translates to development of organic food market, which is particularly marked in case of highly developed countries [6, 7]. In the EU member states, following significant demand surplus and thanks to subsidies, organic production of food is dynamically developing. Similar trends may be observed in case of Poland, where number of organic farms has increased from 3760 in 2004 to 27093 in 2013.

Such development of organic agriculture wouldn't be possible without constituting proper and precise legal frameworks. The community legislator has faced serious challenge to propose and introduce such legal measures that would effectively and precisely

regulate and shape realties of organic agriculture in terms allowing to achieve expected development and environmental sustainability. Beyond the community law, in order to effectively exercise priorities of organic agriculture it is also necessary to create proper legal measures on national grounds that will guarantee direct enforcement of assumed policy.

MATERIALS AND METHODS

Economic aspects of organic agriculture's development analysis were based on data coming from reports of the Agricultural and Food Quality Inspection (AFQI). AFQI is supreme administrative authority that is responsible for creation and execution of domestic system of control overt organic agriculture. AFQI is legally obliged to systematically issue reports presenting substantial data regarding organic agriculture sector in Poland, including such issues as number and structure of organic farms or organic processors or area and structure of organic agricultural areas [1].

Furthermore, economic analysis of organic agriculture in Poland was also based on statistical data from Farming Accountancy Data Network (Polish FADN) [8]. Given data allows to compare aspects as: economics, organization and financial effectivity of organic and conventional farms.

In terms of legal aspects, the study was based on the analysis of legal frameworks shaping organic agriculture in both Poland and EU. The author, by the analysis of community and domestic law, intends to present how on the polish example organic agriculture is controlled and managed.

RESULTS AND DISCUSSIONS

Economic aspects of organic farming's development in Poland

1. Number and structure of organic producers

Development of organic agriculture in Poland before the accession had been relatively slow. Such weak trend had been shaped mainly by lack of financial aid, limited possibility to obtain higher sale prices and weak administration of organic products market. Faster development rate of organic production was initiated in years 1998-1999 when subsidies for farm control costs and direct payments to areas were introduced and first complex domestic legal frameworks of organic agriculture came into force [4]. However, particularly strong dynamic of organic agriculture may be observed only after 2004, i.e. since the accession of Poland into EU (Table 1). Both system of subsidies and size of common market caused that total number of organic producers in 2004-2013 increased from 3,760 to 27,093, i.e. sevenfold. Such trends and changes resulted mainly from growth of agricultural organic producers' number and since 2006 the trend has started to be more transparently linked also to other groups of organic producers, mainly connected to food processing (Table 2). According to data from 2012 (Table 2), the biggest business representation of organic producers was observed in fruit and vegetable processing (31.6%), cereal (23.6%) and other food and agricultural products (24.8%). Furthermore, as it is indicated in the Table 2, organic production is more often exercised by enterprises dealing with meat processing (7%), milk and cheese processing (4,7%) and plant and animal fat production (2,4%).

Table 1. Number of organic producers in Poland in 2004-2013

Years	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total number of organic producers	3,760	7,182	9,194	12,121	15,206	17,423	20,956	23,847	26,376	27,093
In the agricultural production	3,760	7,182	9,187	11,870	14,896	17,091	20,582	23,449	25,944	26,598
Other producers	0	0	7	251	310	332	374	398	432	495

Source: own elaboration based on AFQI [1].

Table 2. The structure of organic processing companies in Poland in 2007-2012 (%)

Years	Fruit and vegetables processing	Processing of other agri-food products	Processing of grain mill products	Meat processing	Milk processing and cheese making	Plant and animal fats processing	Other
2007	28.0	16.0	19.0	7.0	2.0	2.0	26.0
2008	25.0	27.0	13.0	5.0	2.0	2.0	26.0
2009	33.0	24.3	21.9	6.6	2.4	2.4	9.4
2010	32.4	32.1	19.4	5.1	2.7	1.3	7.0
2011	32.0	25.8	23.0	6.5	3.0	1.8	7.9
2012	31.6	24.8	23.6	7.0	4.7	2.4	5.9

Source: own elaboration based on AFQI [1].

2. Areal structure of organic farms and area and structure of organically used land

Following significant growth of organic producer's number, also total area of organically used land experienced similar increase (Table 3). Total area of such lands increased in years 2004-2013 from 104.9 thousands ha to 669.9 thousands ha, i.e. over six fold. However, it may be concurrently observed that currently the growth dynamic of organic land area is fading. The majority of analyzed growth had been observed in three first years after the accession. Yearly growth for 2005 is estimated to 58% and in 2006 to 38%. At the same time, yearly growth observed for year 2012 was estimated only to 1.25% and such trend resulted mainly from fading number of lands being converted for need of organic production.

It should be also noted that increase of organic land area has been also translated to specific changes in structure of farms. As the data from Table 4 indicates, until 2008 the share of the smallest organic farms (to 5 ha) was growing in most dynamic pattern (from 19% to 36%), while the share of the biggest organic farms was decreasing (from 26% to 18% for farms between 10 to 20 ha and from 18% to 13% for farms between 20 and 50 ha). After 2008 trends in structure of organic farms were different as the share of the biggest farms experienced most transparent growth while the number of the smallest one was fading. Growth of organic farm's average area (in years 2008-2013 from 21.1 ha to 25.5%) should be considered as direct consequence of such direction of observed changes. It should be noted that average area of organic farm in Poland is clearly bigger than average area of conventional farm.

Table 3. The area of organic land in Poland in 2004-2013 [thous. ha]

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
The area of organic land in conversion	58.1	127.6	152.9	150.3	136.1	163.4	210.9	229.4	204.5	176.9
The area of organic farmland after the conversion period	46.8	38.6	75.1	137.1	178.7	252.7	308.0	376.0	457.0	492.9
The total area of organic agricultural land	104.9	166.3	228.0	287.5	314.9	416.2	519.0	605.5	661.6	669.9

Source: own elaboration based on AFQI [1].

Table 4. The structure and size of organic farms in Poland in 2004-2012

Years	2004	2005	2006	2007	2008	2009	2010	2011	2012
up to 5 ha	19.0	26.0	26.0	28.0	36.5	33.6	23.7	21.1	19.3
5-10 ha	25.0	24.0	26.0	25.0	23.5	22.2	24.3	24.2	24.1
10-20 ha	26.0	24.0	21.0	19.0	18.0	19.3	22.0	23.8	25.5
20-50 ha	18.0	16.0	15.0	15.0	13.0	14.1	16.5	17.1	17.4
50-100 ha	7.0	6.0	8.0	8.0	6.0	7.2	9.0	9.2	9.1
> 100 ha	5.0	4.0	4.0	5.0	3.0	3.7	4.5	4.7	4.6
average area of farms (ha)	27.9	23.2	24.8	24.2	21.1	24.4	25.2	25.8	25.5

Source: own elaboration based on AFQI [1].

Changes in number and structure of organic farms in Poland were also connected to alterations of organically used lands' structure. As the data from Table 4 indicates, in period of years 2009-2012 the areal shares of pasture and meadow (from 45.1% to 35.35), cereal (from 21.2% to 18.6%) and fruits and berries (from 16.1% to 8.9%) decreased while the share of land dedicated to feed plants experienced significant growth (from 13% to 33.7%).

Changes in number and structure of organic farms in Poland were also connected to alterations of organically used lands' structure. As the data from Table 5 indicates, in period of years 2009-2012 the areal shares of pasture and meadow (from 45.1% to 35.35), cereal (from 21.2% to 18.6%) and fruits and berries (from 16.1% to 8.9%) decreased while the share of land dedicated to feed plants experienced significant growth (from 13% to 33.7%).

However, it should be also highlighted that grassland still represents important areal share in organic farmlands. Share of such areas is almost two time bigger than average domestic values. Takin into consideration values related to cereals, it should be also noted that its share is almost three times lower than average value and results mainly from weak yields and poor quality cause by ineffective plant protective measures. Similar remarks can be addressed to fruit, vegetable and berries production where its relatively low share results mainly from poor farm specialized equipment and very time-consuming production Furthermore, accessibility to plant health products in Poland is relatively limited and such fact impede possibility to lower damages caused by pests and diseases [5].

Table 5. Organic land use structure [%] in Poland in 2009-2012

Participation in the agricultural area [%]	2009	2010	2011	2012
meadows and pastures	46.1	42.3	38.2	35.3
feed plants	13.0	20.6	28.5	33.7
cereals	21.2	19.6	18.1	18.6
fruit and berry crops	16.1	13.3	11.9	8.9
vegetables	0.9	1.0	1.2	1.4
other	2.7	3.2	2.1	2.1

Source: own elaboration based on AFQI [1].

3. Economics, organization and profitability of organic farms in Poland

Table 6 present statistical data regarding basic determinants of economics, organization and profitability of conventional and organic farms in Poland coming from data gathered by Polish FADN in 2012 [8]. Considering all gathered data, firstly it may be observed that average organic farm had less agricultural area than in case of average conventional entity (39.2 and 48.4 ha). Thus, it may be assumed that average level of production of organic farms was lower than in case of conventional.

Main consequence of such differences may be observed in case of revenues from plant production per area. In case of conventional farms, revenues from 1 ha of plant production were estimated to 4,379 PLN, while at the same time, revenues of organic farms from 1 ha of plant production were 58% lower and were 1,834 PLN.

Significant differences between conventional

and organic farms can be also noted in the case of animal production, density and units. Taking into consideration each of above aspects, it is apparent that conventional farms are dominating. Generally, it can be stated that these brunch of agricultural production has relatively weaker importance for organic farms, as it can be supported for instance by law stocking density (0.5 LU/ha)

Table 6. Indicators of organization, productivity and profitability of organic and conventional farms by 2012.

Specification	Farms	
	conven-tional	Organic
Agricultural area (ha)	48.4	39.2
Plant production (PLN/ha):	4,379.4	1,834.4
Stocking density (LU/ha)	1.6	0.5
Animals total (units),	31.8	14.7
Milk yield of cows (litres)	6,052	3,394
Animal production (PLN/1LU)	4,708	3,175
Land productivity (Value added/ha. PLN)	3,959	2,939
Labour productivity (Value added / employees. PLN)	81,934	58,813
Land profitability (Farm income/ha. PLN)	2,510	2,046
Work profitability (Farm income/ employees. PLN)	71,077	52,111
subsidies/farm income (%)	47.2	78.8

Source: Polish FADN [8].

Lower animal production in case of organic farms may be also observed in the case of milk production, where average milk yield for conventional farms was estimated to over 6,000 litres while organic production of milk was estimated only to 3,400 litres. Relatively low animal production of organic farms can be also proved by indicators concerning value of animal production per livestock number (PLN/1LU). In this case, conventional production was 4,708 PLN and organic production was 32% lower and was estimated to 3,175 PLN.

Highlighted differences in organization and productivity transfer to similar differences in productivity measured with value added and in profitability of farms. Data proves that land and labour productivity (3,959 PLN/ha and 81,934 PLN/employee) were higher for conventional farms. Higher productivity rates experienced in conventional agriculture also transferred to relatively higher work and land profitability of conventional farms (2,510 PLN/ha and 71,077 PLN/employee).

At the same time, average land profitability (2,046 PLN/ha) and work profitability (52,111 PLN/ha) of organic farms were 18% and 27% lower. It is also worth mentioning that income situation of organic farms in Poland is significantly determined by measures of Common Agricultural Policy of the European Union, as in 2012 subsidies share in farms' income in case of organic farms

Legal aspects of organic farming in Poland

1. Community law frameworks of organic agriculture.

The Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products constitutes direct legal frameworks of community organic agriculture policy [2]. The regulation has complex character and should be considered as set of legal principles, tasks and directives shaping such aspects as: managing organic farms, organic production, labelling, system of control and certifying such activities and trade with third countries.

As it is indicated in the regulation, its basic task is to impose effective legal measures assuring constant development of organic production which will not violate order and principles of internal market's competitiveness (art. 1 of the Regulation) [2]. Is should be also noted that community legislator has also regulated all stages of organic activities – from production, through processing and preparation, to distribution and control of sold organic products (art. 1 and 2 of the Regulation) [2]. As it appears, analyzed regulation has simple task to comprehensibly regulate all vital aspects of organic agriculture. Such policy seems to be reasonable as only complex measures may guarantee effective development and control

of organic production.

As it may be observed in the regulation, common organic production has clearly defined goals and tasks. Articles 3-22 of the regulation present precise definition of tasks and goals related to organic production, starting from general principles and aspects and ending on rules related to specific issues [2]. To sum up, the basic aim of organic production in to create sustainable system of organic agriculture control guarantying best quality of products and not causing and damage or danger to environment and people (art. 3 of the regulation)[2]. It should be also noted that management in organic agriculture has to include such values as: biological diversity, responsible use of natural resources and proper condition of soil, water, plants and animal (art. 3(a) of the regulation) [2]. Turning to rules of organic production, firstly it should be indicated that such production should be generally based on maximal and sustainable exploitation internal resources with concurrent minimal use of external sources (art. 4 of the regulation) [2]. It is also necessary to highlight that community legislator do not recognize economic and financial aspects as the most important and leading principles and tasks of organic production.

It should be also indicated that organic agriculture should not focus only on productivity and profitability. As the community legislator states, organic agriculture should be based on such aspects as: biological diversity, ecological sustainability, combating soil erosion, recycling or natural animal and plants production (art. 5 of the regulation) [2].At the same time, any use of GMO or ionizing radiation is prohibited in organic production (art.9 and 10 of the Regulation) [2].

Besides general directives and determinants of organic production, the regulation also defines specific rules concerning such aspects as: processing of organic food (art.6), farm production (art. 11), plant production (art. 12), seaweed production (art. 13), animal production (art. 14), aquaculture animal production (art. 15) or products and substances with authorized use in organic farming (art. 16) [2]. As it can be clearly observed, community legislator intends to comprehensively regulate production aspects of organic agriculture. Specific frameworks should guarantee that only products of desired quality can operate on internal market labelled as organic products.

Finally, it is worth highlighting that the regulation also shapes two other aspects of grave importance to organic agriculture and production. The regulation introduces legal frameworks of complex system dedicated to labelling and identifying organic products. In the light of community law not each product of organic agriculture can be considered as organic product. Only after specific process of labelling and indications, given product with defined identification number and logo can be recognized as organic product (art. 23 -25 of the regulation) [2].

It should be also noted that community legislator also intends to ensure efficient and proper exercise of organic policy through legal obligations burdening each EU member state to create system of control over domestic organic agriculture system (art. 27 of the regulation) [2]. Domestic systems of supervision over organic farming should be considered as necessary element of common organic policy as only authorities of each EU member state are able to effectively assure exercising common goals on national ground.

Consequently, it should be highlighted that any common policy in order to be properly exercised requires constituting functional legal frameworks on national grounds. Enforcement of strict ecologic and quality requirements demands proper regulations adapted to specific realities.

2. Domestic legal frameworks of control and supervision over organic agriculture.

In view of the fact that general principles, rules and standards of organic production have been regulated under community law, basic obligation of any EU member state is to create efficient system of control and supervision over organic production. Polish authorities accomplished majority of the obligation by adoption and execution of the Act of 25th June 2009 on organic agriculture [9]. As it is already indicated in art. 1 of the

act, given bill regulates mostly tasks and jurisdiction of public administration authorities and other organizational units involved in domestic system of control over organic agriculture and in exercising provisions of the Regulation No 834/2007 [9]. The act mostly regulates such issues as system of authorities involved in the supervision and their prerogatives and powers.

We can distinguish three types of authorities operating within the system:

a) Chief Inspector of Agricultural and Food Quality Inspection with provincial inspectors, jointly creating Agricultural and Food Quality Inspection (AFQI),

b) certifying authorities and

c) cooperating authorities among which we can list Trade Inspection, Veterinary Inspection and State Plant Health and Seed Inspection Service.

AFQI creates core of domestic system of supervision over organic agriculture in Poland. AFQI exercises following tasks:

1) supervision over authorized certifying authorities and over organic production,

2) release to free circulation of organic products from third countries on internal market by shipment inspection and control certificates,

3) gathering, storing and processed data regarding organic producers,

4) managing applications for derogation of organic production rules,

5) temporary operating as certifying authority up to 60 days,

6) informing organic producers about revoking of authorization granted to competent certifying agency and

7) preparing qualification exams for organic agriculture inspectors and maintaining register of such inspectors [1].

The Chief Inspector is head of AFQI and is supreme body of public administration in sector of organic production. According to the act, Chief Inspector is responsible for following aspects:

a) compiling formal notification from regarding beginning of activity in organic agriculture (art. 3(2) of act),

b) revoking authorizations for certifying authorities (art. 6(3) of the act),

c) supervision over certifying authorities – data gathering, audits, inspections, audit conclusions and instructions (art 8(2) of the act),

d) supervision over organic production (art. 8(3) of act) and

e) issuing authorizations of derogation of defined production conditions (art. 11 of the act) [9].

Specific tasks of Chief Inspector can be exercised by provincial inspector after obtaining direct authorization (art. 8(6) of the act) [9].

In practical view of analyzed control system, the most important role is exercised by certifying authorities. Each farmer willing to begin organic production is obliged to file proper application form to competent certifying authority (art. 4(1) of the act) [9]. It should be noted here that each certifying authority can operate in the system only after obtaining direct authorization from Minister of Agriculture (art. 5(1) of the act) [9].

Main task of certifying authorities is to carry out certifying process of organic producer during which such authority enjoys series of important prerogatives enabling it to examine all elements of factual and legal situation. Certifying units maintain registers of organic producers and submits monthly reports to the Chief Inspector regarding data applications and changes in structure of the producers (art. 4(6) and 17 of the act) [9]. It should be also noted that among from registry and application processing, certifying units are also entitled to exercise specific control acts within the common control system (art. 7(1) of the act) [9]. As certifying authorities enjoy regional jurisdiction and competence, exactly these units constitute fundaments of domestic control system.

During analysis over role of certifying units, it is also wroth to focus on requirements related to the post of inspector controlling organic producers on behalf of given unit. As the act clearly indicates, only individuals listed in official registry maintained by the Chief Inspector can be inspectors (Art. 21(1)(2) of the act)[9]. Required qualification are defined as: sufficient theoretical and practical knowledge, issue of special qualifying

decision (art. 21(3) of the act) passing state exam (art. 21(4) of the act) and constant skill improvement (art. 21(4a) of the act) [9]. We may observe that domestic legislator introduces series of competence requirements that are aimed at guaranteeing professionalism and precision of common control system over organic agriculture.

Finally, it is worth highlighting that each certifying unit shall be liable for serious abuse or negligence. The act introduces harsh financial penalties for defined violations, abuses or negligence which value can range from 10 to 20 times average monthly wage in national economy for previous year and its size in dependent on gravity of misconduct (Art. 24 of the act) [9]. As it appears, national legislator also introduce set of negative legal measures that are aimed at guaranteeing proper functioning of common control system.

CONCLUSIONS

Since accession of Poland into EU structure we may observe specifically apparent dynamic of development of organic agriculture. Size of internal sales market and subsidies schemes have caused that in years 2004-2013 number of domestic organic producers experienced significant growth of over 700%.

Dynamic changes in number of organic producers and organic land areas in domestic agricultural system were also transferred to changes in structure of farms. Before 2008 the smallest organic farms had enjoyed biggest growth, while the number of biggest farms had been reduced. After 2008 the trend changed and biggest organic farms started to gain bigger share in total value while share of smallest farms started to decline. Clear growth of average organic land area should be considered and direct consequence of such turn of trends.

It should be also stated that organic and conventional farms differs from each other in terms of productivity and profitability. According to data from Polish FADN, land and work productivity were 35% and 39% higher in case of conventional farms than in case of organic farms. Furthermore, income situation of organic farms in Poland has been significantly determined by subsidies. In 2012 in Poland, average share of subsides in income of organic farms was estimated to over 78.8% while in case of conventional farms this share was only about 50%.

The statistical data proves that organic agriculture is gaining more attention and importance on internal market. This long-term importance of this sector has caused that community legislator introduced complex legal frameworks of organic production policy and forced domestic authorities to constitute proper regional frameworks and exercise goals of common policy. The Regulation No 834/2007 defines general goals, principles, rules, tasks, directions and standards of organic production and agriculture. Accomplishing of these direction is fully dependent on proper policies introduced on national grounds. In case of Poland, regional legal frameworks of common policy related to organic agriculture is expressed by the act on organic production. The act introduces regional structure exercising task of creation system of supervision that should guarantee that only products of desired quality will be circulating on the internal market labelled as organic products.

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LEGAL AND ECONOMIC ANALYSIS OF STATE OPERATIONAL PROGRAMME FOR POLISH FISHERY SECTOR IN YEARS 2014-2020

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Abstract

The main aim of the article was to analyse legal and economic basis of state aid schemes for polish fishery sector in years 2045 - 2020. The paper focuses mainly on the characteristics of one operational programme "Fishery and Sea" (PO RYBY 2014-2020) . Evaluating importance of current operational program in domestic fishery sector it is crucial to analyse structure of funds dedicated to the program and main areas of fishery activities on domestic market. Funds employed in the program have complex structure and should be spent of different tasks that are defined in specific acts. Presented analysis is focused on one domestic legal act, where we can find both fundamental frameworks and basic legal measures aimed at fulfilling defined goals of the 2014-2020 Common Fishery Policy (the CFP). We may observe that proposed legal measures basically intend to stimulate competiveness and modernity of domestic fishery sector. It is worth highlighting that the programme "Fishery and Sea" is powered with substantial funds and may have crucial impact on domestic and European fishery markets. It should be also noted that any public aid scheme has to both be accepted by the UE authorities and reflect basic directives and principles of the Community law. Basically, any programme within the CFP should be beneficiary for both domestic and European fishery markets.

Key words: *Common Fisheries Policy, economy, EU, fishery, legal analysis, law, operational program, Poland, state aid scheme*

INTRODUCTION

The Common Fishery Policy for years 2015-2002 has clearly defined goals. The priorities of the current CFP can be accomplished on national grounds with use of substantial funds coming from the European Maritime and Fishery Fund (EMFF). As the Regulation (UE) No 508/2014 indicates, funds coming from the fund can be spent only in order to fulfill basic aims of the CFP [9]. We may observe that any domestic program operating within the CFP and obtaining any funds from the Maritime and Fishery Fund should be designed to support and strengthen such aspects as: conservation of marine biological resources, management of fisheries and fleet exploiting these resources, fresh water biological resources and aquaculture, the processing and marketing of fishery and aquaculture products [9]. As it appears, the CFP for 2015-2020 has varied goals related to both economic aspects of European fishery market and ecological aspects of marine resources.

As with the Common Agricultural Policy (CAP), in order to assure proper functioning of the CFP, it is necessary to create and shape basic legal frameworks on national ground of any EU member states. The requirement originates from simple dependency that the CFP is basically based on the Community law's regulations, which in order to fully operate on national levels requires implementing in form of domestic legal acts. We should also remember that implementing of UE regulations may turn out to be extremely difficult and elaborate task for national governments. Such statement derives from simple fact that implementing of any UE regulations is associated with an absolute necessity to reconcile fundamental directives and values of the European Union with reality of national economy and law.

The CFP for 2015-2020 in Poland is based on the Fishery and Sea Operational Programme

(PO RYBY 2014-2020). Within the programme, polish authorities intend to spent total sum of over Euro 710 Million within one elaborate state financial aid scheme. Domestic programme operating within the CFP is broadly based on single legal act – the Act on supporting sustainable development of the fishery sector with participation of the European Maritime and Fishery Fund of 10th July 2015 [11]. The act creates complex legal solutions and measures required to complete basic goals of the CFP. The aim of the article is to present basic legal solutions and measures presented in the act and to analyse economic and financial aspects of both polish fishery sector and the operational program.

MATERIALS AND METHODS

The research presented in the article was based on the analysis of polish legal regulations implementing different directives and directions defined in the Common Fisheries Policy for years 2015 – 2020. The author, building his analysis on research of national legal basis of state aid scheme in fishery sector, intends to present how on the polish example it is possible to propose effective legal measures supporting such desired features as: modernization and competitiveness of domestic fishery sector or preservation and protection of maritime biological resources and environment. In terms of economic aspects, the article is based on three different sources related to financial frameworks of analyzed operational program and fishery sector in Poland. Analysis of breakdown of funds employed in the program is based on estimation data coming from official project report of Fishery Department of Ministry of Agriculture [6]. Furthermore, aspects regarding changes size of polish fishery sector in terms of production and fleet seize was based on statistical data coming from Polish Central Statistical Office [2]. Finally, assessment of polish fishery sector's position in comparison to total EU-28 was based on statistical data coming from official report of European Commission regarding basic information related to CFP[1].

RESULTS AND DISCUSSIONS

Legal characteristic of the Polish Operational Program "Fishery and Sea"

1. Brief characteristic of the Common Fisheries Policy for years 2015-2010

The Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December on the Common Fisheries Policy should be considered as the direct legal basis regulating fundamental directions, goals and directives of the CFP in years 2015-2020 [7]. The abovementioned act of the community law defines new principles of the CFP and focuses on the most important aspects of fishery market and maritime environment. It has be clearly indicated that given act addresses not only issues related to economic aspects of the fishery, but also refers to problematic cases of maritime environment's biological resources.

The major goal of current CFP is to improve management and operation of the fisheries and fleets in terms of preserving and protecting maritime biological resources (art.1(1) of the Regulation)[7]. In other words, functioning of fishery market and its participants should not lead to aggravation of maritime environment and its resources. Any financial or economic benefit should not overshadow environmental priorities. As it appears from the regulation, biological and environmental aspects dominates measures proposed in the CFP. Such policy should be considered as thoughtful, as it may assure that fishery and aquaculture activities will be resource and environmentally sustainable in long-term perspective.

The regulation clearly defines major priorities of the CFP for years 2015-2012, which we can split to economic and environmental sets.

Economic aspects of current CFP concerns such issues like:

a) beneficiary and efficient management of fishing and aquaculture activities in terms of economic, social and employment aspects (art. 2(1) of the Regulation),

b)improvement of probability and competiveness of the fishery industry (art.2(5) of the Regulation),

c) strengthening transparency of the market

and its security in terms of employment, standards of living and accessibility of products (art. 2(5)(e)(f)(g) of the Regulation) [7].

In terms of environmental and biological aspects, the CFP focuses mainly on:

a)assuring environmental sustainability in long-term of the fishery and aquaculture activities (art.2(1) of the Regulation),

b)maintain levels of the living marine biological resources' exploitation on levels assuring maintenance and restoration of the harvested species' populations (art. 2(2) of the Regulation),

c) minimalizing negative impact of fishery and aquaculture activities on maritime ecosystems (art. 2(3) of the Regulation),

d) reducing and efficient employment of discards and unwanted catches (art. 2(5)(a)(b) of the Regulation)[7].

Taking into consideration abovementioned directions, we may observe that current CFP intends to improve not economic or social aspect of the fishery, but also tries to impose sustainable policy assuring improvement and restoration of maritime environment. It is important that goals of the CFP doesn't focus only on short-term issues but also relate to long-term condition of internal fishery and aquaculture sectors.

Financial frameworks of the CFP are defined in the Regulation (EU) No 508/2014 of the European Parliament and of the Council of 15 May 2014 on the European Maritime and Fisheries Fund [9]. As it is indicated in the regulation, financing of the CFP's fundamental goals is based on funds obtained from the European Maritime and Fisheries Fund [9]. The Fund should be employed in order to assure substantial financial resources for financing domestic operation programs and state aid schemes aimed at supporting environmentally sustainable development, competitiveness economic profitability and responsibility of fishery and aquaculture activities (art. 5 of the Regulation) [9]. It should be clearly highlighted here that any funds originated from the fund can be spent only on directly and clearly stated goals and priorities that are indicated in the art. 6 of the Regulation 508/2014 [9] and in the Regulation 1380/2013[7].

Finally, any state operational programme operating within the CFP has to compatible with guidelines defined and described by the EU authorities [3]. As it is clearly indicated in the official document, any state aid scheme has to:

a) be consistent with goals and directions of the CFP and the Competition Policy, assuring that the scheme will be beneficiary for whole internal fishery market and that aid will not destabilize internal competition (p. 3(1) of the Guidelines),

b)assure necessary level of consistency between general principles of the Community law regulating financial aid and the principles of the European Fishery Fund (p. 3(2) of the Guidelines).

c)present incentive effect, assuring stimulation or activeness of the beneficiary (p.3(3) of the Guidelines),

d) be transparent in terms of intensity of aid or amount of employed funds (p. 3(5) of the Guidelines) and

e) be scheduled for maximum duration of 10 years (p. 3(6) of the Guidelines)[3].

Taking into consideration the above-mentioned provisions and guidelines, the Community law presents relatively complex, thorough and comprehensive legal frameworks of the current CFP. It should be also highlighted that any national public aid scheme, in order to obtain any funds from the European Fishery Fund, has to meet all defined requirements.

2. The Fishery and Sea Operational Programme as an expression of the Common Fisheries Policy in Poland

Common Fisheries Policy in Poland for years 2014-2020 is based on the single operational programme called "Fishery and Sea"(PO RYBY 2014-2020)[4]. Beyond the Community law regulations and guidelines, legal frameworks of the current CFP in Poland are expressed within the Act on supporting sustainable development of the fishery sector with participation of the European Maritime and Fishery Fund of 10th July 2015 and in its implementing rules [11]. The act covers almost all issues related to defining frameworks of any state aid scheme

able to operate within the CFP and defines such aspects as: the CFP's priorities fulfilled within the scheme, tasks, jurisdiction, prerogatives and obligations of institutions and organisational units operating within the scheme, scope of aid's beneficiaries or conditions, procedure and form of obtaining funds (art. 1 of the Act)[11].

The Act indicates that the Fishery and Sea Operational Programme covers listed below priorities of the CFP for years 2015-2020:

a) promotion of environmentally sustainable, efficient in terms of resources, innovative competitive and based on knowledge fishery (art. 3(1)(1) of the Act),

b) supporting environmentally sustainable efficient in terms of resources, innovative competitive and based on knowledge aquaculture (art. 3(1)(2) of the Act),

c) supporting implementation of the CFP (art. 3(1)(3) of the Act),

d) increasing employment and territorial cohesion levels (art. 3(1)(4) of the Act),

e) supporting marketing and processing in fishery and aquaculture (art. 3(1)(5) of the Act),

f) fostering implementation of the Integrated Maritime Policy (art. 3(1)(6)[4][11].

Among from fulfilling defined priorities of the CFP, the scheme covers also legal aspect of technical aid. Takin into consideration the above-mentioned tasks, we may observe that analysed operational programme was created in order to fulfil all priorities defined in the Community legal frameworks (especially – in art. 6 of the Regulation 508/2014[9]).

Both, the Community regulations and the domestic act mention about different types of authorities operating within the CFP and state aid schemes. Focusing on the domestic regulations, we can find series of provision defining such aspects as prerogatives, tasks and obligations of authorities which functioning seems to be indispensable for proper use of funds from the European Maritime and Fisheries Fund.

Within the act, we can distinct four types of authorities:

a) managing authority,
b) intermediate authority,
c) certifying authority and
d) audit authority [11].

According to art. 5(1) of the Act, the Minister Competent for the Fishery is designated as the managing authority [11]. Its tasks are related to management of the operational programme and cover such issues like evaluation and monitoring of program's execution, presenting descriptions of management and control systems in front of the European Commission or appointing supportive, advisory and opinion bodies in order to improve management processes (art.5 of the Act) [11].

The intermediate authority is appointed by the Fishery Minister and is responsible for part of management tasks of the operational programme powered by the European Fund (art. 6(1) of the Act)[5][11]. Only four types of bodies can function as the intermediate authorities. According to the art 6(1) of the Act, two of them - the Agency for Restructuring and Modernisation of Agriculture and local governments operate under the Act, when the rest – the unit of public finance sector and foundations fully funded by the State Treasury - may operate within the scheme only under direct authorisation of the Minister in form of separate regulation [11].

The certifying authority is another type of bodies operating within the program and its function is carried out by polish Minister of Public Finance (art. 7 of the Act) [11]. As the Act does not define prerogatives of the certifying authority, it is necessary to refer to provisions of the Regulation (EU) No 1303/2013 [8]. As the art. 126 of the Regulation indicates, the certifying authority is responsible for accountancy related to expenditures, payments and other operations within the CFP's scheme [8].

The last type of the authorities operating in

[4]The legislator has simply rewritten priorities described in the art. 6 of the Regulation (EU) No 508/2014[9].

[5]Intermediate authorities and generally responsible for data storage and electronic register system connected to the program. They gather data necessary for evaluation and monitoring of the program and submit regular reports regarding fulfilling the CFP's priorities (art. 25(1) of the Act) [11].

the program is audit authority responsible for control and verification of proper functioning of management and control systems operating within the program (art. 127 of the Regulation)[8]. In the case of the Fishery and Sea Operational Programme, the Inspector General of Fiscal Control is designated as the audit authority (art. 8 of the Act)[11].

Financial aid from the operational aid is granted on the basis of the financing contract preceded by submission of the proper motion (art.11 of the Act)[11]. The Act also does not limit legal form of potential beneficiary who can function as natural person, legal person or other entities without legal personality (art. 11 of the Act)[11]. Under article 12 of the Act, candidates with legal access prohibition to any state grants, bankrupt or who appears in registry of excluded from European financial schemes or of infringing rules of CFP shall be expelled from the scheme [11]. However, it should be also highlighted that the legislator has not defined yet all requirements that each beneficiary will have to meet in order to obtain financial aid for any fisheries-related operation. Without such regulation it is impossible to fully evaluate accessibility of analysed operational programme.

As it was highlighted before, financial aid is dependent on proper application. Any candidate for the scheme has to file legal application to competent intermediate authority within defined period indicated in the notice about financial applications (art. 12 (1)(2) of the Act)[11]. Brief and precise presentation of personal data, description of proposed operations, its goals, place of undertaking, range and costings should be included in the application (art.13(3) of the Act)[11]. Total duration of application's examination should not exceed 3 month since the day of submission (art. 13(5) of the Act)[11]. Taking above into consideration, we can observe that legal requirements related to subjective scope and content of application are relatively simple and present standard solution for similar programs.

Researching form of state aid scheme in polish fishery it is also necessary to note that the legislator has also defined basic directives of conduct and administrative proceedings which are addressed mainly to authorities operating within the program and partially to other parties and participants of the proceedings. Under art. 15 of the Act, any entitled authority shall stand in defense of rule of law, is obliged to fully examine evidence, present necessary instructions parties and assure their active participation in any stage of proceedings [11]. As it appears, proceedings related to the analyzed state aid scheme enjoy relatively formal frameworks which may assure that each subsidies will be granted duly.

The Act of 2015 has also defined form and content of the financing contract which should be considered as direct legal basis of granting state aid. As the art. 17 of the Act indicates, the contract should be done in writing and should present data regarding identification of contract's parties, conditions, period, place and goal of operation, amount of granted aid, conditions and periods of aid's payments, termination and funds' return conditions [11]. Not applying to legal requirements may result in sanction of annulment (art.17(4) of the Act)[11]. Direct list of contract's components should assure proper control of the program.

Finally, in order to fully evaluate the act it is also necessary to focus on defined circumstances when granted aid should be repaid by beneficiaries. Legal obligation to repay the aid plus interest[6] arises in each case when the funds were received unduly or were misused (art. 32(1) of the Act) [11]. The act has also constituted exhaustive list of cases when the aid is unduly received. Under art. 32(2) of the Act, beneficiary unduly received aid when:

a) the operation or related obligations are not partially or fully fulfilled,

b) the aid was granted without legal basis or in value exceeding aid granted in the financing contract,

c) beneficiary doesn't fulfill obligations related to aid,

d) beneficiary, within 5 years since receiving final payment, has been registered as violator of CFP's regulations or

[6]Interest rate estimated like in case of tax arrears (art. 32(1) of the Act) [11].

f) aid was granted in violation to national or Community law [11].

As it appears from the above, national legislator intends to propose transparent regulation that clearly define also negative aspects of operational program in domestic fishery sector. We should remember that constituting legal exhaustive list of negative or positive premises, the risk of any arbitrariness or discretion of state authorities in directly limited.

Economic aspects of the Fishery and Sea Operational Program

1. Structure of funds employed in the operational program

As it was mentioned before, total funds employed in the Fishery and Sea Operational Program come from two sources – the European Maritime and Fisheries Fund and from state's budget. The data from Table 1. clearly shows that funds from the European fund constitute major financial contribution for the scheme (over Euro 532 Million) while state's budget's share is apparently smaller (over Euro 179 Million)[6].

Polish authorities has proposed transparent from of breakdown of funds from the scheme between specific priorities of the CFP [6]. As it was described before, the Fishery and Sea Operational Program could be created only on order to fulfil specific common tasks.

In terms of financial aid, the task aimed at supporting environmentally sustainable efficient in terms of resources, innovative competitive and based on knowledge aquaculture should be considered as most important within analysed scheme as total funds employed in fulfilling given priority equal to Euro 269 Million.

Second most important task of the operational program is to promote environmentally sustainable, efficient in terms of resources, innovative competitive and based on knowledge fishery where state's authority plan to spent total sum of over Euro 190 Million.

Third most financially biggest priority of state's scheme is to increase employment levels and territorial cohesion levels with total dedicated funds of over Euro 94 Million.

Table 1. Breakdown of funds between specific priorities of the CFP

Priorities	Total support (Euro Mil.)	
	Funds from EMFF	State funds
Promotion of sustainable fishery	130.2	60.6
Support of sustainable aquaculture	201.7	67.3
Support of CFP implementation	23.6	6.2
Employment and territorial integrity	79.7	14.7
Support of marketing and processing	61.6	14.1
Support of Integrated Maritime Policy (IMP)	2.5	0.8
Technical aid	31.8	10.6
Total	532.2	179.3

Source: data from project of Fishery Department of the Ministry of Agriculture [6].

Less financially consuming priorities are supporting or marketing and processing in fishery and aquaculture (Euro 75.7 Million), supporting of CFP implementation (Euro 29.8 Million) and supporting of IMP (Euro 3.3 Million). The rest of funds is targeted at technical aid's expenditures (Euro 42.4 Million).

As it appears from the data, financial structure of the operational program is complex and specific sums dedicated to each of CFP's priorities indicate importance of given priority for polish realities of fishery and aquaculture market.

2. *Changes in size of polish fishery sector in years 2005-2014*

In years 2005 – 2009, polish fishery sector in terms of production and fishing fleet experienced series of minor fluctuations. In years 2005 – 2008 value of production (fish and shellfish catches in thousands tonnes) had been shaped by stable but low trends (from 126 thou tonnes in 2006 to 136 in 2005). In 2009 we may observe vital increase in production (212 thou tonnes), however it should be concurrently noted that given record was unique for analysed period. After 2009 production rate was higher and experienced minor fluctuations (from 171

thou tonnes in 2010 to 195 in 2013).

We may observe similar fluctuations in terms of fishing fleet seize. However, in order to precisely evaluate changes in fishing fleet it is necessary to take into consideration both determinants – number and gross tonnage. As it appears from the Table 2, despite reduction in number of ships (from 975 to 878 in 2014), the value of gross tonnage remained quite stable (from 30 thousands in 2005 to 34 in 2014). We may also observe that there were two periods of changes in fishing fleet numbers. In terms of number of ships, years 2006-2011 should be described as the period of constant reduction, while since 2012 number of ships started to experience reverse and positive trend.

Observed trends make it difficult to sketch any forecast regarding future seize of polish fishery sector. The production rates should remain stable as environmental sustainability of fishery and aquaculture are main priorities of the CFP. We should remember that higher production transfers to stronger environmental exploitation and maritime resources' deterioration. In terms of fishing fleet seize, we may assume that relatively stable value of GT despite of fleet reduction in number results mainly from the fact that nowadays polish fishery fleet is more specialized and employs bigger and progressive units.

Table 2. Changes in value of production and fishing fleet in Poland in years 2005-2014

Years	Fish and shellfish catches in thousand tonnes	Fishing fleet	
		Number of ships	Gross tonnage (GT) in thousands
2005	136	975	30
2006	126	881	32
2007	133	867	31
2008	126	832	41
2009	212	806	38
2010	171	793	37
2011	180	790	33
2012	180	798	33
2013	195	838	34
2014	171	878	34

Source: Główny Urząd Statystyczny – GUS (Central Statistical Office), Maritime Economy 2014 [2].

3. Polish fishery in the EU economy

Table 3 presents data regarding position of polish fishery sector in comparison to total EU 28 in terms of fishing fleet, value of output, employment in processing sector, production and extra-EU trade, coming from the statistical report of the European Commission [1].

Table 3. Polish fishery sector in comparison to total EU-28 in terms of fishing fleet, value of output, employment in processing, production and extra-EU trade.

Specification			Poland	EU-28
Fishing fleet*		Number of vessels	832 (1%)	87,445
		Gross tonnage	33.73 (2%)	1,725,938
Value of output** (Euro Thousands			1,806,317 (6%)	29,825,802
Employment in processing sector** (full-time equivalent)			15,051 (13%)	115,651
Production** (catches and aquaculture)			197,578 (3%)	6,143,294
Extra-EU trade***	Import of fishery and aquaculture products	Volume (tonnes)	162,202 (3%)	5,578,068
		Value (Euro thou. EUR)	374,328 (2%)	19,238,417
	Export of fishery and aquaculture products	Volume (tonnes)	29,639 (1.5%)	1,976,740
		Value (Euro thou.	88,475 (2%)	4,170,313

*Data for situation as at 28th February 2014
** Data for 2011
*** Data for 2012
Source: Facts and Figures on the Common Fisheries Policy, European Commission [1].

General shape of data allows to draw simple conclusion that polish fishery sector plays minor role in the EU fishery sector. Such conclusion is based on single fact that in each of analysed determinants (with exception of employment in processing sector of fishery) share of polish output and fishery sector ranged between 1-3% of total EU-28 market. Such trends proves that polish fishery sector has no major importance for common fishery

market and its fluctuations have minor influence on general situation of common market.

The only exceptions are related to two aspects: value of output and employment in processing sector where share of polish fishery sector represents respectively 6% (Euro 1,806,317 thousand) and 13% (15,051 employed in the processing sector) of the EU-28 total share.

In given aspects, any vital fluctuation observed on domestic market can cause respective change on common market.

However, in general view it should be clearly stated that polish fishery sector belongs to category of smaller domestic sectors. Poland should be considered as minor players on international market that satisfy its fishery needs mainly by extra-EU trade and import from internal market.

CONCLUSIONS

To sum up, presented above legal frameworks implementing the CFP in Poland should not be considered as extraordinary or innovative solution. Examined act of 2015, expressing direct fundaments of the Fishery and Sea Operational Program, presents standard legal solutions and measures originating from experience acquired during accomplishment of previous the CFP and the CAP goals. Experience coming from management of previous state aid scheme should be considered as significant advantage that may cause higher efficiency and precision of current operational program. It should be clearly noted that any state aid scheme powered by European funds has to be fully focused on accomplishing clearly defined goals and priorities. Not individual participants of operational programs but European fishery and maritime sectors should be direct and main beneficiaries of the current CFP, and such order should be priority of any state aid scheme in the fishery.

Regarding minor role of polish fishery sector on position of common market, it should be clearly highlighted that main task of analysed operational program is to improve maritime biological and environmental aspects. Economic and financial priorities should be considered only as less important background.

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TRENDS IN ROMANIA'S AGRICULTURAL PRODUCTION

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Abstract

Agriculture is an important sector in Romania's economy. Crop production brings the highest contribution to agricultural production value, being followed by animal production. Cereal cropping is very important in Romania, and wheat and maize are the top cereal crops. Also sunflower seeds production is very good positioning Romania in the top in the EU. Vegetable and mainly fruit sectors registered an important decrease of production. Meat production declined in case of beef and pork, but it recorded a slight increase for mutton and goat meat. Poultry meat recorded a continuous development because of the high efficiency in broilers fattening and lower consumer price compared to beef and pork. Milk production declined due to the reduction of cattle livestock and the small yield/cow. In order to balance demand/offer ration, in the domestic market there many products coming from import, which deeply affect Romanian producers. The financial support offered by the EU for the Horizon 2014-2020 must be used in order to increase agricultural production. Farmers to join their capital and develop their business in associative forms which could help them to obtain farm inputs at cheaper costs, lower production costs, and to sell better their products in the market.

Key words**:** *agricultural products, market, Romania, trends*

INTRODUCTION

Agriculture is an important economic sector assuring food for population, raw materials for processing industry and agro-food products for export. Its contribution to GDP is 5.6 %. It registered a continuous development in the last decade, and its future depends on a modern technical endowment, investments, employment of high qualified persons, a corresponding farm structure able to assure a higher productivity, economic efficiency and competitiveness.(Popescu Agatha, 2005b) [35].

In Romania, there are good soil and climate conditions for crop production and animal production. However, the climate change in the sense of higher temperatures, severe droughts, rainfalls, extreme phenomena have affected and could continue to have a negative influence on agricultural production (Cofas *et al*., 2014) [2].

In Romania there are 3.56 million farm, most of them being subsistence and semisubsistence farms, of a small size, but ! % of the total number of farms are working about 56 % of the arable land. Extensive cropping is largely applied, but also, in the commercial farms, we can discuss about modern agriculture. the need to assure environment protection and sustainable development of agriculture left room for conservation agriculture as an alternative to the conventional agriculture (Grigoras *et al*., 2012a, b) [6, 7].

The EU policies regarding the reform in agriculture and the financial support allowed the establishment of new farms and the modernization of the old ones with new equipment and modern technologies with a substantial impact on the economic performance. Unfortunately, Romania was not able to use all the allotted funds allotted by the EU, because the difficulties regarding the ownership titles, farmers' lack of financial resources to start their business, the unattractive credit system and the lack of experience in setting up projects (Grigoras *et al*, 2006) [5]. The new Horizon 2014-2020 Programme will continue to support Romanian farmers.

In this context, the present paper had the

purpose to analyze the evolution of agricultural production in Romania in the period 2008-2013 highlighting the major trends and what can be done to improve the results in agriculture.

MATERIALS AND METHODS

The paper is based on the data collected from the National Institute of Statistics data bases, and the indices with fixed basis were used to emphasize the difference between the level recorded in the year 2013 compared to the year 2008.
The main aspects approached in the paper were: the evolution of GDP produced in agriculture and its share in Romania's GDP, the evolution of the value of agricultural production and of its three components: crop production, animal production and agricultural services, the evolution of crop production by main crops, the evolution of animal production by main items, the evolution of the production per inhabitant for the main agricultural products.

RESULTS AND DISCUSSIONS

Agriculture contribution to GDP. Agriculture is an important economic branch in Romania and it gives its contribution to GDP together with industry, trade, buildings, transportation etc. In the period 2006-2013, Romania's GDP increased by 82.3 % from Lei 344.6 Billion current prices in 2006 to Lei 628.5 Billion current prices in 2013.

Table 1.The dynamics of GDP produced in agriculture and its share in Romania's GDP (Lei Billion current prices)

	2006	2007	2008	2009	2010	2011	2012	2013	2013/2006 %
GDP	344.6	416.0	514.6	498	523.6	557.3	586.7	628.5	182.3
GDP IN AGRICULTURE	26.8	23.9	34.4	31.6	29.8	36.3	28.6	35.1	130.9
SHARE OF GDP IN AGRICULTURE (%)	7.7	5.7	6.7	6.3	5.7	6.5	4.9	5.6	-

Source: Own calculations based on Statistical Yearbooks Romania, NIS

The GDP produced in agriculture, forestry and hunting accounted for Lei 35.1 Billion current prices in 2013, being by 30.9 % higher than in 2006.
As a result, the contribution of agriculture, hunting and forestry to Romania's GDP declined from 7.7.% in the year 2006 to 5.6 % in 2013 (Table 1).
Agricultural production value. In the period 2006-2013, the value of agricultural production increased by 54.9 % from Lei 50,649 Million current prices in 2006 to Lei 78,464 million current prices in 2013.
Crop production increased by 71.8 % from Lei 31,327 Million in 2006 to Lei 53,843 Million in 2013, Animal production increased by 26.6 % from Lei 18,849 Million in 2006 to Lei 23,876 Million in 2013. Finally, Agricultural services increased by 57.3 % from Lei 473 Million in 2006 to Lei 744 Million in 2013 (Table 2).
The contribution of the three sectors to the agricultural production value was 68.6 % crop production, 30.4 % animal production and 1 % agricultural services.
Compared to the year 2006, it is obvious that crop production remained on the top position, followed by animal production.
However, while the crop production increased its share from 61.9 % in 2006 to 68.6% in 2013, the animal production declined its weight from 37.2 % in 2006 to 30.4 %.(Table 3).
Analyzing the situation of agricultural production by development region, in the year 2013, we found the following: South Muntenia 19.9 %, South East 16.8 %, North East 16.7%, North West 12 %, Centre 11.3 %, West 11.2 %, South West Oltenia 11.1 %, and Bucharest Ilfov 1 %.

Table 2.The dynamics of Agricultural Production Value in Romania, 2006-2013 (Lei Million, current prices)

	2006	2007	2008	2009	2010	2011	2012	2013	2013/2006 %
AGRICULTURAL PRODUCTION VALUE	50,649	47,700	66,994	59,928	64,452	76,508	64,259	78,464	154.9
CROP PRODUCTION	31,327	28,723	45,742	35,735	43,488	54,180	40,169	53,843	171.8
ANIMAL PRODUCTION	18,849	18,291	20,536	23,441	20,407	21,784	23,555	23,876	126.6
AGRICULTURAL SERVICES	473	684	716	751	447	545	535	744	157.3

Source: Own calculations based on Statistical Yearbooks Romania, NIS

Table 3. Structure of agricultural production, Romania, 2006-2013 (%)

	2006	2007	2008	2009	2010	2011	2012	2013
CROP PRODUCTION	61.9	60.2	68.3	59.6	67.5	70.8	62.5	68.6
ANIMAL PRODUCTION	37.2	38.3	30.6	39.1	31.6	28.5	36.7	30.4
AGRICULTURAL SERVICES	0.9	1.5	1.1	1.3	0.9	0.7	0.8	1.0

Source: Own calculations based on Statistical Yearbooks Romania, NIS

Crop production. Romania's crop production is deeply oriented to cereal cropping due to the fertile soil in the South, South West and South East part of the country. Wheat and maize are the main cereals cultivated, but also barley, rye and oats.

Cereal crops are profitable and Romania can obtain high yields if climate conditions are favorable. There were years with good productions and also years with lower productions.

The high cost of the farm inputs (fertilizers, herbicides etc) do not allow each farmer to apply modern technologies, and for this reason high performance is achieved in the farms with a good technical endowment and high qualified managers.

However, the cereal yields are lower compared to the ones recorded in other EU countries, but cereal production is enough high due to the large cultivated surfaces. For maize production Romania was recently in the top in the EU, being followed by France. (Popescu Agatha, 2012b, Popescu Agatha, 2012d) [27,29].

The higher and higher cereal production led to un unbalance demand/offer ratio in the market, and as a consequence, the price at the farm gate declined. However, cereal production continue to cover the market needs and to contribute to the agro-food export of Romania. Romania is a cereal producer, exporter and importer. (Popescu Agtaha, 2015d) [37].

In the analyzed period, crop production registered a positive evolution in case of cereals. Cereals production increased by 32.6 % from 15,759.3 thousand tons in 2006 to 20,897 thousand tons in 2013, the year with the highest performance.

Wheat and maize are the main cereals cultivated in Romania. Wheat production increased by 32 % from 5,526.2 thousand tons in 2006 to 7,296 thousand tons in 2013. Maize production increased by 25.8 % from 8,984.7 thousand tons in 2006 to 11,305 thousand tons in 2013. This performance was a result of the cultivated area and average production per ha.

The oleaginous crops are more important in the agricultural production structure because of the need of oil for human consumption, and also for producing biodiesel. Romania is the most important producer and exporter of sunflower seeds in the EU (Arghiroiu *et al*, 2015, Popescu Agatha, 2012c) [1, 28]

Therefore, among the oilseeds crops, sunflower is in the top position. Its production increased by 40.3 % from 1,526.2 thousand tons in 2006 to 2,142 thousand tons in 2013. This was determined by the farmers wish to

extend the cultivated surface and benefit of the subsidies allotted for this crop.

Sugar beet registered a lower production across the time, reaching 1,029 thousand tons in 2013, by 10.7 % less than in 2006. The reduced cultivated surface was determined by the high production cost per ha and the fail of processing industry.

Table 5. Evolution of crop production, Romania, 2006-2013 (thousand tons)

	2006	2007	2008	2009	2010	2011	2012	2013	2013/2006 %
CEREALS	15,759.3	7,814.8	16,826.4	14,873	16,712.9	20,842.2	12,824.1	20,897	132.6
WHEAT	5,526.2	3,044.5	7,181	5,202.5	5,811.8	7,131.6	5,297.7	7,296	132.0
MAIZE	8,984.7	3,853.9	7,849	7,973.3	9,042	11,717.6	5,953.4	11,305	125.8
SUNFLOWER	1,526.2	546.9	1,169.9	1,098	1,262.9	1,789.3	1,398.2	2,142	140.3
SUGAR BEET	1,152.2	748.8	706.7	816.8	8367.9	660.5	719.8	1,029	89.3
POTATOES	4,015.9	3,712.4	3,649	4,004	3,283.9	4,076.6	2,465.2	3,290	81.9
VEGETABLES	4,138.9	3,116.8	3,819.9	3,901.9	3,863.6	4,176.3	3,535.3	3,961	95.7
FRUIT	1,486.4	1,085.8	1,179.2	1,323	1,419.6	1,479.9	1,128.6	768	51.6

Source: Own calculations based on Statistical Yearbooks Romania, NIS

Potatoes production decreased by 18.1 % from 4,015.9 thousand tons in 2006 to 3,290 thousand tons in 2013. This was the result of the climate change during the last decade, the deep droughts in 2007 and 2012, producers low financial resources for irrigation, high production cost for potato cropping.

Despite that during the last years, the Romanian market was invaded by imported potatoes coming mainly from Poland affecting local producers, potato will remain a basic food for the population and will continue to be produced.(Pop *et al*., 2012, Vlad *et al*., 2014, Soare,2015) [15, 39, 41]

Vegetable production declined by 4.3 % from 4,138.9 thousand tons in 2006 to 3,961 thousand tons in 2013. However, the extend of production in green houses has deeply supported the extend of the vegetable production. Romania is a producer, but also exporter and importer of vegetables (Dragan, 2012, Popescu Agatha, 2013d) [3, 33]

Fruit production registered the highest decrease, - 48.4 %, from 1,486.4 thousand tons in 2006 to 768 thousand tons in 2013. (Table 5). This was due to the old plantations, the high cost to maintain them, and the extreme atmospheric phenomenon for instance: snowing when the fruit trees were in bloom early in spring season. Fruit sector needs new plantations, therefore investments and hybrids resistant to drought, diseases and pets, organization of the local producers in associative forms in order to assure farm inputs at lower costs and build stores to sell fruit in the extra-season when the price is higher.(Dragan, 2012, Pirvutoiu *et al*., 2013) [3, 14]

The structure of crop production includes: cereals 34.9 %, potatoes 10.5 %, oilseeds crops 9.2 %, fodder plats 10 %, vegetables 17.2 %, fruit and grapes 10.3 % and others 7.9 %.

Animal production. An important place in animal production is occupied by meat production.

Meat production registered a decline in the analyzed period by 7.3 % from 1,401 thousand tons in 2006 to 1,300 thousand tons in 2013. This was due to the decrease recorded by cattle and swine species. the deepest decline was registered by cattle meat production, - 39.7 % and pork production - 11.7 %. The decline in beef and pork output was due to the decrease in cattle and pig livestock, the reduced live weight at slaughter, and due to the small price per kg live weight offered by processors to farmers (Draghici *et al*., 2014, Pirvutoiu *et al*, 2010) [4, 10]

The reduced consumption of beef and even of pork is due to the selling price and small family income, mainly after 2009, when the effects of the economic crisis started to appear. (Popescu Agatha, 2012a, 2015c, Soare *et al*., 2015) [26, 36, 40].

Beef consumption must be encouraged in order to diminish the gap between Romania and other EU countries. In this respect, more

attention will be given in the future to specialized breeds for meat production (Grodea, 2015) [9].

In case of sheep and goat, meat production increased by 2.9 %, because of the chance for export (Popescu Agatha, 2013c) [32].

Table 6.Evolution of animal production, Romania, 2006-2013

	MU	2006	2007	2008	2009	2010	2011	2012	2013	2013/2006 %
MEAT (LIVE WEIGHT)	THOU TONS	1,401	1,503	1,426	1,443	1,305	1,357	1,332	1,300	92.7
-CATTLE	THOU TONS	318	333	306	264	205	212	198	192	60.3
-PIGS	THOU TONS	618	642	6-05	585	553	557	555	546	88.3
-SHEEP AND GOAT	THOU TONS	101	110	104	104	100	110	107	104	102.9
- POULTRY	THOU TONS	361	416	410	489	446	477	471	457	126.5
MILK	THOU HL	64,607	61,048	59,016	56,383	49,129	50,074	48,337	48,728	75.4
WOOL	TONS	19,378	21,025	22,075	22,352	20,457	19,026	19,713	20,719	106.9
EGGS	THOU PIECES	7,429	6,522	6,692	6,211	6,199	6,327	6,398	6,388	85.9
HONEY	TONS	18,195	16,767	19,833	19,937	22,222	24,127	18,000	21,000	115.4

Source: Own calculations based on Statistical Yearbooks Romania, NIS

Poultry farming is continuously developing, Romania being both a producer, but also an exporter and importer. Broilers fattening is a profitable activity assuring the highest economic efficiency because the production cost is smaller compared to pig fattening or steer fattening. Its development was encouraged by consumer preferences for a lean and white mean, with a lower cholesterol content and sold at a cheaper price than pork and beef (Pirvutoiu et al., 2012b, Popescu Agatha, 2007b) [13, 23].

Chicken meat is well developing in the EU-28 and in all the CEECs due to its advantages for farmers and for consumers. (Popescu Agatha, 2007a, Sandu, 2015). [22, 38].

In the analyzed period, the poultry meat registered the highest growth, +26.5%.

Milk production. Milk production is important in any country, as milk is a strategic product, and also a basic food for children adults and old people, and also for animals. Romania has a good potential to produce milk, but in the last decades, the cattle stock declined with a negative influence on milk production. Compared to other EU countries, Romania has the lowest milk yield (Grodea, 2013) [8].

Farm size is very small, just 2-5 cows/household, and it is farm away from economic efficiency, which starts from over 4,000 kg/cow/lactation.(Popescu Agatha, 2003, Popescu Agatha, 2005b, Popescu Agatha, 2009) [17, 19, 24].

Milk quality is another problem: number of pathogenic germs, somatic cells, and fat content. Also, the manual milking practiced in the most of farms, except the commercial farms where there are milking parlors, the lack of milk tanks, collection points are other aspects influencing milk quality. For this reason, milk price offered by processors is many times unsatisfactory for dairy farmers, because it can not cover the production cost (Popescu Agatha, 2006a) [20].

In the analyzed period, milk production declined by about 25 % from 64,607 thousand hl in 2006 to 48,728 thousand hl in 2013. This was due to the decline in cow and buffalo live stock, and to the low yield/head.(Popescu Agatha, 2015a) [34].

The demand/offer ratio in the domestic market is unbalanced because it is not enough raw milk for processing industry, and

processors buy raw milk and mainly powder milk from abroad affecting Romanian producers.(Popescu Agatha, 2011) [25].
Sheep and goat milk production had an increasing trend because of the special quality of this type of milk. Production was stimulated by an increased number of sheep and goats (Popescu Agatha, 2013b) [31].

Table 7. Evolution of agricultural production per inhabitant, Romania, 2006-2013

	MU	2006	2007	2008	2009	2010	2011	2012	2013	2013/2006 %
CEREALS	KG	730.1	362.8	819.3	730.2	825.5	1,034.5	638.1	104.3	142.8
WHEAT	KG	256	141.4	349.6	255.4	287	354	263.6	364	142.1
MAIZE	KG	416.3	178.9	382.2	391.5	446.6	581.6	296.2	564	135.5
SUNFLOWER	KG	70.7	25.4	57.0	53.9	62.4	88.8	69.6	106	149.9
SUGAR BEET	KG	53.4	35.9	34.4	40.1	41.4	32.8	35.6	52.3	96.06
POTATOES	KG	186.1	172.4	177.7	196.6	162.2	202.3	122.7	164.3	88.2
VEGETABLES	KG	191.8	144.7	186	191.6	190.8	207.3	175.9	197.8	103.1
FRUIT	KG	68.9	50.4	57.4	65	70.1	73.5	56.2	38.3	55.5
MEAT	KG	64.9	69.8	69.4	70.8	64.5	67.4	66.3	67.0	103.2
MILK	L	299.3	283.5	287.3	276.8	242.7	248.5	240.5	248.0	82.8
WOOL	KG	0.9	1.0	1.1	1.1	1	0.9	1	1	111.1
EGGS	PIECES	344	303	326	305	306	314	318	320	93.0

Source: Own calculations based on Statistical Yearbooks Romania, NIS

Wool production increased by 6.9 % from 19,378 tons in 2006 to 20,719 tons in 2013. However, wool has no price, being used in the countryside for producing carpets and other handicrafts.
Egg production declined by 14.1 % from 7,429 thousand pieces in 2006 to 6,388 thousand pieces in 2013. This was due to the decline in the number of laying hens, high production cost which determined the breeders to be more oriented to broilers' fattening which is a more profitable business. For this reason, egg imports are required to cover consumers' needs, but this affect local producers (Pirvutoiu *et al*., 2012a, Popescu Agatha, 2002) [12, 16].
Honey production has a positive evolution as long as honey is such a special healthy food for human diet and also an income source for beekeepers. The flora variety in Romania and the long tradition of apiculture of over 2,000 years favored beekeepers to keep more bee families. The number of beekeepers, bee hives, bee families and honey yield/bee family and the total honey production increased continuously.
In the analyzed period, honey production (extracted) increased by 15.4 % from 18,195 tons in 2006 to 21,000 tons in 2013. (Table 6). However, in Romania, honey consumption is small, less than 1 kg/inhabitant compared to other EU countries and for this reason Romania make honey export (50 % of its production) in the Western countries mainly in Germany, United Kingdom and the Nordic countries (Pirvutoiu *et al*., 2011, Popescu Agatha 2006b, 2013a) [11, 21, 30].
The average apiary size is 26 bee families, but there are apiaries with more than 400 bee families.
Profitability starts from over 100 bee families. The incentives offered by the EU encouraged the beekeepers to extend their business and produce more honey.
The structure of animal production consist of the contribution of the following sectors; cattle 25.2 %, sheep and goats 6.7%, pigs 16.9 %, poultry 20.7 %, products obtained by processing milk in the animal farm 28 % and others 2.5 %.
Agricultural production per inhabitant. Taking into account the dynamics of the population and the evolution of the agricultural production, the agricultural production per inhabitant increased in case of cereals (wheat + 42.1 % and maize +35.5 %), sunflower +49.9 %, vegetables +3.1 %, meat +3.2 and wool +11.1 %, but it decreased in case of sugar beet - 3.94 %, potatoes -11.8 %, fruit -44.5 % and eggs - 7 %.(Table 7).

CONCLUSIONS

Agriculture is an important sector in Romania's economy and will continue to be as long as about 44 % of the population is living in the rural areas, where agriculture is the main activity.

While crop production value increased, animal production value declined, leading to a smaller share of this sector in agricultural production value.

Cereal cropping is very important in Romania, and wheat and maize are the top cereal crops. Also sunflower seeds production is very good positioning Romania in the top in the EU.

The main problems are related to vegetable and mainly fruit sectors, where production registered an important decrease. The need of vegetables and fruit in the market must encourage farmers to invest in new green houses for vegetable and also in the field. New plantations of fruit trees are required to replace the old ones.

Meat production declined in case of beef and pork, but it recorded a slight increase for mutton, lamb and goat meat.

Poultry meat recorded a continuous development which will continue in the future because of the high efficiency in broilers fattening and lower consumer price compared to beef and pork.

Milk production is very much affected by the reduction of cattle livestock and the small yield/cow, and also by imports of raw milk and powder milk in the market which affects local producers.

An important aspect which must be taken into consideration as agricultural production to grow in the future is the need as farmers to join their capital and develop their business in associative forms which could help them to obtain farm inputs at cheaper costs, lower production costs, and to sell better their products in the market.

The financial support offered by the EU for Romania within the Horizon 2014-2020 Programme must be used in order to increase agricultural production.

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MILK AND BEEF PRODUCTION VOLATILITY IN ROMANIA – DOMESTIC SUPPLY STABILITY FACTOR

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Abstract

Having in view the self-sufficiency level in the year 2013, i.e. 92% in beef and 94% in milk, which reveals a chronic deficit in meeting the consumption needs for these products, the purpose of the paper is to identify some new opportunities to revigorate the meat and milk production with the support provided to the cattle sector through the NRDP 2014-2020 measures. Among the three pillars of food security (accessibility, availability, quality and safety), the paper investigates the availability of beef and cow milk, in the light of the representative factor – production volatility. The conclusions reveal a different volatility of beef production (27.38) versus cow milk (12.93); by species, the highest variation coefficient for the production of live weight meat, in the period 2005-2014, is found in the case of beef (27.38), followed by poultry meat (9.70), pork (6.19) and mutton and goat meat (4.25).

Key words**:** *meat production, milk, variation coefficient, volatility*

INTRODUCTION

Agriculture is considered an industry in the EU developed countries that has received sustained support from public sources to reach a high performance and stability level. However, there are concerns related to agricultural production variation depending on the climate changes and agricultural price volatility under the pressure of looking for alternative energy resources and the speculative actions [4].

Production volatility in Romania stems from several drawbacks, mainly the high taxes, low investments in the agricultural sector, absence of land consolidation, absence of a specialized bank, loss of domestic market in favor of imports, little information and an almost non-existing consultancy, etc.[2]. Romania's agriculture performance in terms of supply is influenced by numerous factors that determine the low efficiency level of production, among which a non-homogenous farm structure, low market orientation of family farms, low productivity, low modernization level of the farming sector, adding to the high variability of weather and climate conditions after 2000[1].

Farm production volatility diminution is closely related to the development of the irrigation system, as well as to the development of middle class, of SME market. The agricultural market continues of be highly exposed to the volatilities on the world trade markets with vegetable raw materials, in the conditions in which the relatively small number of animals in the economy does not generate a sufficient market to absorb a part of the raw products that are presently exported [7]. The attracted and future EU funds lie at the basis of growth in agriculture. In this respect, we consider that the livestock sector development would decisively contribute to the diminution of farm production volatility, in the sense that the growth of their number in most species would entail the sustained development of crop production. From this point of view, cattle raising represents a branch of first importance of the world agriculture, due to the volume, diversity and value of productions and products obtained from this activity. Thus, bovines contribute by 90-96% to the total milk production consumed worldwide, 30-35% of meat production and about 90% of total hard animal skins processed in the world tannery industry. Under normal operation conditions, one cow can cover the optimum consumption needs for 6-8 inhabitants, while the milk

needs for 10-15 inhabitants [1]. Beef, by its nutritional and biological value, represents a healthy food with a high biological value due to its protein (18-20 %) content and essential amino acids, vitamins (mainly from the B complex) and mineral salts (25 microelements - Zn, Fe, Cu). Its energy value of 2000 kcal/kg and the moderate cholesterol content gives it the possibility to be used in different food diets, mainly in the digestive tract diseases [6].

MATERIALS AND METHODS

The evaluations of aspects linked to beef and cow milk production volatility in Romania, from the perspective of domestic supply stability, was based on the analysis of technical indicators (herds, milk and meat productions, import, export), using as data source the Tempo-online database – time series – NIS, Population's Consumption Availabilities, 2007-2013, MARD information.

The documentation and synthesis of the main ideas was made from the specialty economic literature on the evolution of cow milk and beef market at European level (reports, studies, EUROSTAT, FAOSTAT publications), while having in view the future agricultural reform, national market operation, management of risks generated by the current climate changes and the economic-financial crisis. [5]

RESULTS AND DISCUSSIONS

In 2014, animal production value represented 32.9% of the agricultural production value, up by 2.5% compared to 2013 (30.4%). The milk production ranks on the second place in animal production, in value terms, after meat. In terms of structure, in the year 2014, bovines accounted for 25.2% of the animal production value, while the products obtained from milk processing on the livestock farms 28%.

Although cattle raising is a traditional activity for the rural population and mainly for the population living in the mountain areas of Romania, the integration into the EU structures in the year 2007 did not result in the revigoration of the milk and beef sector; on the contrary, a strong production decline has followed.

Beef production in EU-28 totalled 7.3 million tons in the year 2014, the main large producers being France with 19%, Germany 15%, United Kingdom 12% and Italy 10%, summing up 56% of total beef production in EU-28. In this rating, Romania is on the 20th position, with a production of carcass meat of 29.2 thousand tons.

In the period 2006-2014, the slaughter meat production for consumption was down by 134.5 thousand tons (-42.3%), but the bovines slaughtered in slaughter houses in carcass equivalent had a slighter decrease, by 3.9 thousand tons (-11.8%), which reveals that a large part of farmers prefer slaughtering their animals on specialized slaughtering units; this is also proved by the increase of slaughtering on specialized units from 26.8% in 2011 to 32.2% in 2014 (Table 1).

Table 1. Evolution of beef production in Romania

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2014/ 2006
Slaughtter bovines for human consumption -total-tons liveweight	318,054	333,282	306,373	264,155	205,347	211,971	198,510	192,206	183,562	-42,3
Bovines slaughtered in slaughter houses-tons liveweight	66,101	87,995	81,717	50,531	57,336	56,897	58,941	60,476	59,116	-10,6
%	20.8	26.4	26.7	19.1	27.9	26.8	29.7	31.5	32.2	
Bovines slaughtered in slaghter houses-tons carcass weight	33,111	43,477	39,821	24,912	28,313	28,065	28,714	29,338	29,203	-11.8

Source: National Institute of Statistics – Tempo online [8].

France, Germany, Italy and the United Kingdom together account for 58% of the bovines slaughtered in slaughtering units in EU-28, Romania being placed on the 20th position, with a share of only 0.4%.

Milk production in EU-28 in the year 2014

totalled 162.8 million tons, out of which cow milk production accounted for 96.8%, the difference of 3.2% being covered by the buffalo cow, ewe and goat milk. The main large producers in EU-28 that account for 53% of the milk production are Germany 20%, France 19%, United Kingdom 9% and Poland 8%.

In this hierarchy, Romania ranks on the 10th position, with a total production of 4.8 million tons, out of which cow milk represents 4.5 million tons. In the period 2011 – 2014, milk production slightly increased (0.15%), as a result of stimulative measures from NRDP (Figure 1).

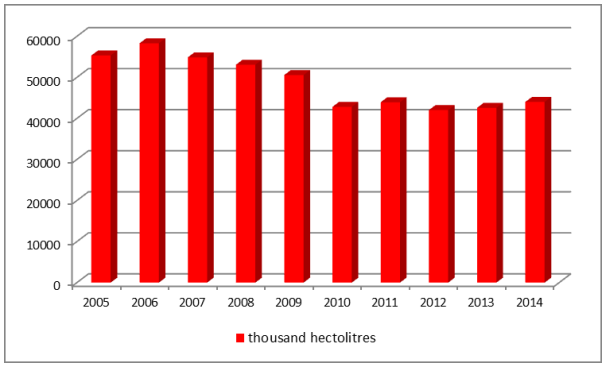

Fig. 1. Evolution of cow and buffalo cow milk production – thousand hectoliters
Source: National Institute of Statistics – Tempo online

The calculation of the variation coefficient for the live weight meat production in all species in the period 2005-2014, as presented in Table 6, reveals that the highest variation coefficient (and the highest production volatility) is noticed in beef (27.38), followed by the poultry meat (9.70), pork (6.19) and the sheep and goat meat (4.25).

Table 2. Variation coefficient for the animal production

Item	Variation coefficient
Beef	27.38
Pork	6.19
Sheep and goat meat	4.25
Poultry meat	9.70
Cow and buffalo cow milk	12.93

Source: own calculations

On comparative basis, the calculation of production variation coefficient reveals a higher volatility in beef (27.38) versus milk (12.93).

In the year 2014, the bovine herds totallized 83.4 million heads in EU-28, and almost half of these (47%) came from three member states (France 22%, Germany 14% and United Kingdom 11%). Romania is on the 10th position among the EU-28 member states, with a total number of 2.1 million bovine heads.

Analyzing the evolution of total bovine herds and of the number of cows and heifers in Romania in the period 2005-2014, we can notice the same stabilization of this number after 2011, like in the case of production (Figure 2).

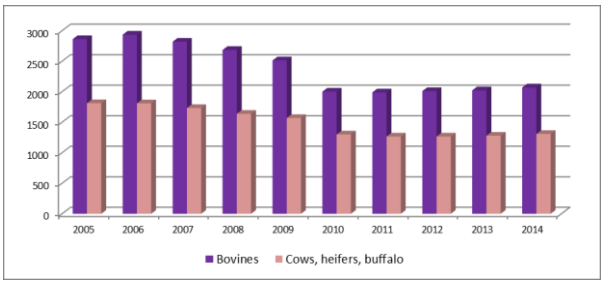

Fig. 2. Evolution of total bovine herds and of cows, heifers and buffalo cows herds – thousand heads
Source: National Institute of Statistics – Tempo online

The milk sector performance in Romania is also affected by its excessive fragmentation. Thus, in the year 2014, the average farm size was 2.14 heads/farm, and 52 % of the total number of dairy cows is found on very small-sized farms with 1-2 heads. Out of the total 655541 farms, 84.4 % (553531) have 1-2 cow heads and only 2042 farms (0.16 %) are considered professional farms that deliver milk directly to the dairy factories (Fig. 3).

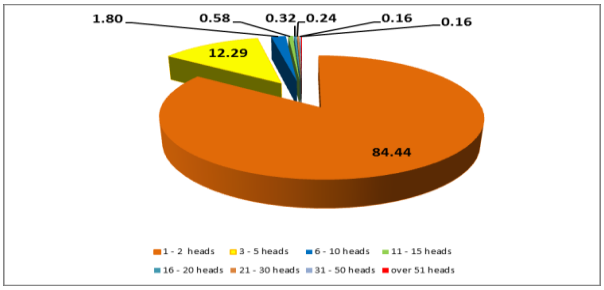

Fig. 3. Structure of cow, buffalo cow and heifer farms – 2014, %
Source: MARD [9]

Even though the total number of farms was down by 38% compared to their number in 2007, the number of the small, non-performant farms has remained quite high,

which reflects the persistent subsistence and semi-subsistence phenomenon in the dairy sector in Romania, as main factor hindering competitiveness growth. On a comparative basis, the average dairy cow farm size is 35 heads in Italy, 46 heads in Germany, 45 heads in France, 58 heads in Ireland, 75 heads in Netherlands or 6 heads in Poland.

Similarly to the milk sector, the sector of young cattle raising and fattening is also extremely **fragmented**.

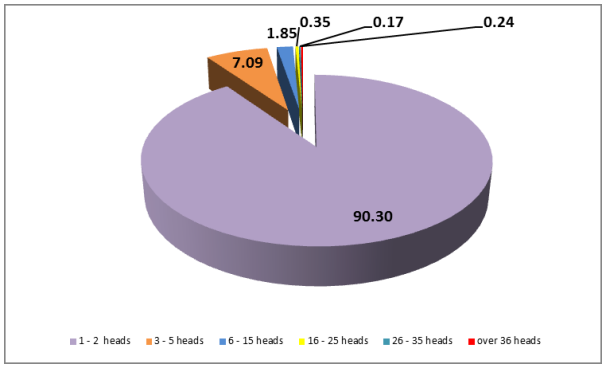

Fig. 4. Structure of farms raising and fattening young cattle – 2014, %
Source: MARD [9]

Thus, out of the total number of 171288 farms, in the year 2014, 90.3% had 1-2 heads; 60.7% of the young cattle herds can be found on these farms (Fig. 4).

CONCLUSIONS

A different volatility of beef (27.38) can be noticed compared to cow milk volatility (12.93).

The calculation of variation coefficient for live weight meat production in all species, in the period 2005-2014, reveals that the highest variation coefficient (and the highest production volatility) has been found in beef (27.38), followed by poultry meat (9.70), pork (6.19) and sheep and goat meat (4.25). This situation can be explained by the fact that in the above-mentioned period, the beef procurement price almost doubled, from 3.1 RON/kg (January 2005) to 5.94 RON/kg (December 2014).

Having in view the self-sufficiency level, in the year 2013, i.e. 92% for beef and 94% in milk, which reveals a chronic deficit in covering the consumption needs for these products, the paper has tried to identify new opportunities for beef and milk production relaunching, while having in view the support provided to the bovine raising sector under the NRDP 2014-2020 measures, i.e. the *de minimis* aid for the procurement of heifers from specialized breeds (measure launched in the year 2014), *de minimis* aid for the procurement of milk cooling tanks (measure launched in 2013), national transitory aids, the coupled support scheme in the bovine species for the beef and milk sector (for the period 2015 - 2020), which adds to the support under NRDP 2014-2020 measures for improving the general performance of farms (Investments on agricultural holdings), improvement of small-sized farm management and increase of market orientation (Support to the development of small farms), increase of the number of young farmers who set up for the first time an agricultural holding as head of the holding (Support to setting up of young farmers).

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STUDY ON TOURISM PLANNING IN PRAHOVA COUNTY BY TOURIST TRAFFIC ANALYSIS

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Abstract

According to some assessments related to imaging in tourism can conclude that tourist satisfied, satisfied where he spent the holiday by sending information, their value can influence other five potential tourists to spend in the future vacation stay on site, while unhappy with the quality of tourist services especially tourism staff, ten influence potential tourists. Tourism can provide an important component of a strategy for community development and economic development in an area. If an area has natural attractions important, certain historical sites or cultural, sports, facilities for special events and other similar goods, the tourist promotion of an area can attract more visitors, potential tourists in the community who will spend time and spend money to access these benefits. To better promote the county Prahova and existing attractions in the area, we performed an analysis of tourist traffic on tourism demand and supply by calculating the most representative tourism indicators: average daily number of tourists, number of overnight stays, average length of stay, tourist traffic density and the coefficient of utilization of the accommodation capacity and other indicators features. The statistics were taken from NIS, Statistical Yearbook of Bucharest and Prahova and statistically processed and interpreted.

Key words: *touristic attractiveness, tourism indicators, tourist movement,*

INTRODUCTION

Basic services are the tourism accommodation, food, treatment and sports. They have a decisive role in the movement and stay of tourists. Therefore, an overnight accommodation and leisure tourist ensures a certain period of time, determined on the basis of prices that vary depending on comfort and season [1].

Tourism could be developed in an area only if there are enough possibilities for accommodation and leisure visitors. Regardless of time and degree of comfort, accommodation is an essential element in ensuring the conditions for a comfortable stay for tourists arriving in resort and for other participants. Generally, housing in its structure [2]:

-commercial component: hotel, restaurant;

-non-commercial sector: second homes, accommodation offered by the educational system, religious groups.

Based on Prahova Valley accommodation includes classical forms (villas and hotels), but also modern forms (inns, tourist stops, cottages, camping sites, holiday camps, cottages, guesthouses) [3].

The county Prahova intersect the parallel of 45 ° latitude and the meridian of longitude 26o East, a point located near Ploiesti, in Blejoi locality. The total area of Prahova County is 4,716 km^2, which represents about 2% of the country.

Located in the southern Carpathians, Prahova County is conducted NNW-SSE direction, being limited to the north of Braşov County, east of Buzău county, west and south of the county of Dâmboviţa and Ialomiţa county Ilfov County [4]. It is crossed by the parallel 45 ° and 26 ° meridian.

Ploiesti is the county seat. Other urban centers are: the Municipality Câmpina and the towns: Azuga, Logs, Sinaia, Comarnic, Breaza, Băicoi, Boldeşti- Scăieni, Urlaţi, Mizil, Slănic Plopeni and Vălenii de Munte [12].

Opportunities for development of tourism activity are determined both by tourism potential and geographical position of the county, which is crossed by European road

E60 and a dense network of roads, Ploiesti is situated at the crossroads of numerous links directions north-south (Bucharest - Ploiesti - Braşov, Bucharest - Ploieşti - Vălenii de Munte - Săcele) and east - west (Buzău - Ploieşti - Târgovişte). Also electrified double track Bucharest - Braşov and the proximity of the capital county ensures a very high accessibility [3].

Prahova county tourist accommodation units are concentrated in the Prahova Valley (Sinaia and logs cities hold 58% of the total accommodation places) and in the city of Ploieşti. The accommodation area and Slănic Prahova Teleajen are underrepresented, are located mainly in Slănic Prahova localities, and key Măneciu (12% of total seats).

In terms of tourist arrivals it is not their constant evolution, presenting important variations over the past few years.

MATERIALS AND METHODS

This paper is based on an analysis of tourism demand and supply in Prahova County, the degree of capitalization of the tourist mountain areas in Romania. The study conducted research consists of studying and analyzing statistical data on tourist traffic in this county tourist density relative to the number of inhabitants and county area.

The objective of this study is analysis of tourist traffic in Prahova County, so we can determine whether promotion and tourist services can be improved. To carry out this research, we used a series of documents provided by Prahova County Council for Tourism, as well as statistics on the number of tourists in the area made available by the National Institute of Statistics.

For tourist traffic analysis we calculated the following indicators of tourism demand and supply at the county level, namely: *Index of global tourist demand change, Index of domestic and foreign demand variation in time, Indicator of total accommodation capacity evolution, Index of global tourist demand distribution, Index of customer evolution, Index of overnight stay evolution, The evolution of the average length of stay, The evolution of the average length of stay, Customer occupancy indicator, The monthly concentration coefficient, Tourist density indicator in relation to population density and Tourist density indicator in relation.* Analysis and interpretation of these indicators of tourist traffic helps us see which is the development of tourism in Prahova County and what strategies and planning of tourism development may be taken in this area.

RESULTS AND DISCUSSIONS

Tourism demand and supply indicators in the County Prahova

Table 1. Indicators regarding tourism demand and supply in the Prahova County

Indicators	2009	2010	2011	2012	2013
No. total Overnights	816,753	799,048	839,230	909,557	876,902
No. Total Overnights Romanian	683,922	664,127	693,296	762,198	747,857
No. Total foreign Overnights	132,831	134,921	145,934	147,359	129,045
Nr. Romanian tourists	285,505	273,433	290,331	324,333	317,693
No. Foreign tourists	44,169	45,377	45,645	48,111	48,583
No. total tourists	329,674	318,810	335,976	372,444	366,276
No. Total accommodation places in hostels in the Prahova County	1,392	1,397	1,648	1,607	1,897
No. Total places in the Prahova County	9,465	9,906	10,319	11,114	12,044
Population in Prahova County	836,146	833,823	830,370	826,511	821,879
Prahova County Area (km^2)	4,716	4,716	4,716	4,716	4,716

Source: Statistical Yearbook of the County Prahova, INSSE, Bucharest, www.insse. [11, 13, 15]

We analyzed the following indicators of tourism demand and supply:

1). ***Index of global tourist demand change*****:**
Ct = (No. Overnights current year / no. Overnights previous year) * 100

$$\Delta CG_{0-i} = \frac{CG_i}{CG_0} \cdot 100 \text{ [5,6,7]}$$

The calculations above we can see that tourism demand has exceeded 100% in 2011 and 2012, with the exception of 2010 and 2013 when he suffered a decrease of approximately 3.5%. The maximum percentage increase is 10.85% in 2012.

Table 2. Index of global tourist demand

Indicators	2009	2010	2011	2012	2013
No. total tourists	329,674	318,810	335,976	372,444	366,276
ΔCG		96.70%	105.38%	110.85%	98.34%

Source: www.insse.ro and own processing

2. ***Index of (Romanian and foreign) demand variation in time***
Ici = [No. Romanian tourists per current year / (No. Romanian tourists + No. Foreign tourists) current year]*100
Ice = [No. Foreign tourists per current year / (No. Romanian tourists + No. Foreign tourists) current year]*100

$$\Delta CI_{0-i} = \frac{CI}{CG} \cdot 100;\ \Delta CE_{0-i} = \frac{CE}{CG} \cdot 100 \quad [5,6,7]$$

Table 3. Internal tourism demand

Indicators	2009	2010	2011	2012	2013
No Romanian tourists	285,505	273,433	290,331	324,333	317,693
Total tourists	329,674	318810	335,976	372444	366,276
ΔCI	86.602%	75.767%	86.414%	87.082%	86.736%

Source: www.insse.ro and own processing

Distribution of domestic tourism demand overall had a constant evolution in the period under review and stood at about 86%. Internal global tourism demand fell the most in 2010 (21%).

Table 4. International tourism demand

Indicators	2009	2010	2011	2012	2013
No. foreign tourists	44,169	45,377	45,645	48,111	48,583
No. total tourists	329,674	318,810	335,976	372,444	366,276
ΔCE	13.398%	14.233%	13.586%	12.918%	13.264%

Source: www.insse.ro and own processing

From the above analysis it can be seen that the highest number of tourists coming in Prahova county are Romanian. The number of foreigners is increasing in 2009-2013, but the distribution of foreign tourism demand has fluctuated in the period under review.

3. ***Index of (domestic and foreign) demand variation in time*:**
Ici = (No. Romanian tourists per current year / No. Romanian tourists per previous year)*100
Ice = (No. Foreign tourists per current year / No. Foreign tourists per previous year)*100

$$ICE_{0-i} = \frac{CE_i}{CE_0} \cdot 100 \quad ICI_{0-i} = \frac{CI_i}{CI_0} \cdot 100 \quad [5,6,7]$$

Internal tourism demand [8]:

Table 5.The indices of national tourism demand

Years	2009	2010	2011	2012	2013
No. Romanian tourists	285,505	273,433	2903,31	324,333	317,693
ICI		95,772%	106,180%	111,712%	97,953%

Source: www.insse.ro and own processing

Variation in demand for domestic tourism grew in 2012 by 11%, while between 2013 decreased by approximately 4%.

Foreign tourism demand:

Table 6. The indices of international tourism demand

Years	2009	2010	2011	2012	2013
No. foreign tourists	44,169	45,377	45,645	48,111	48,583
ICE		102.735%	100.591%	105.403%	100.981%

Source: www.insse.ro and own processing

Variation in demand for foreign tourism increased in 2012 by approximately 5%.

4. The ***average length of stay*** [9] for each accommodation facility, the number of days is replaced by the number of overnight stay registered in the accommodation records, as follows:

$$S_H = \frac{NH}{T} \text{ (days)} \quad [5,6,7]$$

where: NH - number of recorded overnight stay;
T - number of tourists arriving;
S_H - average stay in the hotel.

Total average stay = Nr. Total overnight stays (foreign + Romanian) / No. Total Tourists (Romanian + foreign)

Hotels

Table 7. Overnights and average stay in hotels

Indicators	2009	2010	2011	2012	2013
No. Total Overnights hotels / County	599,541	590,315	642,675	692,418	645,834
No. Total Tourists / County	329,674	318,810	335,976	372,444	366,276
S (travel days)	1.819	1.852	1.913	1.859	1.763

Source: www.insse.ro and own processing

The average stay in hotels recorded the highest value in 2011 (1.913 touristic days) and the lowest value in 2013 (1.763 touristic days)

Hostels

Table 8. Overnights and average stay in hostels

Indicators	2009	2010	2011	2012	2013
No. Total Overnights hostels / County	3,114	5,647	6,894	19,606	24,415
No. Total Tourists / County	329,674	318,810	335,976	372,444	366,276
S (travel days)	0.009	0.018	0.021	0.053	0.067

Source: www.insse.ro and own processing

The average stay in hotels recorded the highest value in 2013 (0.067 days of interest) and the lowest value in 2009 (0.009 days of interest).

Motels

Table 9. Overnights and average stay in motels

Indicators	2009	2010	2011	2012	2013
No. Total Overnights motels / County	38,101	41,092	32,429	34,863	27,836
No. Total Tourists / County	329,674	318,810	335,976	372,444	366,276
S (travel days)	0.116	0.129	0.097	0.094	0.076

Source: www.insse.ro and own processing

The average stay in motels recorded the highest value in 2010 (0.129 days of interest) and the lowest value in 2013 (0.076 days of interest).

Villas

Table 10. Overnights and average stay in villas

Indicators	2009	2010	2011	2012	2013
No. Total Overnights villas / County	42,630	46,418	40,881	38,869	50,407
No. Total Tourists / County	329,674	318,810	335,976	372,444	366,276
S (travel days)	0.129	0.146	0.122	0.104	0.138

Source: www.insse.ro and own processing

The average stay in the villas of the highest value recorded in 2010 (0.146 days of interest) and the lowest value in 2012 (0.104 days of interest).

Chalets

Table 11. Overnights and average stay in chalets

Indicators	2009	2010	2011	2012	2013
No. Total Overnights chalets / County	23,280	16,123	11,095	10,436	9,774
No. Total Tourists / County	329,674	318,810	335,976	372,444	366,276
S (travel days)	0.071	0.051	0.033	0.028	0.027

Source: www.insse.ro and own processing

The average stay per chalets the highest value recorded in 2009 (0.071 days of interest) and the lowest value in 2012 (0.028 days of interest).

Boarding houses

Table 12. Overnights and average stay in boarding houses

Indicators	2009	2010	2011	2012	2013
No. Total Overnights boarding houses / County	76,067	69,636	76,250	76,254	75,750
No. Total Tourists / County	329,674	318,810	335,976	372,444	366,276
S (travel days)	0.231	0.218	0.227	0.205	0.207

Source: www.insse.ro and own processing

The average stay in boarding houses recorded the highest value in 2009 (0.231 days of interest) and the lowest value in 2012 (0.205 days of interest).

Rural locations

Table 13. Overnights and average stay in rural locations

Indicators	2009	2010	2011	2012	2013
No. Total Overnights rural location / County	19,924	13,861	14,920	20,195	26,632
No. Total Tourists / County	329,674	318,810	335,976	372,444	366,276
S (travel days)	0.060	0.043	0.044	0.054	0.073

Source: www.insse.ro and own processing

The average stay in rural locations recorded the highest value in 2013 (0.073 days of

interest) and the lowest value in 2010 (0.043 days of interest).

5. Monthly traffic coefficient is calculated as a ratio between the number of tourists in month with maximum traffic *(LM)* and the number of tourists in month with minimum traffic *(lm)* [10]

$C_{monthly} = \frac{LM}{lm}$, where $C_{monthly} \geq 1$

C monthly : 40257/23466 = 1.715

Table 14. Monthly tourist traffic

Indicators	Month August 2013	Month April 2013
No. Total tourists/county	40,257	23,466
C monthly traffic	1.715	

Source: www.insse.ro and own processing

Monthly tourist traffic coefficient recorded a value of 1.715.

6. The monthly concentration coefficient is calculated by dividing the number of tourists recorded during the highest-traffic month by the total number of tourists during a year A_t.

Cc = [No. Tourists per each month / (No. Romanian tourists + No. Foreign tourists) per year of calculation]*100

$$C_c = \frac{LM}{A_t} \text{ [5,6,7]}$$

Table 15. The monthly concentration coefficient

Indicators / months of the year	Nr. total tourists / month	Nr. Total tourists / 2013	Cc
January	28,449	366,276	0.078
February	28,038	366,276	0.077
March	25,355	366,276	0.069
April	2,3446	366,276	0.064
May	29,678	366,276	0.081
June	31,086	366,276	0.085
July	33,793	366,276	0.092
August	40,257	366,276	0.110
September	32,279	366,276	0.088
October	30,943	366,276	0.084
November	30,719	366,276	0.084
December	29,460	366,276	0.080

Source: www.insse.ro and own processing

The Monthly concentration coefficient for each month had recorded the highest value in August with a value of 0.110 tourists, and in April recorded the lowest value of 0,064 tourists.

7. Share of hotel (B&B) capacity out of total accommodation capacity on County

$$Icc = \frac{LC}{LH} \cdot 100 \text{ [5,6,7]}$$

where: *LH* - Total number of accommodation places in the county;

LC - total capacity of accommodation in hostels / county;

Table 16. The share of hostels accommodation capacity in the total accommodation capacity

Indicators	2009	2010	2011	2012	2013
The total capacity of accommodation in hostels / county	1,392	1,397	1,648	1,607	1,897
The total capacity of accommodation / county	9,465	9,906	10,319	11,114	12,044
Icc	14.707%	14.103%	15.971%	14.459%	15.751%

Source: www.insse.ro and own processing

Accommodation capacity share of pensions in total accommodation capacity in the county, the highest value in 2011 and 2013 by about 16%.

8. Indicator of total accommodation capacity evolution between „0" and „i"

I_{LC} = (No. beds per current year / No beds per previous year)*100

$$\Delta LC_{0-i} = \frac{LC_i}{LC_0} \cdot 100 \text{ [5,6,7]}$$

Table 17. Local accommodation capacity indices

Indicators	2009	2010	2011	2012	2013
Total capacity accommodation/ county	9,465	9,906	10,319	11,114	12,044
ΔLC		104.659 %	104.169 %	107.704 %	108.368 %

Source: www.insse.ro and own processing

Total accommodation capacity grew by about 8% in 2013 no significant dips during this period from 2009 to 2013.

9. Index of overnight stay evolution:

I_N = (No. overnight stay per current year / No. overnight stay per previous year)*100

$$\Delta N = \frac{NH_i}{NH_0} \cdot 100 \text{ [5,6,7]}$$

Table 18. Indices of overnights stay

Indicators	2009	2010	2011	2012	2013
No. total overnight stay /County	816,753	799,048	839,230	909,557	876,902
ΔN		97.832%	105.029%	108.380%	96.410%

Source: www.insse.ro and own processing

Index evolution of overnight stays increased by about 8% in 2012, and in 2010 decreased by 3%.

10. Hotel occupancy indicator

Reflects the use of supply for a given period of time, i.e. hotel activity depending on its capacity [8,9,10]:

Cuc = [No. overnight stays (no. tourist days) / (No. beds * no. days running)] * 100

$$G_0 = \frac{NH \cdot 100}{LH \cdot Z} = \frac{NT \cdot S}{LH \cdot Z} \cdot 100 \text{ [5,6,7]}$$

where:
G_o - occupancy, percentage;
NH - number of overnight stays;
LH - number of beds in hotels;
Z - number of supply days = 365 days;
NT - number of tourists;
S - average length of stay.

Table 19. Hotel occupancy indicators

Indicators	2009	2010	2011	2012	2013
No. Total overnight stays / county	816,753	799,048	839,230	909,557	876,902
No. Total beds / county	9,465	9,906	10,319	11,114	12,044
No. travel days	365	365	365	366	365
Occupancy (%)	23.642%	22.099%	22.282%	22.360%	19.947%

Source: www.insse.ro and own processing

Hotel occupancy recorded in 2009-2013 decreases in occupancy from 23.6% in 2009 to 19.95% in 2013.

11. Tourist density indicator in relation to population density

$$D_{t_{i-0}} = \frac{T_{t_{i-0}}}{Population} \quad \textbf{(tourists/ no. inhabitants)}$$

[5,6,7]
where:
T_{i-0} *– no. total Romanian + foreign tourists;*
Pop - County population

Table 20. Tourist density

Indicators	2009	2010	2011	2012	2013
No. Total tourists / county	329,674	318,810	335,976	372,444	366,276
county population	836,146	833,823	830,370	826,511	821,879
Dt (tourists / No. Inhabitants)	0.394	0.382	0.405	0.451	0.446

Source: www.insse.ro and own processing

Tourist traffic density in relation to population recorded the highest value in 2013 (0.446 tourists / No. Inhabitants) and lowest value (0.0382 tourists / No. Inhabitants) was registered in 2010.

12. Tourist density indicator in relation to area

$$D_{t_{i-0}} = \frac{T_{t_{i-0}}}{Surface} \quad \textbf{(tourists/km}^2\textbf{)} \quad \text{[5,6,7]}$$

where:
T_{i-0} *– no. total Romanian + foreign tourists;*
S - town/village (county) area.

Table 21.Tourist density in relation to area

Indicators	2009	2010	2011	2012	2013
No. Total tourists / county	329,674	318,810	335,976	372,444	366,276
county area	4,716	4,716	4,716	4,716	4,716
Dt (tourists / km^2)	69.905	67.602	71.242	78.975	77.667

Source: www.insse.ro and own processing

Tourist traffic density in relation to surface county recorded the highest value in 2012 (78.97 Tourists / km^2) and the lowest value was recorded in 2010 (67.60 tourists / km^2).

CONCLUSIONS

Analysis of the situation in tourism revealed that Prahova County has a tourism potential outstanding in terms of variety, density and importance of both natural attractions and cultural goods, and tourism infrastructure special but big disparities between different tourist areas bounded across the county. Thus we can say:

A first conclusion is the fact that Prahova County has a huge tourism potential but is poorly capitalized.

Preserving cultural heritage could go hand in hand with tourism development, but careful

monitoring is needed to ensure the maintenance of high standards of conservation.

A second conclusion is related to poor promotion of tourism potential that, over the last twenty years has made sporadic times chaotic, without a spectacular result, only small temporary results. So, by promoting sustainable tourism fairs nationwide through media and promotional materials bear in mind this objective.

Tourism can be an important source of income to achieve, but it requires investment.

There is thus a circle in which revolve endlessly two important factors:

- Achieving quality in tourism services to attract visitors;
- Investment measure to have what attracts them.

If these factors are made, then we can say that tourism is a source of continuous income.

In this context, a third finding may be related to the behavior of the offering tourism services in terms of fairness and solicitude, it is crucial to create a positive image of the tourist destination.

Focusing primarily of tourism facilities in the Prahova Valley and capitalization insufficient potential they hold other tourist areas, decreased occupancy accommodation capacity and diversification and insufficient promotion of tourism are the main issues that are considered when setting targets for tourist arrangement of an area.

Given that tourism is considered that, as the economic activity can be one invigorating for the entire Romanian economy, I think this analytical study is just a response to the need of information that must travel to and from the tourism sector. A prime tourist area as the Prahova County comes to emphasize the need for such research and statistical analysis, just the desire to combine in a most effective tourism supply with demand.

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ANALYSIS OF THE TECHNICAL EFFICIENCY OF SNAIL FARMERS IN ABIA STATE, NIGERIA

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Abstract

Assessing the relative performance of the processes used in transforming given inputs into output is key to increasing agricultural productivity and enhancing food security and income. This study therefore examined the technical efficiency of snail farmers in Abia State, Nigeria. Simple random sampling technique was used in selecting the respondents used for the study. Primary data, collected using structured questionnaire were analyzed using descriptive statistical tools and maximum likelihood estimation procedure using the computer software frontier version 4.1. Results showed that the significant factors influencing output of the snail farmers were stock size, labour, feed and capital. The significant determinants of technical efficiency of the snail farmers were age of the farmer (P = 0.05), educational attainment (P = 0.05), farming experience (P = 0.01), extension contact (P = 0.05), and cooperative membership (p = 0.01). The result also showed that majority (52%) of the snail farmers have an efficiency of between 61 – 80%, with the least efficient and most efficient farmers having efficiencies of 41.6% and 99.9% respectively. The mean level of efficiency was 75.6%. It was recommended that in order to enhance the efficiency and thus productivity of snail farms, policies that would encourage the youths to go into farming should be put in place. In addition, educational and training programmes should be organized regularly for the farmers as well as strengthening the extension services delivery system to provide the farmers the needed information on improved farming practices and innovations.

Key words**:** *distribution, sources, snail farm, technical efficiency*

INTRODUCTION

Despite of the significant progresses made in the agriculture in the past decade, poverty and malnutrition continue to be major problems in Sub-Saharan Africa [21]. The [36] reported that Africa still lags far behind national overall economic growth, with per capita agricultural incomes expanding at less than 1 percent per year during 2000–09. [21] noted that in Sub-Saharan Africa, agricultural production increased to 12.3 percent of gross domestic product in 2009 and yet, 72.9 percent of the population live on less than US$2 per day, 27.5 percent consume inadequate calories, and 23.6 percent of children under five are underweight. Fostering agricultural growth is often seen as being central to development strategies aimed at reducing poverty and hunger in the region [34].

In Nigeria, the agricultural sector is of notable relevance in the country's economic development and growth. It has been described as the engine room for sustainable growth of Nigerian economy [31]. It contributes more than the 48% of the total annual GDP (gross domestic product), employs and provides over 80% of the food needs of the country [1]. Despite these notable roles, food insecurity ranks top most among the developmental challenges facing Nigeria [7]. According to [23], some 200 million or 28 percent of Africa's population are chronically hungry. Of note is the low intake of protein by most Nigerians. An average Nigeria diet contains 7gm/caput/day of animal protein as against the recommended intake of 28gm/caput/day for normal health [25, 13, 20]. This represents a gross shortfall of 70 percent and has predisposed many Nigeria to malnutritional disease.

The economic utility for animal protein supplies is best assessed by the ability of

species as a whole to produce consumable food protein. Snails as a species have an inherently high reproductive rate. Thus, [30] stated that the commercial production of snails can be seen as an honest approach towards realizing improved meat protein intake in Nigeria.

Snail meat (Congo meat) is high in protein, iron, calcium and phosphorus, but low in sodium, fat and cholesterol, and also contains almost all the amino acids needed by man [4, 11, 2, 6]. The major species of snail reared in the study area are *Archatina archatina* and *Archatina marginata*.

The protein content of snail meat to be 37-51% compared to that of a guinea pig (20.3%), poultry (18.3%), cattle, (17.5%) sheep (16.4%) and swine (14.5%). The iron content is 45-59mg/kg, low in fat (0.05-0.08%) in addition to containing almost all the amino acids needed for human nutrition, as reported by [12].

The non-edible parts, the visceral and the shell which represent at least 40% of the snail's weight can be recuperated for feeding monogastric animals. Substances from snail cause agglutination of certain bacteria. This could be of value against a variety of ailments like whooping cough [9]. Also the low fat content and low cholesterol level makes snails meat a good antidote for vascular diseases such as hypertension and heart attack. The shell of snail are used in production of buttons, ring, jewelleries and other ornaments and for decoration of walls.

It has been noted that increasing agricultural productivity can increase food availability and access as well as rural incomes as rural areas are home to 75 percent of Africa's population, most of whom count agriculture as their major source of income. As noted by [21], future sustainable agricultural growth in most countries will require a greater emphasis on productivity growth. One key way of ensuring productivity growth is through efficient utilization of inputs. With the difficulties encountered by farmers in developing countries for developing and adopting improved technologies due to resource poverty. [5] noted that efficiency has become a very significant factor in increasing productivity. The concept of efficiency is concerned with the relative performance of the processes used in transforming given inputs into outputs [15]. Technical efficiency shows to the ability of firms to employ the "best practice" in an industry so that not more than the necessary amount of a given sets of inputs is used in producing the "best level of output [8]. It is the ability of a farmer to achieve a given level of output from a minimum set of input. A farm firm is said to be technically efficient if it is producing maximum output from the minimum quantity of inputs, such as labour, capital and technology.

Given the above scenario, it has become pertinent and indeed imperative to analyze the current level and determinants of technical efficiency among snail farmers in Abia State, Nigeria. Thus, the study would guide policy makers in formulating appropriate policies aimed at raising the present level of efficiency, given the fact that efficiency of production is directly related to the overall productivity of the farm.

MATERIALS AND METHODS

Study area: The study was conducted in Abia State of Nigeria. Abia is a State in South Eastern Nigeria. It is located between latitude 4^{o} 40^{I} and 6^{o} 14^{I} North of the equator and longitudes 7^{o} 10^{I} and 8^{o} O^{1} East of the equator. Abia has a total land area of 5,243.7 km^2, approximately 5.8% of the land area of Nigeria. It has a total population of 2,833,999 inhabitants from the 2006 population census, with a population density of 448.4/km^2 [24, 35]. It shares common boundaries to the North with Ebonyi State; to the South and Southwest with Rivers State; and to the East and Southeast with Cross River and Akwa Ibom States respectively. To the West is Imo State and to the Northwest is Anambara State. The State is made up of 17 Local Government Areas, divided into three agricultural zones namely: Ohafia, Umuahia and Aba Agricultural Zones. Agriculture is the major economic sector of the rural inhabitants.

Simple random sampling technique was adopted in selecting the samples used for the

study. The list of snail farmers in the State was collected from State Agricultural Development Programme. This was updated by including snail farmers whose names were not in the list. These farmers were got though the help of key informants during the pre-test of the survey instrument. The updated list formed the sampling frame from which a total of 100 snail farmers were selected randomly for the study.

Primary data was used for the study. The data were collected using structured questionnaires administered to the respondents. However, only 97 questionnaires were retrieved and 95 were found useful and used for the study. The data relates to the 2014 production season. Data collected were on inputs and output and their respective prices and on the socioeconomic characteristics of the respondents. Data analysis was by estimation of stochastic frontier production model.

Theoretical concept: Technical efficiency results when maximum output is obtained from a given combination of resources (ability to produce at the production frontier) [3]. A stochastic frontier production function is given as:

$$Yi = f(Xi; \beta) \exp. (Vi - Ui), i = 1, 2, \ldots, n \quad (1)$$

where Yi is the output of the i-th farm, Xi is the vector of input quantities used by the i-th farm, β is a vector of unknown parameters to be estimated, f( ) represent an appropriate function such as Cobb-Douglas, translog, etc; Vi is a symmetric error accounting for the effect of random variations in output due to factors beyond the control of the farmer e.g. weather, diseases outbreaks, measurement errors, etc. Vi is assumed to be independently and identically distributed as N (O, δv2) random variables independent of the Uis which is a non-negative random variable representing inefficiency in production relative to the stochastic frontier. The Uis are assumed to be non-negative truncations of the N (O, δv2) distribution (i.e. half normal distribution) or have exponential distribution. The stochastic frontier model was independently proposed by [22] and [3]. Its major advantage is that it provides numerical measures of technical efficiency. The technical efficiency of an individual farmer is defined in terms of the ratio of the observed output to the corresponding frontier output given the available technology.

$$\text{Technical efficiency (TE)} = Yi/Yi^* = f(Xi; \beta) \exp. (Vi - Ui)/ f(Xi; \beta) \exp. (Vi) = \exp(-Ui) \quad (2)$$

where Yi is the observed output and Yi* is the frontier output and other parameters were as previously defined. The parameters of the stochastic frontier models are estimated using the maximum likelihood techniques [3].

Empirical model

The production function of the snail farmers was assumed to be represented by a Cobb-Douglas stochastic frontier production function and was specified as follows:

$$\text{In}Y = \beta_0 + \beta_1 \text{In}\, X_1 + \beta_2 \text{In}\, X_2 + \beta_3 \text{In}\, X_3 + \beta_4 \text{In}\, X_4 + \beta_5 \text{In}\, X_5 + V_j - U_i \quad (3)$$

where In is the natural logarithm, β_0 is the intercept, β_1 to β_5 are the parameters estimated, Y is the value snails sold (naira), X_1 is the stock size (number), X_2 is labour in mandays, X_3 is cost of medication (naira), X_4 is feed (kg), X_5 is capital (made up of capital consumption allowance, interest charges, rent, etc) (naira), and other variables were as previously defined in equations (1) and (2).

In order to determine the factors contributing to technical efficiency, the following model was formulated and estimated jointly with the stochastic frontier production function in a single stage maximum likelihood estimation procedure using the computer software frontier version 4.1 [10]:

$$TE = a_0 + a_1Z_1 + a_2Z_2 + a_3Z_3 + a_4Z_4 + a_5Z_5 + a_6Z_6 + a_7Z_7 + a_8Z_8 + a_9Z_9 \quad (4)$$

where: TE_i is the technical efficiency of the i^{th} farmer, Z_1 is the age of the farmer (in years), Z_2 is gender (a dummy which takes the value of unity for male and zero for female) Z_3 is household size, Z_4 is farmer's level of education in years, Z_5 is years of farming experience, Z_6 is number of extension contact made by the farmer in a year, Z_7 is stock size (number), Z_7 is membership of farmers association or cooperative society (a dummy which takes the value of unity for members and zero if otherwise), Z_8 is access to credit (a dummy which takes the value of unity for

access and zero if otherwise), and a_1, a_2, a_3, ..., a_9 are regression parameters estimated. It was expected *a priori* that a_1 and a_2 would be negative while the others would be positive.

RESULTS AND DISCUSSIONS

Socioeconomic profile of the respondents

The socioeconomic characteristics of respondents are were summarized and presented in table 1. Table 1 showed that majority (69%) of the farmers were aged between 35 – 54 years of age. The mean age of the snail farmers was 45.6 years. This implies that the farmers are still reasonably energetic to cope with the daily demands of snail farming. Also, more males are involved in snail farming than females.

Table 1. Socioeconomic characteristic of the respondents

Socioeconomic factor	Frequency	Percentage	Mean
Age			
25 – 34	12	12.63	
35 – 44	27	28.42	
45 – 54	42	44.21	
55 – 64	14	14.74	45.6
Gender			
Male	58	61.05	
Female	37	38.95	
Marital status			
Single	16	16.84	
Married	57	60.00	
Widowed	22	23.16	
Educational attainment			
Primary	22	23.16	
Secondary	36	37.89	
Tertiary	37	38.95	
Household size			
1-3	14	14.74	6
4-6	50	52.63	
7-9	31	32.63	
Farming experience			
1-3	29	30.53	5
4-6	38	40.00	
7-9	19	20.00	
10-12	9	9.43	
Membership of cooperative			
Member	46	48.42	
Non-member	49	51.58	
Extension contacts			
Had contact	50	52.63	
Had no contact	45	47.37	

Source: Field Survey data, 2014.

Table 1 showed that 60% of the respondents were married. This implies that the households were stable. The educational distribution of the respondents showed that the snail farmers were literate. This is desirable because according to [29], the level of education of a farmer not only increases his farm productivity but also enhances his ability to understand and evaluate new production techniques. This is given the fact that snail farming requires skills.

The mean household size of the respondents was 6 person per household. This posit positive implications for increased snail productivity as households rely more on members of their households than hired workers for labour on their farms. The result showed that the mean farming experience was 5 years. This means that commercial snail farming is relatively being embraced of recent in the area. According to [15, 17] and [27], the number of years a farmer has spent in the farming business may give an indication of the practical knowledge he has acquired on how he can overcome certain inherent farm production problems.

About 48.42% of the respondents were members of cooperative/farmers association while 52.63% had extension technical services. [16] noted that as change agents, extension workers serve as channels for diffusion of technical innovations.

Technical efficiency of Snail farmers

The maximum likelihood (ML) estimates of the Cobb-Douglas production function of the snail farmers is summarized and presented in Table 2. The estimated variance (δ^2) for these snail farmers is statistically significant at 1 percent indicating the goodness of fit and correctness of the specified distribution assumption of the composite error. Gamma (γ) being 0.602 is statistically significant at 1 percent. These imply that 60.2 percent of the variations in value of output is due to technical efficiency. The coefficients of stock size, labour, feed and capital were all statistically significant at 1% level of significance.

Table 2. Production function of the snail farmers

Variable	Parameter	Coefficient	t - ratio
Intercept	$\beta 1$	0.497	5.885***
Stock size	$\beta 2$	0.337	18.897***
Labour	$\beta 3$	0.001	-3.040***
Medication	4	0.004	0.252
Feed	5	0.032	3.195***
Capital	7	0.038	2.758***
Diagnostic statistics			
Sigma squared	δ^2	0.477	5.748***
Gamma	γ	0.602	5.162***
Likelihood function		47.414	

Source: computed from Frontier 4.1 MLE/Survey data, 2014
Note: *** indicates statistically significant at 1% level of significance.

The coefficient of stock size was positively signed, showing a direct relationship with output. This implies that output increases as the size of stock increases. On the other hand labour was negatively signed indicating an inverse relationship with output. Labour here refers to the available human effort for use in snail production. The negative relationship between labour and output may have resulted due to increased use of labour beyond the point of economic optimum (that is, to the point of its diminishing returns). This may be the case when labour is supplied by members of the household and therefore not paid for.

The coefficients of feed and capital were both positively signed indicating that increase in these variables, ceteris paribus, would lead to increase in output.

Sources of technical efficiency

The estimated determinants of technical efficiency of the snail farmers in Table 3. The coefficients education, farming experience, extension contact, and cooperative membership were significant and positive, while age was negative.

Table 3. Determinants of technical efficiency of the snail farmers

Variable	Parameter	Coefficient	T-ratio
Intercept	a_0	0.927	5.112***
Age	a_1	0.001	--2.460**
Gender	a_2	-0.007	-0.126
Household size	a_3	0.121	1.370
Years of education	a_4	0.040	2.440**
Experience	a_5	0.008	3.514***
Extension contact	a_6	0.148	2.003**
Stock size	a_7	-0.412	0.998
Cooperative membership	a_8	0.422	2.613***
Access to credit	a_9	0.001	1.110

Source: computed from Frontier 4.1 MLE/Survey data, 2014
Note: ***, **, and * indicates statistically significant at 1%, 5% and 10% level of significance respectively

The coefficient of age was significant at 5% and negatively related to technical efficiency. This implies that the efficiency of the snail farmers decreases as the farmer gets older. This result with respect to age is consistent with a priori expectation and [19], [17], [26], and [14]. [14] explained that the order a farmer becomes, the more he is unable to combine his resources in an optimal manner given the available technology . [18], [19] and [27] stated that the risk bearing abilities and innovativeness of a farmer, his mental capacity to cope with the daily challenges and demands of farm production activities and his ability to do manual work decrease with advancing age. This explains the negative relationship between age and technical efficiency. In this guise, the youth should be encouraged to take up farming generally and in particular snail farming so as to achieve the goal of increased agricultural productivity.

The coefficient of years of educational attainment was significant at 5% level of significance and negatively related to technical efficiency. This result is consistent with those of [19], [17], [33], and [32] and implies higher educational attainment enhances the efficiency of the farmers. According to [19] and [18], education increases the ability of the farmers to adopt agricultural innovation and hence improve their efficiency and productivity. Educating the farmers is of great importance as snail farming requires technical skills. Therefore, education and training programmes should be organized for these farmers to enable them acquire the necessary skills for the operations as snail farmers.

The coefficient of years of farming experience was significant at 1% level of significance and positively related to technical efficiency. This implies that the higher the experience of the farmer, the greater his efficiency. This result conforms to a priori expectations. According to [27], the number of years a farmer has spent in the business of farming may give an indication of the practical knowledge he has acquired on how to overcome certain inherent farm production problems. Also of note is the assertion that farmers will count a lot more on their farming experience for increased productivity and efficiency.

The coefficient of extension contact was significant at 1% level of significance and positively related to technical efficiency. This implies that increased extension contact increases technical efficiency. Extension services provide informal training that helps to unlock the natural talents and inherent enterprising qualities of the farmer, enhancing his ability to understand and evaluate new production techniques leading to increased

farm productivity and incomes with concomitant increase in the welfare of the farmer [28]. [17] stated that farmers' interactions with extension agents would help them to receive and synthesize new information on economic activities in his locality and beyond.

The coefficient of cooperative membership was significant at 1% level of significant at positively related to the technical efficiency of the snail farmers. This implies that farmers who belong to cooperatives/farmers association has higher efficiency than non-members. Cooperative societies/ farmers' associations are sources of good quality inputs, labour, credit, information and organized marketing of products. According to [32], members of cooperative societies have enhanced ability to adopt innovations than non-members.

Distribution of technical efficiency for the snail farmers

The frequency distribution of the technical efficiency of the snail farmers is summarized and presented in Table 4. According to the Table, the individual technical efficiency indices ranges from 0.416 to 0.999 with a mean of 0.756. Majority (52%) of the snail farmers have efficiency of between 61 – 80%. The level of technical efficiency obtained in this study suggests that ample opportunities exist for the snail farmer to improve on their efficiency and hence productivity and income

Table 4. Technical efficiency distribution for the snail farmers

Range of efficiency	Frequency	Percentage
0.41 – 0.60	14	14.74
0.61 – 0.80	52	54.75
0.81 – 1.00	29	29.00
Minimum efficiency	0.416	
Maximum efficiency	0.999	
Mean efficiency	0.756	

Source: computed from Frontier 4.1 MLE/Survey data, 2014

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ANALYSIS OF FACTORS INFLUENCING THE ADOPTION OF CLIMATE CHANGE MITIGATING MEASURES BY SMALLHOLDER FARMERS IN IMO STATE, NIGERIA

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Abstract

Due to its significant reliance on weather patterns, as well as other environmental factors, agricultural production is particularly vulnerable to changes in climate. Adoption of climate change mitigating strategies are key to coping and building resilience against the vagaries of climate change and hence, increasing agricultural poverty, and lifting rural smallholder farmers out of poverty and food insecurity. This study analyzed the factors influencing the adoption of climate change mitigating measures by smallholder farmers in Imo State, Nigeria. Multi-stage sampling technique was used is selecting 60 respondents were used for the study. Primary data, collected using structured questionnaire, were analyzed using descriptive and inferential statistical tools such as frequency counts and percentages, mean, likert scale type analysis and probit regression. Results showed that unusual early rains followed by weeks of dryness, high temperature, incidence of diseases, heavy rainfall, decrease in soil fertility, increase in pest problems, erratic rainfall pattern, loss of forest resources, reduced harmattan, flooding, soil erosion, heavy winds, thunderstorms, heavy and long period of rainfall, weed infestation, overflowing of rivers and streams, and extinction of some crop species were some of the major effects or manifestations of climate change and they have severe effect on crop production. Also, climate change mitigation measures mostly adopted by the farmers were drainage/flood barrier construction, multiple cropping, mulching, use of improved varieties of crops, change of planting date, irrigation of crops, planting of cover crops, and tree planting. The probit regression showed that the significant variables influencing adoption of climate change mitigation measures were age of the farmer, farming experience, tenancy status, years of education, extension contact, income, access to credit and membership of farmers' association. Education and training of farmers especially as it pertains adoption of good agricultural practices was recommended, as well as the provision of credit to enable them adopt mitigation measures to climate change.

Key words**:** *adoption, change, climate, farmers, mitigation*

INTRODUCTION

The natural environment comprises the entire basis for food production through water, nutrients, soils, climate, weather and insects for pollination and controlling infestations. [13] noted that most adverse climatic and environmental impacts that occur today are manifestations of man's inadvertent modification to climate on a local and to a limited extent, regional scale in some activities of the distant past. [2] reported that agriculture places heavy burden on the environment in the process of providing humanity with food and fibre, while climate is the primary determinant of agricultural productivity.

Due to its significant reliance on weather patterns, as well as other environmental factors, agricultural production is particularly vulnerable to changes in climate. Some 40 percent of the Earth's land surface is under cropland and pasture, while natural forests cover another 30 percent.4 Emissions from agricultural activities represent [16]. Climate change has direct impact on agricultural production, because of the climate-dependent nature of agricultural systems. Global food insecurity remains a serious problem and more than 900 million people are still hungry in 2010 [5]. Poverty and malnutrition continue to be major problems in Sub-Saharan Africa. In most countries, future sustainable agricultural growth will require a greater

emphasis on productivity growth, as suitable area for new cultivation declines, particularly given growing concerns about deforestation and climate change.

According to [13], climate and environmental change processes lead to changes in the biophysical life support system including land surface (vegetation), water resources, soil, and atmosphere which constitute the elements that support the long-term sustainability of life on earth. Projected changes in the frequecy and severity of extreme climatic events are prdicted to have serious consequences for food and food security than changes in projected mean temperatures and precipitation [16].

Climate change exerts multiple stresses on the biophysical as well as the social and institutional environments that underpin agricultural production [17]. [18] classified the patterns of impact of climate change on agriculture into biophysical and socio-economic impact. The biophysical impacts include; physiological effects on crop and livestock, change in land, soil and water resources, increased weed and pest challenges, shifts in spatial and temporal distribution of impacts, sea level rise and changes to ocean salinity and sea temperature rise causing fish to inhabit in different ranges. The socio-economic impacts result in decline in yield and production, reduced marginal GDP from agriculture, fluctuation in world market price, changes in geographical distribution of trade regime, increased number of people at risk of hunger and food insecurity, migration and civil unrest. According to [3], climate change is further exacerbating people's vulnerability with its negative impacts on public health, food security, water availability or livelihoods, and its consequences in terms of human mobility. In general terms, the most vulnerable groups such as the children, the elderly, and the extreme poor tend to bear the brunt of environmental impacts.

Africa's climate change challenges are enormous [34] as it is arguably the most vulnerable region in the world to the impacts of climate change**.** For instance, a 2011 report from the National Adaptation, Strategies and Plan of Action on Climate Change for Nigeria (NASPA-CCN) stated that climate change is already having significant impacts in Nigeria, and these impacts are expected to increase in the future. Recent estimates suggest that, in the absence of adaptation, climate change could result in a loss of between 2% and 11% of Nigeria's GDP by 2020, rising to between 6% and 30% by the year 2050. This loss is equivalent to between ₦15 trillion and ₦69 trillion.

[36] noted that the vulnerability of agriculture is not determined by the nature and magnitude of environmental stress like climate change per se, but by the combination of the societal capacity to cope with and/or recover from environmental change. The awareness of climate problems and the potential benefits of taking action is important determinant of adoption of climate change mitigating measures [8]. [22] argued that farmer awareness of change in climate attributes (temperature and precipitation) is important to adaptation decision making. Innovation adoption is key to increasing farm productivity. Adoption of climate change mitigating strategies are key to coping and building resilience against the vagaries of climate change. This study there examined the factors influencing the adoption of climate change mitigating measures by smallholder farmers in Imo State, Nigeria.

MATERIALS AND METHODS

This study was conducted in Imo State of Nigeria. Imo State lies within latitudes 4^{o} 45^{I} and $7^{0}15^{1}$ North of the Equator and longitudes $6^{o}50^{I}$ and $7^{0}25^{I}$ East of the Greenwich Meridian. It occupies a land area of 5,530Km^2 (2,140 m^2) and comprises of 27 local government areas, divided into three agricultural zones, namely Owerri, Okigwe and Orlu. Imo has a total population of 3,934,899 [24] and has an average population density of 710/km^2 (1,800/m^2). The effects of population pressure in the area have been recognized in a broad spectrum of livelihood activities such as intensive agriculture, engagement in non-farm activities and migration. The State is part of the southeast

Nigeria, which is particularly vulnerable to ecological problems, especially soil erosion in all forms [28, 30].

Multi-stage sampling technique was used is selecting the samples used for the study. One Agricultural Zone, Owerri Agricultural Zone, out of the 3 in the State was randomly selected in the first stage. In the second stage, 2 Local Government Areas (LGA) were selected randomly. The third stage involved the random selection 2 farming communities from the list of farming communities in each selected LGA. In the final stage, 15 crop farmers were randomly selected from the list of crop farmers in each chosen community. In all, 60 respondents were used for the study.

Primary data was used for the study. Data collection was through the use of structured questionnaire designed to elicit information on status of awareness of climate change and its link with agriculture, crops grown, land use practices that could exacerbate climate change, effects of climate change on the farmers' farm activities, their coping strategies, estimated costs and returns of these strategies, problems encountered in coping with climate change, etc.

Data collected were analyzed using descriptive statistical tools such as frequency counts, percentages, means, etc. and inferential statistical tools. The probit model was estimated for the factors influencing the adoption of climate change mitigation strategies and is specified as follows:

$$P(Yi = 1/\chi) = \Phi(\chi' \beta) = \exp(-z2/2)dz \quad (1)$$

Where P is the probability that the ith household used the new technology, and 0 otherwise.

The probit model is generated by a simple latent model of the form,

$$Y^* = \chi' \beta + \varepsilon \quad (2)$$

Where $x|\varepsilon$ is a normally distributed error term; Y is the index of use of technologies/innovation measured as Y = (U/V)*100, where U is the participatory score of the respondent household on the number of technologies/innovations adopted and V is the overall score of all the innovations available. (NB: households with adoption index < 50% are regarded as non-adopters, and households with index ≥ 50% are regarded as adopters).

X is a vector of explanatory variables such as age of farmer (years); gender (dummy: male = 1, female = 0), farming experience (years); tenancy status (dummy: owner occupier = 1, tenant farmer = 0); years of educational attainment; extension contact (dummy: 1 if the farmer was visited by extension agents in the last cropping season, and 0 if otherwise); farm size (hectare); income (naira); access to credit (amount of credit obtained (naira), and membership to an agricultural association/cooperative society (dummy: member = 1; non-member = 0).

RESULTS AND DISCUSSIONS

Perceived patterns of effect of climate change on weather elements and the environment

The perceived patterns of effect on climate change on weather elements and the environment is presented in Table 1.

The result in Table 1 showed that unusual early rains followed by weeks of dryness, high temperature, incidence of diseases, heavy rainfall, decrease in soil fertility, increase in pest problems, erratic rainfall pattern, loss of forest resources, reduced harmattan, flooding, soil erosion, heavy winds, thunderstorms, heavy and long period of rainfall, weed infestation, overflowing of rivers and streams, and extinction of some crop species are some of the major effects or manifestations of climate change.

Agricultural production is highly sensitive to climate variability and weather extremes as stated in Table 1.

As noted by [31], climate variability is one of the major challenges facing agricultural production systems and has become one of the critical determinants of agricultural output especially in developing countries where rain fed agriculture is predominantly practiced with heavy dependence on climatic resources and labour.

[23] observed that seasonal changes in rainfall

and temperature, which are features of climate change could impact agro-climatic conditions, altering growing seasons, planting and harvesting calendars, water availability, pest, weed and disease populations.

[32] noted that agricultural production is particularly vulnerable to irregular or extreme conditions of climate such as more frequent droughts and deviations from "normal" growing season conditions.

Variability in climate variables, as noted by [35], will also interact with other forms of stress associated with agricultural production and affect crop yield and productivity in different ways, depending on the type of agricultural practices and systems in place.

Variations in climatic factors are directly linked with reduced soil productivity and to a higher incidence of pests and diseases. According to [14], poor yield and drought are brought about as a result of delayed onset of rainy season as the vegetative cover of soils withers and the soil become exposed to the vagaries of weather.

With heavy rains and the associated heavy leaching, the soil become eroded and rendered infertile leading to low productivity.

Using a five point Likert scale, the severity of the effects of these changes on the elements of weather and climate and the environment was tested.

The critical mean was 3 and any mean score that was greater than or equal to 3 is regarded as being severe and otherwise if less than 3. The result showed a grand mean of 3.72 indicating that the observed changes in climate variables had severe effect on agricultural production based on the perception of the farmers.

[4], noted the usual features of climate change as affect the volume, quality, quantity, stability of food production and the natural environment in which agriculture takes place.

[18] also noted that heat stress might affect the whole physiological development, maturation and finally reduces the yield of cultivated crop.

Table 1. Perceived patterns of effect of climate change on weather elements and the environment

Climate change phenomena	"Yes" response		"No" response		Mean score	SOE
	Freq.	%	Freq.	%		
Unusual early rains that are followed by weeks of dryness	60	100.0	0	0.0	4.75	S
Erratic rainfall pattern	55	91.7	5	8.3	4.38	S
Delay in the onset of rain	39	65.0	21	35.0	3.55	S
Long period of dry season	40	66.7	20	33.3	3.55	S
Heavy and long period of rainfall	45	75.0	15	25.0	3.93	S
Less rainfall	20	33.3	60	66.7	2.67	NS
No harmattan	25	41.7	35	58.3	2.70	NS
Reduced harmattan	47	78.3	13	21.7	3.70	S
Long period of harmattan	28	46.7	32	53.3	2.98	NS
Higher temperature	57	95.0	3	5.0	4.90	S
Thunderstorms	42	70.0	18	30.0	3.85	S
Heavy winds	47	78.3	13	21.7	4.02	S
Flooding	50	83.3	10	16.7	4.13	S
Drought	24	40.0	36	60.0	2.90	S
Loss of forest resources	48	80.0	12	20.0	3.85	NS
Heat waves/high temperature	40	66.7	20	33.3	3.48	S
Heavy rainfall	54	90.0	6	10.0	4.10	S
Desertification	18	30.0	42	70.0	2.50	S
Soil erosion	51	85.0	9	15.0	4.05	S
Decrease in soil moisture	34	56.7	26	43.3	3.05	S
Increase in pest problems	48	80.0	12	20.0	4.15	S
Disease incidence	57	95.0	3	5.0	4.40	S
Decrease in soil fertility	51	85.0	9	15.0	4.10	S
Weed infestation	46	76.7	14	23.3	4.00	S
Drying up of streams	33	55.0	27	45.0	3.20	S
Overflowing of streams/rivers	42	70.0	18	30.0	3.65	S
Extinction of some crop species	42	70.0	18	30.0	3.90	S
Grand Mean					3.72	S

Source: Field Survey, 2015.
SOE = severity of effect, S = severe, NS = not severe

Climate change mitigation measures adopted by the farmers

The distribution of the respondents based on climate change mitigation measures adopted is presented in Table 2. Multiple responses were recorded. The result showed that the climate change mitigation measures mostly adopted by the farmers were drainage/flood barrier construction, multiple cropping, mulching, use of improved varieties of crops, change of planting date, irrigation of crops, planting of cover crops, and tree planting. Agroforestry and planting of vertiver grass were the least adopted measures.

Drainage construction/flood barrier (contour ploughing) help in erosion control by controlling run off resulting from rainfall. Multiple cropping which was adopted by all the farmers protect the farms from risk of total crop failure due to the vagaries of climate change. That explained it adoption as a climate change mitigation measure by all the respondents. The result is consistent with the report of [1].

The use of mulching as a mitigation measure against the effect of climate change help decrease water requirements and increase

water retention (reduced evapotranspiration); lower emissions due to reduced herbicide use for weed removal; increased capture and sequestering of CO2 and carbon into soils; reduced herbicide input costs; reduced soil-borne pathogen infection of plants, with resultant increased yields and quality; and reduced "drudgery" of hand weeding [6].

According to [6] and [37], the use of zero/minimum tillage has the beneficial effect of reducing soil erosion during severe rainfall; improved water absorption capacity; reduced release of carbon and organic matter stored in soils; reduced use of fossil fuels for plowing; improved profit margins due to reduction or elimination of tilling and plowing expenses.

It has been noted worldwide that farmers have already experienced an increase in the frequency and severity of droughts, floods, and other extreme weather events, and they have shown that adoption of basic agronomic techniques can reduce losses from these events (particularly short-duration events such as flash flooding). For drought conditions, these include mulching and contouring to retain and increase soil moisture, and more efficient irrigation methods that conserve water. For floods and heavy flash rains, mitigation measures include raised beds or contouring to divert heavy flows from plants and reduce soil erosion.

Table 2. Climate change mitigation measures adopted by the farmers

Mitigation measure	Frequency*	Percentage
Drainage construction/flood barriers	60	100.00
Planting of cover crops	37	61.67
Mulching	54	90.00
Crop rotation	28	46.67
Multiple cropping	60	100.00
Use of improved varieties of crops	52	86.67
Change of planting date	47	78.33
Irrigation	40	66.67
Tree planting/Afforestation	32	53.33
Planting of grasses (vertivar grass)	25	41.67
Zero/minimum tillage	29	48.33
Agroforestry	20	33.33

Source: Field Survey, 2015.
* Multiple responses

Factors influencing adoption of climate change mitigation measures

The probit regression estimates of the factors influencing the adoption of climate change mitigation measures is presented in Table 3. The coefficient of determination (R^2) was 0.8958 which implies that 89.58% of the variations in adoption of climate change mitigation measures were explained by the variables included in the estimated probit model. The likelihood ratio chi square was significant at 1% level of significance indicating the goodness-of-fit of the model. The significant variables influencing adoption of climate change mitigation measures were age of the farmer, farming experience, tenancy status, years of education, extension contact, income, access to credit and membership of farmers' association.

Table 3. Factors influencing adoption of climate change mitigation measures

Variable	Coefficient	Standard error	t-ratio
Intercept	3.865	1.002	3.86***
Age (X_1)	-1.943	0.905	-2.15**
Gender (X_2)	1.136	0.238	4.77***
Farming experience (X_3)	0.161	0.049	3.28***
Tenancy status (X_4)	5.122	1.048	4.89***
Years of education (X_5)	0.061	0.025	2.45**
Extension contact (X_6)	-0.005	0.001	-3.89***
Farm size (X_7)	0.002	0.002	1.16
Income (X_8)	0.1848	0.0766	2.41**
Access to credit (X_9)	0.050	0.014	3.67***
Membership of association (X_{10})	9.018	1.159	7.78***
R^2	0.8958		
Likelihood Ratio Chi^2	57.17		

Source: Field Survey (2015)
*** = significant at 1%, and ** = significant at 5%

The coefficient of age was significant at 1% level of probability and negatively related to adoption of climate change mitigation measures. This implies that the adoption of climate change mitigation measures strategies declines as the farmer gets older. This result is consistent with [12]. It has been noted that the older one becomes the more risk averse he/she is. This explains the negative relationship between adoption of new innovations and age.

The coefficient of gender was significant at 1% level of significant and positively related to adoption of climate change mitigation measures. This implies that adoption of climate change mitigation measures was higher for male farmers than their female counterparts. This result agree with those of [20], [12] and [27]. [12] opined that the higher rate of adoption by men has a bearing on the lopsidedness of extension services, the major means of innovation diffusion. [7] reported that few extension services are targeted at rural women, few of the world's extension agents are women and most of the extension services focus on commercial rather than

subsistence crops-the primary concern of women. Also, [29] and [25] noted that gender affects technology adoption since the head of household is the primary decision maker and men have more access to and control over vital production resources than women due to socio-cultural values and norms.

The coefficient of farming experience was significant at 1% and positively related to adoption of climate change mitigation measures. The result has some positive implications for increased agricultural productivity because according to [26] and [12], as the number of years a farmer has spent in the farming business may give an indication of the practical knowledge he has acquired on how he can overcome certain inherent farm production problems, which include the vagaries of climate change effect.

The coefficient of tenancy status of the farmer was significant at 1% level of significance and positively related to adoption of climate change mitigation measures. This implies that adoption of mitigation measures increases if the farmer is the owner of the farm land rather than a tenant farmer. [11] and [21] noted that insecure property rights over land reduce sharply the level of activity on the land as it serves as disincentive to farmers from investing meaningfully on the land since the land goes back to the owner after the cropping season. According to [33], land tenure and property rights affect the application of technologies for agricultural and natural resource management.

The coefficients of level of education and extension contact were significant at 5% and 1% level of probability respectively and positively related to adoption of climate change mitigation measures. This implies that the higher the level of education attained and number of contacts with extension services, the higher the adoption of climate change mitigation measures. According to [10], education increases the ability of the farmers to adopt agricultural innovation and hence improve their productivity and efficiency. On the other hand, extension services provide informal training that helps to unlock the natural talents and inherent enterprising qualities of the farmer, enhancing his ability to understand and evaluate and adopt new production techniques leading to increased farm productivity [10, 12].

The coefficients of income and access to credit significant at 5% and 1% probability level respectively and positively related to adoption of climate change mitigation measures. This implies that adoption increases with enhanced access to credit and increase in income. As noted by [9], [15] and [19], lack of fund and access to credit prohibits smallholder farmers from assuming risks of financial leverage associated with the adoption of new technology. This result is consistent with the findings of [12].

The coefficient of membership of farmers' association was positively signed and significant at 1% level. This implies increase rate of adoption of mitigation measures with cooperative membership. Membership of farmers' association/cooperative serve as sources of good quality inputs, labour, credit, information and organized marketing of products. They are expected to help them to receive and synthesize new information and innovations within his locality and beyond. These explain their significant and positive relationship with adoption of climate change mitigation measures.

CONCLUSIONS

It could be concluded from this study that the farmers were ample aware of the pattern of effect of climate change. This informs their adoption of climate change mitigation measures to reduce their severe effects. The study therefore, recommend education and training of farmers especially as it pertains adoption of good agricultural practices, a package of techniques that increase productivity on a sustainable basis by improving soil composition, reducing erosion, raising soil fertility and water-holding capacity, and creating a balanced ecology of microflora and fauna within the soil and crop environment; and provision of credit to enable them adopt mitigation measures to climate change.

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INFLUENCE OF DIFFERENT FACTORS ON SOME BIOMETRICAL TRAITS AT TRITICALE

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Abstract

Triticale is a cereal species obtained by crossing the wheat with rye, and therefore it has specific traits between those of the parental species. There are two important factors in establishing the resistance to plant lodging: the plant height and thickness of straw. These two traits with importance upon the plant lodging are determined by the plant genetics and are influenced, between some limits, by the environmental and technological factors. In this respect, the aim of the paper is to present the results obtained at different triticale varieties under different technological and climatic conditions regarding the biometrical traits plant height and straw thickness. The experimental data were obtained in field experiments located in South Romania. In the agricultural year 2012-2013, ten triticale varieties were studied. In the agricultural year 2013-2014, two triticale varieties were studied under three technological conditions: two preceding crops (sunflower and maize); two soil tillage (ploughing and harrowing); six nitrogen application variants (respectively 0+0+0, 40+40+40, 40+80+0, 0+40+80, 0+80+40, and 0+120+0 kg.ha^{-1}). For each triticale variant and replication and in each experimental year, there were measured the plant height and stem diameter at soil level. The obtained results showed that the plant height and straw thickness do not correlate each other according to the triticale variety. But, for a given triticale variety, the plant height correlates negatively with the straw thickness, according to the plant water supply, preceding crop and soil tillage. However, nitrogen application determined the increasing of both studied plant traits, respectively the plant height and the straw thickness, the effect being different according to the split nitrogen applications.

Key words**:** *environmental factors, plant height, straw thickness, technological factors, triticale, varieties*

INTRODUCTION

Triticale (X *Triticosecale* Wittmack) is a new species obtained through crossing the wheat with rye. The first wheat and rye cross occurred in Scotland in 1875, but the first fertile crosses were realised in Germany in 1888, and the name triticale was first used in literature in Germany in 1935 [4].

This new species was designed to combine the good quality and high yielding capacity which is specific for wheat with the tolerance to abiotic and biotic stress factors which is specific for rye [7, 12]. As a result, triticale has specific traits between those of wheat and rye. For instance, an important feature of triticale is the resistance to some unfavourable biotic and abiotic environmental factors and the capacity to produce good yield in marginal regions [11, 13].

The interest in triticale increases due to its unique combination of a number of economic characteristics, such as: high grain yield, significant amount of the accumulated protein with a high content of essential amino acids, primarily lysine, as well as high degree of adaptive capacity [3].

In Romania, in 1971 it was initiated the breeding program for triticale species at National Agricultural Research and Development Institute (NARDI) Fundulea [5]. The first Romanian triticale cultivar created at Fundulea was TF2, which was registered in 1984 [10].

The specific growing conditions from South Romania are favourable for triticale crop [6], this being used both for producing grain and biomass yields.

The biometrical characteristics of the plants are specific traits to each variety, these being determined by the plant genetics and being influenced, between some limits, by the environmental and technological factors.

The plant height is very important in terms of resistance to lodging [4]. Also, an important factor in establishing the resistance to lodging

is the thickness of straw, respectively the diameter of the stem.

In the NARDI Fundulea breeding programme, an important contribution in the yield improvement had the decrease of plant height from 128.8 cm to 114 cm (-0.871 cm/year), with favourable effects on the improvement of the lodging resistance [10]. The intensive triticale varieties with small plant height have better yielding performances than the extensive triticale varieties with high plant height [9].

Nitrogen fertiliser application at different plant stages has an essential effect on the height of stems [1]. Moreover, it is expected that also the other technological factors to have a certain influence on the biometric traits of the plant.

The aim of the paper is to present the results obtained at different triticale varieties under different technological and climatic conditions regarding the biometrical traits plant height and straw thickness.

MATERIALS AND METHODS

Researches were performed in the agricultural years 2012-2013 and 2013-2014, in field experiments located in South Romania, respectively in the specific conditions from Moara Domneasca Experimental Farm belonging to the University of Agronomic Sciences and Veterinary Medicine of Bucharest.

The specific soil in the studied area is reddish preluvosoil, with a humus content between 2.2 and 2.8%, a clay loam texture, and a pH between 6.2 and 6.6.

In the period September 2012 - June 2013, the average temperature was of 9.3^{o}C, and the sum of rainfall was of 225 mm. In the period September 2013 - June 2014, the average temperature was of 9.5^{o}C, and the sum of rainfall was of 572 mm.

In the agricultural year 2012-2013, ten triticale varieties were studied, respectively: Negoiu, Mezin, Cascador, Haiduc, Stil, Gorun 1, Polego, Tulus, Titan, and Oda. The sowing was performed on 16th of October 2012, at 12.5 cm row spacing, and at a density of 500 germinal seeds per square meter. The preceding crop was rapeseed and the soil tillage was ploughing. Fertilization was performed with 86 kg ha^{-1} of nitrogen and 40 kg ha^{-1} of phosphorus.

In the agricultural year 2013-2014, two triticale varieties were studied (Tulus and Gorun 1) under the following technological conditions: two preceding crops, respectively sunflower and maize; two soil tillage, respectively ploughing and harrowing; six nitrogen application variants, respectively 0+0+0 kg.ha^{-1}, 40+40+40 kg.ha^{-1}, 40+80+0 kg.ha^{-1}, 0+40+80 kg.ha^{-1}, 0+80+40 kg.ha^{-1}, and 0+120+0 kg.ha^{-1} (figures means the amount of nitrogen at first application + amount of nitrogen at second application + amount of nitrogen at third application). For the experimental variants with ploughing, the ploughing work was performed on 26th of September 2013, at a depth of 18 cm, after one harrowing work, and with one harrowing work after ploughing. For the experimental variants with harrowing, two harrowing works were performed on 26th of September 2013, at a depth of 12 cm. Seedbed preparation was performed on 29th of October 2013, and the sowing was performed in the same day, at 12.5 cm row spacing and at a density of 600 germinal seeds per square meter. Split nitrogen applications were the following: first application in the autumn, before seed bed preparation (on 29th of October, 2013); second application in the spring, in the tillering growing stage (on 14th of March, 2014); third application in the spring, in the two nodes growing stage (on 26th of April, 2014).

In both experimental years, the weed control was performed by using herbicides.

The plant height and stem diameter at soil level were measured at ten stems for each triticale variant and replication and in each experimental year. The experimental data were statistically processed by analyses of variance (ANOVA).

RESULTS AND DISCUSSIONS

Under the specific climatic conditions of the year 2013 and according to triticale variety, the plant height varied between 76.9 and 97.5 cm, with an average value for the ten

studied varieties of 86.9 cm, and the diameter at the base of the stem varied between 4.33 and 5.07 mm, with an average value for the ten studied varieties of 4.68 mm [8]. The values for the plant height registered in 2013 are lower than those reported by other authors in Romania because of the low rainfall recorded this year. Thus, Draghici [5] found for twelve triticale varieties tasted in the period 2009-2011 on sandy soils conditions from Dabuleni, in South Romania, a variation of the plant height from 86.3 to 106 cm, with an average value for the studied varieties of 93 cm. Pochişcanu et al. [14] found for six triticale varieties tasted in the period 2007-2012 on a cambic chernozem located at A.R.D.S. Secuieni, Neamţ county from Romania, a variation of the plant height from 89 to 110 cm, with an average value for the studied varieties of 104.8 cm.

Analysing the experimental data at the ten studied triticale varieties in 2013, it was found that plant height and diameter at the base of the stem do not correlate each other (Fig. 1). That means there are some triticale varieties with tall plant and thick straw, but also there are triticale varieties with tall plant and thin straw, and vice versa.

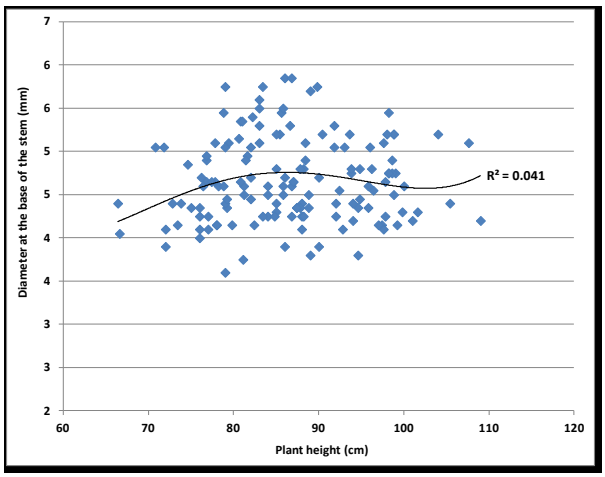

Fig. 1. Correlation between plant height (cm) and diameter at the base of the stem (mm) at the studied triticale varieties (2013)
Source: Own determinations

However, it is interesting to notice that there is a slight tendency for the plants with the height between 80 and 90 cm to have thicker straw. This means that in practice, these triticale varieties could have a higher resistance at the plant lodging process. These findings need to have further evaluations through testing an assortment of triticale varieties in different climatic and soil conditions.

The better climatic conditions of 2014 compared to 2013, especially concerning the much better water supply from rainfall, determined a significant increase in the plant height at both triticale varieties, respectively Gorun 1 and Tulus (Fig. 2). But, the increasing in plant height was associated with a decrease of the diameter at the base of the stem for both studied varieties of triticale. These findings lead to the conclusion that, for a given triticale variety, the plant height correlates negatively with the thickness of straw according to the plant water supply.

Fig. 2. Biometrical determinations at two triticale varieties under the different climatic conditions of 2013 and 2014: a) plant height; b) diameter at the base of the stem
Source: Own determinations

Nitrogen application has as consequence the increasing of the plant height and the diameter at the base of the plant (Fig. 3). So, both plant traits, respectively plant height and straw

thickness, correlate positively with nitrogen application. Nevertheless, the effect is different according to the split nitrogen applications.

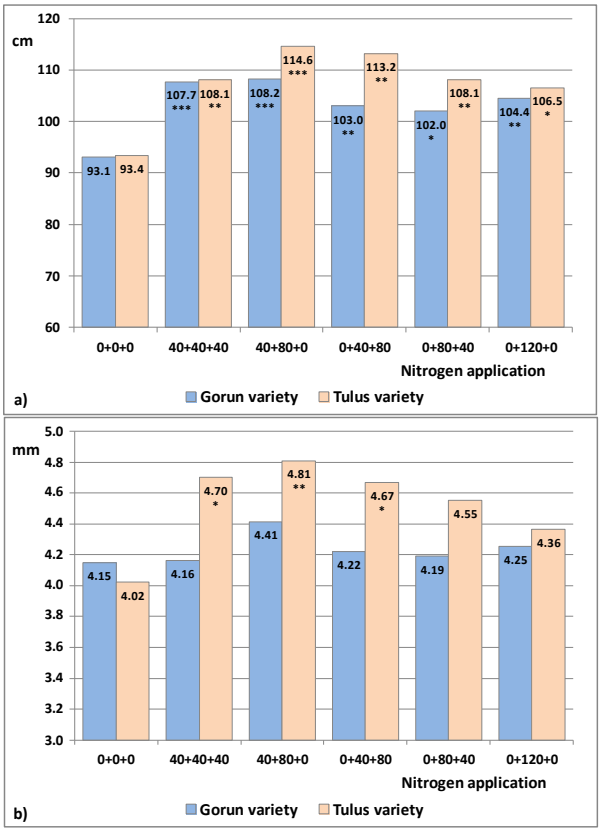

Fig. 3. Biometrical determinations at two triticale varieties under different nitrogen split applications (2014): a) plant height; b) diameter at the base of the stem

Source: Own determinations

The highest value of the plant height and the highest value of the diameter at the base of the plant were registered at the nitrogen split 40+80+0, respectively 40 kg.ha^{-1} of nitrogen applied in autumn before seedbed preparation, 80 kg.ha^{-1} of nitrogen applied in spring in the tillering growing stage, and 0 kg.ha^{-1} of nitrogen applied in spring in the two nodes growing stage.

It has to be emphasized that the nitrogen application, but also the split nitrogen applications has a similar effect both on the plant height and the diameter at the base of the plant. However, compared to the unfertilised variant (0+0+0), all the split applications of nitrogen determined differences statistically significant for the plant height. As concerning the diameter at the base of the plant, only the split applications 40+40+40, 40+80+0 and 0+40+80 determined differences statistically significant and only at Tulus variety. Given these results, it can be concluded that the split nitrogen applications have a more significant effect upon the plant height than upon the thickness of straw.

The two triticale variety reacted differently at nitrogen application and at the split applications.

Among the two studied preceding crops, sunflower determined higher triticale plant heights but thinner straw, while maize determined smaller triticale plant heights but thicker straw (Fig. 4). It is interesting to notice that, according to preceding crop, the plant height correlate negatively with the diameter at the base of the stem.

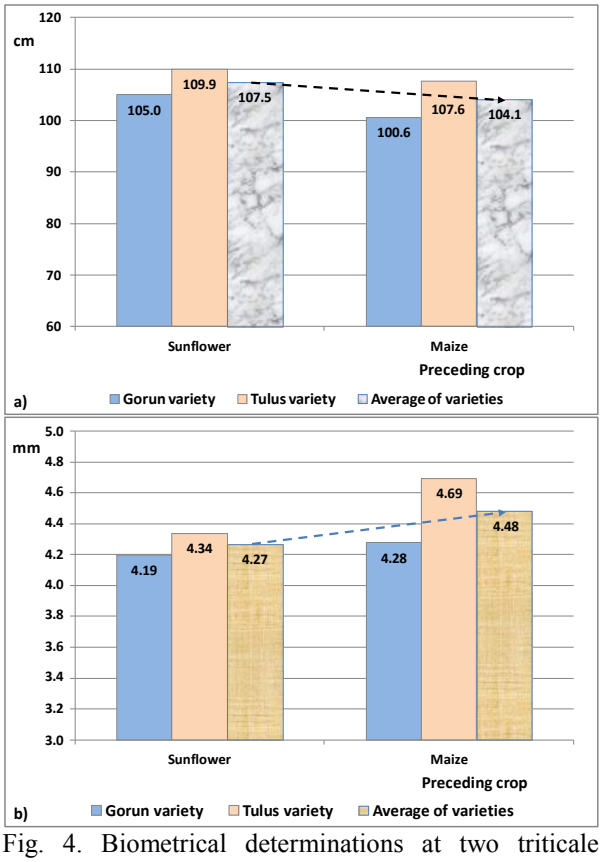

Fig. 4. Biometrical determinations at two triticale varieties under different preceding crop conditions (2014): a) plant height; b) diameter at the base of the stem

Source: Own determinations

Among the two studied soil tillage, harrowing determined higher triticale plant heights but thinner straw, while ploughing determined

smaller triticale plant heights but thicker straw (Fig. 5). As in the case of the preceding crop, it is interesting to notice that, according to soil tillage, the plant height correlate negatively with the diameter at the base of the stem.

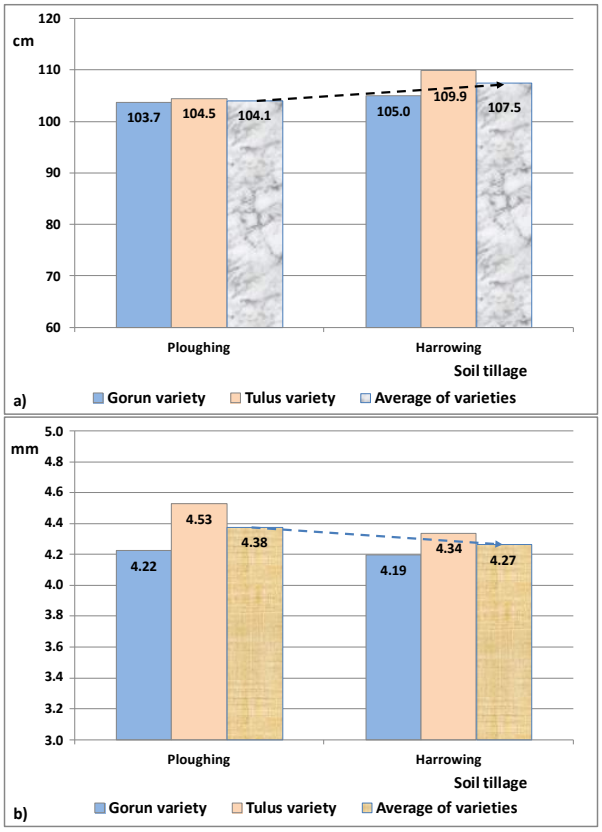

Fig. 5. Biometrical determinations at two triticale varieties under different soil tillage conditions (2014): a) plant height; b) diameter at the base of the stem
Source: Own determinations

CONCLUSIONS

The plant height and straw thickness do not correlate each other according to the triticale variety.

For a given triticale variety, the plant height correlates negatively with the straw thickness, according to the plant water supply.

Nitrogen application determined the increasing of both studied plant traits, respectively the plant height and the straw thickness. However, the effect is different according to the split nitrogen applications. In our study, the highest values were registered at the nitrogen split 40+80, respectively 40 kg.ha^{-1} of nitrogen applied in autumn before seedbed preparation and 80 kg.ha^{-1} of nitrogen applied in spring in the tillering growing stage.

The split nitrogen applications determined a more significant effect upon the plant height than upon the thickness of straw.

The preceding crop and the soil tillage determined specific biometrical characteristics of the triticale plants. According to preceding crop and soil tillage, the plant height correlate negatively with the straw thickness.

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SUSTAINABLE DEVELOPMENT STRATEGY OF RURAL AREA BY THE COMMUNITY PARTICIPATION - CASE STUDY

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Abstract

The analysis of the rural communities is presented in terms of evolution of the social, historical, economic, organizational and cultural components. Over the time, these evolutions made rural development a growing political concern aimed to restore the connections between agriculture and nature, to maintain and to keep a clean environment to promote the population stabilization in these areas, with complex implications on the overall state of the rural communities. The analysis of these areas allowed the identification of the development stage and of the resources needed to ensure sustainable development. Based on these considerations, the case study in Borcea commune, Calarasi county, focuses on the evolution during the last 20 years, due to the influence of the economic, social and political factors, as well as on new directions for sustainable rural development. Quantitative on site research was achieved based on a semi-standardized questionnaire, applied face to face, at the respondents home and by interviewing the administrative responsibilities factors, namely: local councilors; local main stakeholders (doctors, teachers, priests, representatives of culture, education, social care, police institutions); companies. Based on this data, analysis was made on areas of interest, being used in elaborating the strategy for economic and social development, at local level, with the participation of the members of the respective community, in order to establish a strategic orientation that integrates in the Development Strategy at regional level.

Key words: *community, economic and social development, rural area, strategy*

INTRODUCTION

Romania rural development strategy for the next years is part of the reform and development that EU proposes for Europe strategy 2020 [3].

Following the lines of this ambitious strategy, NRDP aims to meet the overall objectives of the Common Agricultural Policy related to food security, sustainable management of natural resources and balanced territorial development and the specific objectives of the rural development. Thus, addressing in a strategic manner all the six priorities of rural development NRDP aims to support in a sustainable and intelligent manner the economic and social development of the rural areas in Romania [1, 5].

Considering the results obtained following the interpretation of the questionnaires SWOT analysis was made, for each area of interest regarding the proposed study, based on which action directions were identified for business development; human resource development; local public administration development and social services development [8, 10].

In the case study on the perception of the community members on the social and economic development in Borcea commune, the starting point in the elaboration of the development strategy was the analysis of the current social, economic and institutional situation and the evolution of these aspects over the past 20 years [7].

This commune benefited and benefits at present by favorable conditions for the economic development and increase the living standards of the population due to the following factors: the existence of some diversified natural resources (climate and fertile soils favorable to agriculture: fishery resources, forestry); high degree of accessible road (DN 3B Călăraşi-Feteşti near Soarelui Highway); highly skilled and highly adaptable workforce; relatively diversified socio-economic profile; high degree of accessibility to other transport systems; various social, cultural, educational services, etc [6].

MATERIALS AND METHODS

For the analysis of social and economic development of Borcea commune, Călăraşi county, 3 specific research methods were used: dynamic, deductive and quantitative economic analysis; SWOT analysis; economic survey or participative research that involve collecting information from the territory using as research techniques "the questionnaire" and "the interview".

We analyzed the documents provided by the town hall, the Department for Agriculture and Rural Development in order to achieve the diagnostic analysis of the commune, which included: data about the commune location about its physical and geographical features; statistics and censuses carried out at local level in the fields: demography, employment, economic sector, education and culture, environment protection; specific statistics on environment and agriculture, made by the Institute for Life Quality Research under the project "Pollution control in agriculture"; General Urban Plan (GUP).

The quantitative on site research was made during November-December 2015, based on semi-standardized questionnaire, applied face to face, to the respondents domicile.

The research recorded the opinions and attitudes of the population in Borcea commune, Călăraşi County, regarding: assessment of living standard, local public services; trust in institutions and citizen participation; perception of change and development potential of the area; prioritization of the development actions of the commune; involvement in implementing rural development programs in the community.

The questionnaire comprising 11 questions was applied to a total of 93 respondents in the commune. The sample was selected with a statistic sampling step based on electoral lists and on the Agricultural Registry from the local council in order to provide a representative sample in terms of age groups and income. [11].

RESULTS AND DISCUSSIONS

Borcea commune is situated in the South-East part of the Romanian Plain, in South Baragan Plain, on the left bank of Borcea Branch. It was created following the administrative and territorial re-organization of Romania in 1968 [2].

Borcea commune centre is situated on the left bank of the Danube branch: Borcea branch. The commune is located 14 km from Fetesti town and 37 km from Calarasi municipality; it has a total surface of 39,422 ha of which inside land: 585 ha and outside land: 38,837 ha, of which, arable land l30,499 ha (Table 1.).

Table 1. Land structure of Borcea commune, on use categories, in 2014

No crt.	Category	Surface (ha)	Percent(%)
1	Arable land	30,499	77.10%
2	Forests	3,204	8%
3	Roads	455	1.85%
4	Constructions	128	0,3%
5	Degraded lands	325	0.5%
6	Water and ponds	3,607	9.13%
7	Pasture	1,204	3.12%

Source: Fiche of Borcea locality

In Borcea commune, over 200 companies are registered, which have as activity object trade of food and non-food products to the population, 32 agricultural companies, of which three are former IAS which operates more than 8,000 ha of arable land [2].

Besides all these companies there are in the commune: a travel agency S.C. BORCEA S.A. dating from 1991 and it has 45 subordinate employees; a small textile factory, in the Cultural Hall in Pietroiu village, leased for 10 years with 35 women employees; a bread factory where 20 people work; a beauty salon with 3 employees; bakery; 2 slaughterhouses; can factory; 3 units of cereal processing (oil factories, bakeries).

In the locality there are at present 60 shops and 14 service providing units.

According to the census made in 2011, Borcea commune population is of 7,986 inhabitants, decreasing compared to the previous census in 2002, when there were 9,694 inhabitants. From the present population (8,777 inhabitants) most citizens are Romanian orthodox (Table 2).

The lands of great quality and crops are the main resources of Borcea commune, the most common crops being wheat, maize, potatoes,

oilseeds and vegetables. Vast crops of sunflower and rapeseed enable the development of beekeeping [7].

Table 2. Ethnical structure of Borcea commune

Total population	UM	Total	Men	Women
Borcea commune	Nr	8777	4257	4520
	%	100	49,3%	50,7%
Romanian	Nr	8555	4237	4318
	%	97,47%	49,82%	50,18%
Lipoven	Nr	33	13	20
	%	0,37%	0,11%	0,26%
Hungarian	Nr	13	9	4
	%	0,15%	0,09%	0,06%
Rroma	Nr	170	86	90
	%	2,01%	1,15%	0,86%

Source: Fiche of Borcea locality

The commune has infrastructure in order to provide educational services to the population. (Table 3).

Table 3. Educational infrastructure, in 2015, in Borcea commune

Education units	Teachers	Pupils
Kindergarten no. 1	4	70
Kindergarten no. 2	3	69
Kindergarten no. 3	4	38
Kindergarten with extended program	2	25
School No. 1	26	380
School No. 2	21	350
School No. 3	15	200
Technological High School No.1	13	105
School of Arts and Crafts No.2	6	36

Source: Own calculation.

Water supply is made by a centralized system. The sewerage network does not exist, but it is submitted a sewerage project under the Environment Funds which has as objective to create a treatment plant and 35 km of sewerage. The project meets the needed score but the funding is pending.

At present, the medical services are provided by two individual medical offices, two pharmacies, an analysis laboratory and a veterinary unit. [8].

The structure of the interviewed population depending on the school level graduated is as follows: 11.68% of total respondents graduated secondary education; 31.48% of the total are graduates of vocational and foremen school; those who completed only primary education 9.20%; 25.76% are high school graduates and 15% of the population completed or are in the process of completing the high level of long duration; the percent of the population who did not graduate from any school is of 6.88%.

Many tourists visit the locality, especially for hunting and fishing opportunities, but also for the opportunities provided for relaxing, walks on the water or in the surrounding forests.

In Borcea commune two parks are created, according to the European standards by the necessary utilities and facilities; sports grounds with synthetic carpet and adjustable night installation; pensions; Beach which is to be arranged; camping spaces nearby forest; restaurants with traditional food; disco, bars and terraces [9].

Starting from the social aspects of the commune, one of the questions addressed to the respondents was referring to the assessment of the living conditions (Figure 1), where respondents appreciated that 41% are not too satisfied; 26% quite satisfied; 18% dissatisfied; 15% very satisfied.

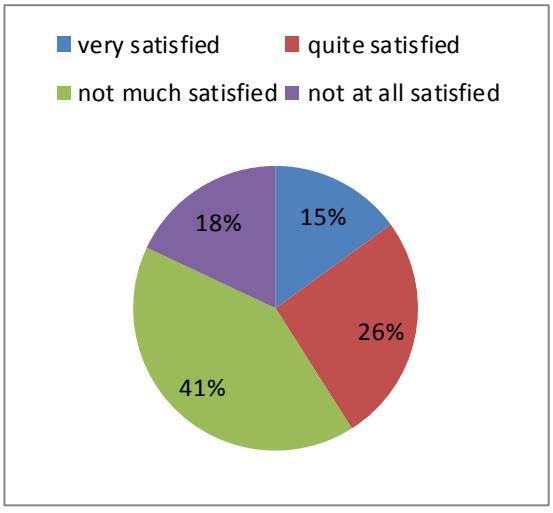

Fig. 1. Appreciation of the living standard

From the survey carried out it resulted that the inhabitants of Borcea commune are totally dissatisfied that they do not have sewerage and that some roads in the commune have not been rehabilitated yet.

Another question referred to the migration of the young people to find a job. At this question (Figure 2), a percent of 42%

responded that they leave the country, 39% leave for town and 12% stay in the commune.

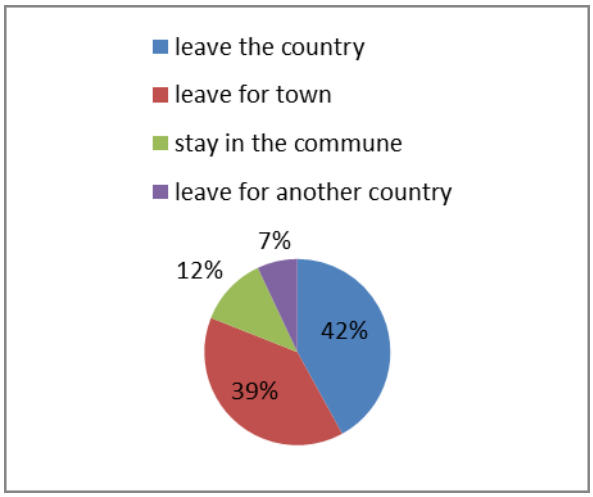

Fig. 2.Orientation of young people to profession

From the total of respondents in Borcea commune, even they live in the rural area, 35% of the respondents do not have land anymore, 25% decided it is more profitable to lease the land and only 13% are owners and they work their land (Figure 3).

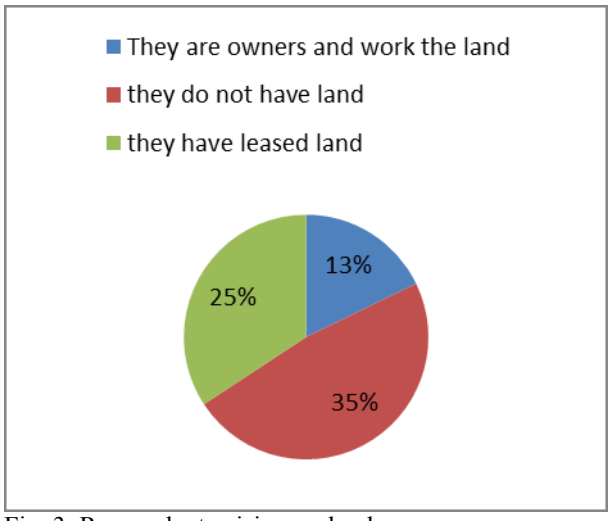

Fig. 3. Respondents vision on land use

Referring to the development priorities of the commune, 22% of the respondents believe that water and sewerage should be prioritized in the future projects of the local council, creating jobs and connecting to the gas network with an equal percent of the respondents, 20 % (Fig. 3).
When asked, however, whether and how they would contribute to the implementation of projects that contribute to solve the problems that they consider priority, 44% of the respondents are willing to contribute with work to achieve a community project, 24% would participate with work and money and 15% would support with money such a project (Fig. 4).

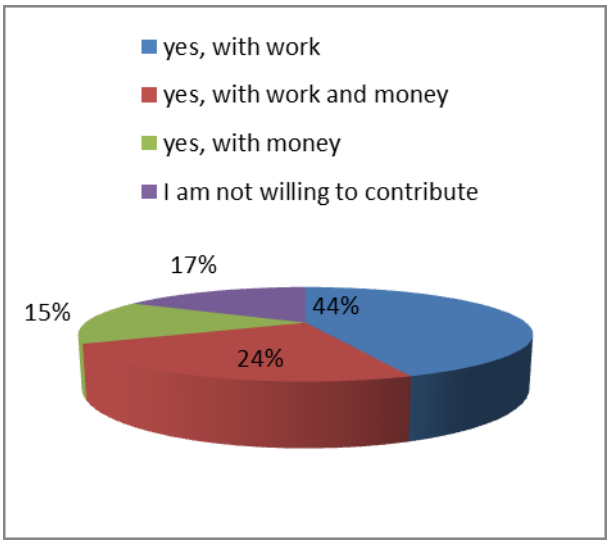

Fig. 4. Way to support the priority projects of the commune

The vision of the citizens of Borcea commune is in the spirit of developing the area from economic and social point of view, through a better use of local resources, attracting investments and investors, creating/ rehabilitating the infrastructure of urban type and valuing the geographical position, with full respect for environment.
Both the Local Development Strategy, and the institutional mechanisms involved in the implementation process must take into account the interests of the community, which were expressed by the survey.

CONCLUSIONS

After questioning 93 persons in Borcea commune and following the discussions with the community leaders, the following suggestions of the inhabitants result:
Regarding the agriculture: creation of some livestock farms by accessing European funds; attracting investors to the area; better organized exploitation of the fisheries potential of the area; achievement of ecologic agricultural products; support the young

farmers in developing activities and services in agriculture; creation of some associations of the agricultural producers; creation of some processing units of agricultural products; achievement of some investments for green energy production, the area having wind and solar potential.

Local services: Accessing government programs to encourage local initiatives; Development and diversification of social services provided, based on identified needs and available resources; Use of financial resources available under EU programs; Civil society development.

The orientation of the companies existing in the commune towards diversification of products and services; Involving the local authorities in solving the social problems of the community; Informing the citizens about the legislation on environment rules; The establishment of micro-units for processing resources and non-agricultural products existing in the commune; Creating jobs for active population existing in the commune; Changing the citizens mentality towards retraining; Increasing the training level of the population through the implementation of the program "The Second Chance" in the rural area, too.

Sustainable tourist development: Establishment of some agrotourist pensions with a focus on developing the equestrian tourism under Measure 313, Priority Axis 5, Arrangement of tourist activities; Organization and promotion of activities in sportive fishery sector.

Such a strategy would meet the main problems of Borcea commune, namely poor development of communication infrastructure and in particular the technical infrastructure, and also it would provide opportunities for access to the potential investors in the area and conditions necessary for carrying out the economic activities.

But the infrastructure does not resolve yet the depopulation problem and the lack of jobs. A solution in this regard is found in attracting investors in sectors such as ecologic agriculture, with a focus on vegetable growing and cattle breeding.

A sustainable development of the local economy implicitly contributes to the community mobilization. Any attempt to mobilize the population fails in the absence of support, and this cannot be achieved but in a situation of economic stability.

Attracting investors through fiscal measures could be a viable solution for workforce employment and in terms of increasing the number of specialized jobs. But addressing such a strategy is risky, considering the poor state of the infrastructure. Poorly developed infrastructure is constituted as inhibiting factor for any type of activity, regardless other benefits provided to the potential investors [4].

A multilateral approach for the commune development is to achieve some investments both in infrastructure and in improving the local economy and the level of community mobilization. This strategy is ideal for the development of a commune, but some priorities must be set up depending on the commune particularities and its diagnosis.

Encouraging the economic initiatives closely follows to improve the infrastructure regarding the overall development of the commune. As local development direction, the development of the milling sector, bakery and food industry and vegetable processing, milk processing and use of animal products and farms development of young cattle breeding and fattening, are taken into consideration.

As development strategy of the local economy it is necessary to encourage the ecologic agriculture, the vegetable growing, fruit growing, processing the obtained products.

The rural area is seriously deprived by the infrastructure and institutions that facilitate social participation. Social exclusion in the European definition, means also lack of access to communication and information systems, linking individuals and between individuals and the community. In this respect topics such as banking integration (and access to credits), investments, insurances, media, telephony, cultural institutions should be addressed. In the Romanian rural area, the banking and financial infrastructure as cultural infrastructure (theaters, museums, cinema) are under-developed, the degree of

monetary integration is very low and the use of insurance instruments is also deficient. Businesses in the rural area are generally perceived by the banking system as high-risk customers and accordingly they are confronted with additional demands for guarantees and higher financial costs for loans. Also, there is a tendency to reduce the activity of the banking sector in the rural area due to low profitability [4].

A unilateral development of the commune does not offer conditions for economic stability, therefore investments are absolutely necessary both as regards agricultural activities and also to encourage initiatives in the agro-tourism sector. The priority projects will be those to increase the comfort level of the population, precisely the improvement of the transport infrastructure and technical infrastructure.

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DEVELOPMENT OF RURAL TOURISM AND AGROTOURISM IN ROMANIA BY IMPLEMENTING EUROPEAN PROGRAMS

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Abstract

The rural tourism becomes more and more attractive as the tourists become more mobile and look for a change from the city life. The rural tourism and agrotourism activities interfere, complement and support each other, forming a sector to be organized specifically taking account its geographical, economic, social specific etc., the specificity of its products and the role they should play in the development of the rural area. Based on these considerations, the present paper proposed an analysis of the implementation of the European projects to support the tourism activities in the rural area, by type of programs and their impact on socio-economic development in these areas given that in the period 2000- 2014, the number of tourist structures in the rural area increased from 3121 units to 6089 units with the accommodation potential and agrotourism activities. The analysis was made at the macroeconomic level, on total country and by development regions, quantifying the number of projects implemented in each region.

Key words**:** *rural population, rural tourism, tourism potential, tourist structures*

INTRODUCTION

The rural tourism is one of the most effective solutions to harmonize the tourism requirements with the requirements of environment protection and sustainable development. Compared to the classic tourism, it is significantly different in terms of space delimitation, features and holidays content. In usual practice, in order to designate holidays spent in the rural area the concepts of rural tourism and agrotourism are used. The two concepts overlap to some extent, have a common denominator, and particular elements [3].

The rural tourism and agrotourism have a motivational base, represented by: return to nature; knowledge of tradition and culture, the creation of various rural communities; health care; playing some sports - hunting, fishing, climbing, etc.; food and fresh fruit consume [7].

The rural tourism represents the tourism activities in the rural area and benefit from the fact that many main points of tourist attraction and heritage in Romania are in the rural area, such as the painted monasteries, wooden churches, fortified Saxon churches, Dacian fortresses. Internationally known tourism brands of Bucovina, Maramures, Transylvania and Danube Delta are also especially in the rural area [7].

The concept of agrotourism is circumscribed at household or farm level. Therefore it consists in the organization of activities of tourists reception and all tourist services at agricultural farm level. The agrotourism may be appreciated by the economic effects on the farms. [4].

MATERIALS AND METHODS

As research methods, we used documenting, the analysis and data processing from a secondary analysis. These methods are based on the sinthesis processes, induction and deduction, analogy and comparative analysis. Once the information was defined, known and interpreted, the next step was the detailed documenting of the interest field. In the analysis activity, the study of the documentation available for the field or for the analysed system is a starting point. This alows in the analysis to obtain the first

knowledge and information. The documentation implied also the analysis of the legislation or the compared analysis of the various specialised sources.
The documenting, the analysis and the data processing and the information obtained from the following sources: monographs, scientific papers about tourism and agrotourism, informative data from the Statistical Yearbook, Annual progress Report on the implementation of the national program for rural development in Romania in 2014 on MADR website, information taken from the websites specialized on the European Programs implementation.[6].

RESULTS AND DISCUSSIONS

In Romania, at the end of 2014, there were 6,089 tourist units compared to 3,121 in 2000, the increase being of 195.1% (Table 1). Analyzing the trend of evolution of the average number of tourist units, we find an annual average increase of 434 units travel in the rural area. In Romania, from 2008-2014, the number of tourist structures evolved under conditions strongly marked by the virulent global financial and economic crisis. The year 2012 shows the highest growing determined by the fact that funding of the European funds of several programs was unlocked, including those aiming the developing of the tourism infrastructure in the rural area. [9].

Table 1. Evolution of the main rural tourist structures, at the country level, in the period 2000-2014

Tourist structure type	Year	2000	2008	2010	2012	2014
Total of which:	no	3,121	4,694	5,222	5,821	6,089
	%	*100*	*150.4*	*167.3*	*186.5*	*195.1*

Source: Processed according to: INS, 2015,Tempo-Online,https://statistici.insse.ro/shop/?page=tempo2&lang=ro&context=63

By development regions, as regards the number of tourist structures with accommodation option, South East Region won the first place, recording the highest percentage of 31.3% of the total national level. The second place is Centre Region with 16.7%, followed by North East Region with 11.2% and North West Region with 10.8%. Bucharest-Ilfov Region has the smallest percentage with 3.3% (Fig.1).

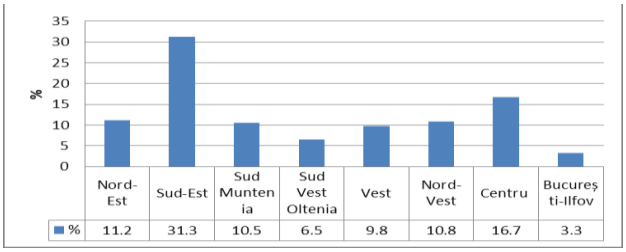

Fig. 1. Percentage on development regions of the tourist structures of accommodation, in 2014

SAPARD program, in terms of **enterprise creation** (criterion 1.2) contributed to the establishment of units of tourist and agro-tourism guesthouses.
This program is interesting to see how the indicators were achieved for the accommodation created. Thus, by SAPARD funding in the period 2001-2009, the increase was made with over 11,200 places, of the accommodation units in the Romanian rural areas. If we refer to the contextual situation (Table 2), the data takes on a greater relevance, underlining thus that more than half of the seats/bed, created in Romania, from 2003 until 2009, were supported by SAPARD funding, demonstrating thereby, very good coverage that the Program had, especially in North West and Centre Region and good correspondence of the program to the general trend of the tourism sector [5, 8].
Supporting tourism in the rural area and agrotourism, was made somewhat chaotic, under SAPARD program, and thus, busy tourist areas appeared such as Moeciu, some have lost their charm, and in others, hostels were opened without potential customers, namely, the investments were made without economic dimension [2].
The rural areas with cultural or tourist objectives cannot exploit the potential without an adequate promotion, which could base on the existance of some studies and some projects made by the specialists. These projects can be chieved jointly, by the local administrations in the respective area, by associations of intercommunity development.
The promotion of a comune and of its economic/tourist potential, can be made by

the existence [1], in the respective commune, of a tourist information centre.

Table 2. Investment Program in the tourism infrastructure, on development regions 2010-2014

Crt. No.	Specification	Projects number	Allocated sums	
			Million Lei	%
1	North-East Iaşi	16	108.38	8.2
2	South-East Constanța	24	126.53	9.6
3	South Muntenia Târgoviște	20	108.43	8.2
4	South-West Oltenia Craiova	18	230.74	17.5
5	West Timişoara	23	151,38	11.5
6	North-West Satu Mare	19	75,74	5.8
7	Centre Alba Iulia	52	511.12	38.8
8	Bucharest Ilfov	6	4.7	0.4
Total		178	1,317.02	100

Source: Processed according to:***MDRAP, 2015, Investment program in toruism infrastructure, according to GD no. 120/2010, http://www.mdrt.ro/ro/turism/dezvoltare-turistica

Regarding ROP: DMI 5.2 – creation, development, modernisation of the tourism infrastructure, the studies for the assessment of the regional operational program show that regio 2007-2013 had a positive impact for the funding beneficiaries, doubled by a propagation effect among the whole community, for the 5 major fields of interventions [2].

In the tourism sector, 2007-2013 Regio funds contributed to the accommodation increase, the number of tourists, the occupancy level and turnover – in the beneficiary units compared to the units that did not implement Regio projects. The number of the newly created accommodation and rooms increased: 28.25 newly created rooms/beneficiary SME and 50.42 accommodation places per beneficiary SME newly created, compared to similar units that did not benefit from intervention DMI 5.2.

The number of "arrivals" and "overnights" increased: private beneficiaries of DMI 5.2 recorded in 2014 compared to 2009, increases by 2-3 times of the number of "arrivals" (including arrivals of foreign tourists) and "overnights" (including foreign tourists). The occupancy level of Regio beneficiaries increased as average from 37.44% to 45.63%, above the levels seen at the national level, about 25%.

The number of employees/ beneficiary SME increased, as turnover as: DMI 5.2 brought to each beneficiary SME with 12.40 more employees, an increase in the total turnover of Lei 1,122,536 and an increase in tourism turnover with Lei 933.995. These indicators were obtained from the analysis of 43 projects, finalized until 31st December 2014 [7]. The contribution from the European Regional Development Fund–ERDF FEDR: 68. Million euro.

Measure 313 of „Encouraging the tourist activities" of tourist activities development in the rural areas contributed to the increase of the jobs and alternative incomes, as well as to the increase of rural area attractiveness. Until 31.12.2014, 11 open calls for proposals took place, during which 1,175 projects were contracted [8].

Regarding sharing of the projects approved depending on the type of action, it is as follows: The highest percentage is the category "leisure infrastructure (tourist accommodation structures)" for 69.64% of all projects, with 818 projects approved with a total investment volume of Euro 291,256 thousand and a public value of Euro 109,901 thousand.

Category "Small scale infrastructure (tourist information centers)" holds a share of 29.95% of all projects, with 351 projects approved with a total investment of Euro 64,501 thousand and a public value of Euro 49,318 thousand.

Category "Development/ promotion of rural tourism services" has a share of 0.41% of the total projects approved, with 5 projects approved, with a total volume of investments Euro 627 thousand and a public value of Euro 514 thousand.

For the period 2014-2020, PNADR, provides that a main source of income and development for the eight regions will be tourism. The investments aimed at rehabilitating historic centers and cultural objectives belonging to the cultural heritage and their inclusion in the sightseeing tours. It is also wanted the rehabilitation and

modernization of resorts and accommodation infrastructure and the diversification of the tourist products

CONCLUSIONS

In Romania, at the end of 2014, there were 6,089 tourist units compared to 3,121 in 2000, the increase being of 195.1% with an annual average increase of 434 tourist accommodation units.

By development regions, as regards the number of tourist accommodation structures with accommodation options, South East Region won the first place, recording the highest share of 31.3% of the total national. The second place is Centre Region, with 16.7%

On Measure 313 "Encouraging the tourism activities" 1,175 projects were contracted: the highest percentage is the category "Leisure infrastructure (tourist accommodation structures)" of 69.64%; category "Small scale infrastructure (tourist information centers)" holds a share of 29.95%; category "Development/promotion of the rural tourism services" has a share of 0.41%.

The impact of the projects funded by DMI 5.2 of Regio is stronger at local and regional level, through the jobs created and taxes paid to the local budget, but also by stimulating other investment and related businesses.

The most effective projects are implemented in large cities and in tourist resorts of national and local interest.

The projects which have an "integrated" concept (in the modernization and expansion of the existing infrastructure and diversify the tourist product by developing a leisure infrastructure or adding such infrastructure or existing accommodation) have a higher impact compared to the investments made only in the accommodation infrastructure.

Tourism and rural tourism in Romania provided four priorities, namely:

(1)touristic programs complete: tourist routes, development of tourism spas medical tourism program for the development of cultural tourism and ecumenical (the specific architecture of the villages of the historical Romanian provinces, wood and stone, folk, art decoration, events etnoculturaleşi traditional religious; fairs and exhibitions of ethnographic museum) program ,,Eco-bike Adventure";

(2)carrying out marketing activities (engagement is needed at national and international tourism fairs, exhibitions, workshops tourism is the main way to promote tourism potential);

(3) human resources development and institutional framework in the field of tourism (tourism establishment of centers that strategic aim of increasing the number of tourists and the development of elements of national and European identity by highlighting all local traditions);

(4)development of infrastructures for tourism (marking and approval of tourist routes.

For the programming period 2014- 2020, PNADR, provides that a main source of income and development for the eight regions will be tourism. The investments aimed at rehabilitating historic centers and objectives belonging to the cultural heritage and their inclusion in the sightseeing tours. It is also wanted the rehabilitation and modernization of resorts and accommodation infrastructure and the diversification of the tourist products.

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PLANTATION OF ENERGY PLANTS AS AN ELEMENT OF THE LANDSCAPE PROVIDING THE ECOSYSTEM SERVICES

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Abstract

Earth's ecosystems provide for humanity full range of benefits known as ecosystem goods and services. By the processing of information was used the methodology of Millennium Ecosystem Assessment (4 groups of ecosystem services). The paper assessed the first group of services - provisioning services with the possibility of using agricultural lands for growing energy plants. In the paper are evaluated the energy plant Miscanthus and Populus. The crop Miscanthus (covered 2010-2014) presented two genotypes. In 2012 (the third year of growing) has been reached the production of 24.85 t ha^{-1} (60% more than in 2011). In 2014 (the fifth year of growing) the crop reached production 28.60 t ha^{-1} of dry biomass. The plantations Miscantus × giganteus genotype planted the rhizomes are appeared productive. Fast-growing poplars Italian provenance, in the first three-year cycle in 2012 formed 51.47 t ha^{-1} of biomass. In 2014, the second year of the three-year harvest cycle average value of their biomass was 34.40 t ha^{-1}. Based on an assessment of production above-ground organs monitored varieties of poplar are more productive varieties Monviso and Pegaso. Based on the evaluation of the ability of energy plant plantations (grasses genus Miscanthus and woody plant of the genus Populus) to produce enough above-ground biomass for energy use can be confirmed the high prevision service of this type of cultural ecosystem (agro-ecosystem).

Key words: *agroecosystem, ecosystem services, energy crops, Miscanthus, Poplar, provisioning*

INTRODUCTION

Ecosystems are the basis of all human life and human activities. The goods and services which provide are essential for maintaining prosperity as well as for future economic and social development. At the ecosystem level we register the complex and dynamic combination of plants, animals, micro-organisms and the natural environment, existing together as a unit and the parts depend on each other. Earth's ecosystems provide for humanity full range of benefits known as ecosystem goods and services – provisioning, supporting, regulating and cultural ecosystem services.

Ecosystem Assessment is a tool for evaluating the many different aspects of ecosystem health and the provision of ecosystem goods and services. In 2000 the United Nations started a global initiative called the Millennium Ecosystem Assessment. The report from this assessment indicates that up to two thirds of ecosystem services on Earth are threatened or in decline [13].

Natural ecosystems and agroecosystems differ in the intensity of their management and in the resulting consequences for their physical and biological components. Yet, they provide a range of goods and services that may be of interest for various stakeholders on various space and time scales.

Traditionally, agroecosystems have been considered primarily as sources of provisioning services, but more recently their contributions to other types of ecosystem services have been recognized [13]. Influenced by human management, ecosystem processes within agricultural systems can provide services that support the provisioning services, including pollination, pest control, genetic diversity for future agricultural use, soil retention, regulation of soil fertility and nutrient cycling. Whether any particular agricultural system provides such services in support of provisioning depends on management, and management is influenced by the balance between short-term and long-

term benefits.

Cultivation of energy crops is alternatives with higher net greenhouse gas reduction and less impact on many ecosystem services than conventional crops. According to [8], biomass production based on energy plants allows for the minimization of such inputs as fertilizers, tillage or herbicide use. Short-rotation coppices also increase structures in intensively used agricultural areas, and provide space for nesting birds [10]. They may also increase scenic qualities and contribute to a green infrastructure [11] in intensively-used agricultural landscapes.

Agro-ecosystems are recognised in the international ecosystem services literature for their potential to contribute to the supply, of provisioning services, and also cultural, regulating and supporting services [17] and [15]. The major ecosystem services and ecosystem dis-services to agriculture are described in Figure 1. How agro-ecosystems contribute to, or impact on, the supply of ecosystem services depends on the management of those systems [7].

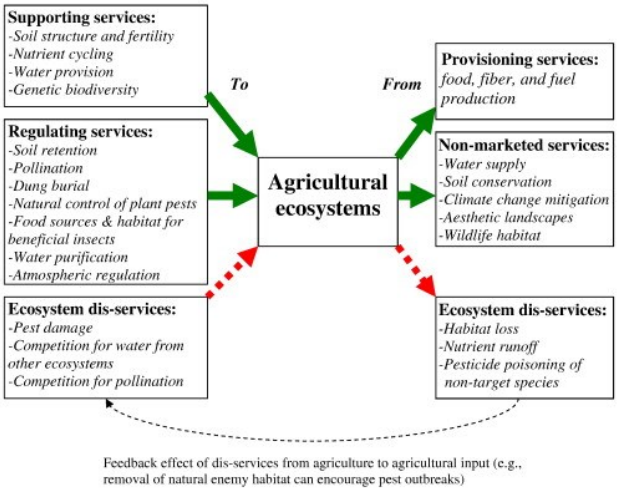


Fig. 1. Ecosystem services and dis-services to and from agriculture. Solid arrows indicate services whereas dashed arrows indicate dis-services [17]

The concept of agroecosystem services has become an important tool for modelling the interactions between agroecosystems and their external environment in condition of global bioclimatic changes.

The aim of this paper is to evaluate the potential of energy plants plantations in relation to the diversity of the country and identifying the contribution of these cultural ecosystems in the provision of ecosystem services in the landscape.

MATERIALS AND METHODS

As a basis for assessment of the ecosystem services of agro-ecosystems - energy plants plantations, serve the methodology of the European Environment Agency (EEA) Experimental framework for assessment ecosystem services in Europe [5] and Methodology for mapping and evaluation of ecosystems and their services [12].

Millennium Ecosystem Assessment divides ecosystem services into four basic groups - provisioning, supporting, regulating and cultural ecosystem services. The subject of this evaluation is the first group of services - provisioning services. Provisioning services are evaluated in terms of supply of energy resources serving as bioenergy. In this case, this is the cyclic provision of phytomass and woody biomass of the energy crops grown by plantation way.

In the paper are evaluated energy plants *Miscanthus* and *Populus* in term of their production capabilities in the process of adaptation to environmental conditions in the Slovak Republic.

The research area of energy plants was based on area of the University agriculture farm in the village Kolíňany (Slovakia) from 2009 to 2010.

Genus *Miscanthus* represents two genotypes: *Miscanthus sinensis* Tatai and *Miscantus* × *giganteus*. The characteristics of genotypes are referred to in the work [9] and [14]. Method of in vitro propagation (*Miscanthus sinensis* Tatai) is disclosed by [6].

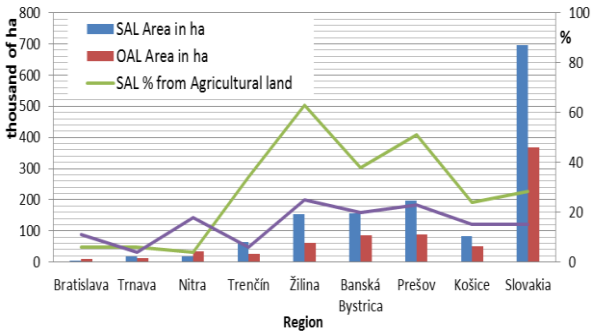
The genus *Populus* (poplar) representing the four Italian varieties: Monviso, Pegaso, AF-2 and Sirius. The characteristics of each variety are processed in work [2].

RESULTS AND DISCUSSIONS

Agro-ecosystems are natural human-managed systems with the main objective of obtaining food and other non-food and environmental services. In Slovakia is 49.16% of the

agricultural land - agroecosystems.

Slovakia needs to have 1,367,853 hectares agricultural land as a minimum area for food self-sufficiency, which represents about 56% of currently registered agricultural land of Slovakia [16]. On these soils can be achieved the best economic results from field crops, therefore, for strategic reasons should be left to direct agricultural use. It is the primary agricultural land. Land resources further comprise a secondary land, particularly arable land on which is supposed more profitable cultivation of agricultural crops. Secondary soil can be temporarily used for other purposes than food production, assuming the interests of society. This land can be allocated to alternative agricultural uses such as bio-energy. Secondary agricultural soil occupies 696,038 hectares, which represents about 29% of currently registered agricultural land of Slovakia (Figure 2). Within agricultural lands, there is also the other soil that should be used in preference to alternative agricultural use, for energy plants, at various non-biological purposes (sports, tourist and recreational). Other agricultural land occupies 368,587 hectares, which represents about 15% of currently registered agricultural land of Slovakia. Not only area of possible agricultural land plays an important role in the establishment for plantations of energy plants. The climate parameters are important element. Possibilities for using agricultural land for cultivation of the energy plants depend on the characteristics and habitat eligibility for the given plant. Considering the sufficiency of land to assign food security in Slovakia can be a relatively large part of agricultural land also used for cultivation of the energy plants. Temporary allocation of agricultural land for cultivation purposes of non-agricultural crops should be conditional on elaboration and especially the execution of a project retrospective reclamation. These plantations of energy crops create positive cultural ecosystem (agroecosystem) in agricultural landscape. The cultural ecosystem – plantation of energy plant provides the entire spectrum of ecosystem services. The main asset of plantations of energy plants is their productive potential - the provisioning ecosystem services. The production potential of the above-ground biomass can be used in bio energy as an alternative energy source.



Legend: SAL – secondary agricultural land; OAL – other agricultural land

Fig. 2. Area of the agricultural land usable for the cultivation of energy plants in Slovakia regions
Source: Own Processing by data from Slovakia National Agriculture and Food Centre (2016)

In the present paper are evaluated ecosystem services plantations of energy plants on the basis of provisioning ecosystem services. The yield of the biomass was evaluated by fast-growing trees and herbs grown on arable land. The biomass yield is expressed in terms of biological yield of the above-ground organs. The *Miscanthus* growth was studied in terms of biomass production in the period 2010-2014 (Table 1). The highest increases of the biomass were generated (both *Miscanthus* genotypes) in the third growing year (2012). There was achieved average yield 24.85 t ha^{-1}, which compared to year 2011 increased by almost 60%. After the fifth year growing (2014) the growth reached average production of 28.60 t ha^{-1} of dry biomass. The plantations of the *Miscantus* × *giganteus* genotype planted from the rhizomes appear more productive.

Biomass production Italian varieties of poplar (in kg dry weight of the individual) and converted to t ha^{-1}. $year^{-1}$ dry mass is listed in Table 1. Short rotation poplar of Italian provenance formed 51.47 t ha^{-1} of biomass in the first three-year cycle in 2012. In 2014, the second year of the three-year harvest cycle was average production of the biomass 34.40 t ha^{-1}. Based on an assessment of production above-ground organs monitored varieties of poplar are more productive plantations of Monviso and Pegaso varieties.

Table 1. Yield of dry above-ground biomass plantations of the energy plant species (t $ha^{-1}.year^{-1}$) grown in the research site in Kolíňany, southwestern Slovakia

Energy plants / Year	2010	2011	2012	2013	2014
Miscantus × *giganteus*	11.10	18.10	27.10	30.30	30.90
Miscanthus sinensis Tatai	10.80	16.90	22.60	24.10	26.30
Miscanthus - average	10.95	17.50	24.85	27.20	28.60
Populus MONVISO		28.80	58.33	21.92	19.86
Populus PEGASO		18.59	58.31	14.09	42.80
Populus AF-2		26.69	40.73	12.34	43.66
Populus SIRIO		30.11	48.53	15.51	31.60
Populus - average		26.05	51.47	15.97	34.48

Source: Own calculation.

Table 2. Single-factor analysis of variance (ANOVA) of the biomass yields between the Miscanthus genotypes and in each experimental year (2010-2014), between poplar varieties and experimental year (2011-2014) (level of significance is defined as: n: non-significant impact, +: significant impact in $P \leq 0.05$, ++: $P \leq 0.01$ and +++: $P \leq 0.001$)

Analysed parameter	F	P-value	F critical	Significance
Miscanthus genotypes and Years	158,0191	$9{,}28E^{-69}$	1,947348	+++
poplar varieties and Years	10,71837	$1{,}51E^{-08}$	1,99199	+++

Differences in biomass production of the *Miscanthus* genotypes and Italian varieties of *Poplar* were statistically highly significant in each studied growing period (Table 2). It is also possible to note a high statistical significance (R^2 = 0.9923) between the growing years and the production of total above-ground biomass for energy grass *Miscanthus*.

Based on the evaluation of the ability of energy plants plantations, grasses genus *Miscanthus* and woody plant of the genus *Populus*, to produce sufficient above-ground biomass for energy use can be confirmed the high provisioning services of this type of agro-ecosystem. The subject of further ecosystem research will be the spectrum of other ecosystem services that these cultural ecosystems of energy plants do provide.

Collection of appropriate types of energy plants is supplemented by willow. [1] and [3] was devoted to the cultivation of willow plantation method. The results achieved in the Hungarian varieties Experess and Csala and Swedish variety Inger also confirmed the high adaptability of willows on the climatic conditions in the Slovak Republic, namely in the village Kolíňany (Nitra region). Ability to take roots and to allocate gradually biomass into individual organs is a prerequisite for a successful future production of organic mass. The results of authors do complement the information on the suitability of energy crops cultivation in Slovakia in relation to the possibility to use them for the benefit and ensuring the well-being of a man. Cyclic provision of woody biomass energy willow as poplar and miscanthus too is a basic ecosystem services that plantation of energy crops can provide.

Production parameters of varieties of willow and poplar compares [4] and authors confirm the results of research set out in this paper. Production parameters monitored varieties of willow and poplar in the Slovak Republic reached the level economically advantageous production. The research results contribute to the knowledge of the cultivation energy plants in Slovakia as alternative energy resources providing ecosystem services in the country. The production of these energy resources does not negatively impact on the environment quality. With proper use of natural resources may be used biota, support the natural biodiversity of the area and also ensure the protection of the nature and landscape.

CONCLUSIONS

Agricultural land in Slovakia, in terms of its division, is possible to use for alternative agricultural use, such as bioenergy. Secondary Agricultural land (696,038 hectares, which represents about 29%) and other land (368 587 ha, with about 15%) constitute a space that can be used also to other than the biological (food) production.

Plantations of energy crops in Slovakia represent a positive cultural ecosystem in

agricultural landscape. They provide wide spectrum of ecosystem services. The main contribution of plantations of energy plants is their production potential - provisioning ecosystem services. The above-ground biomass production has potential use in bio energy as an alternative energy source.

The growth of energy plant *Miscanthus* (monitored in the period 2010-2014), in terms of biomass production (both genotypes), formed in the third growing year (2012) average yield 24.85 t ha^{-1}, which compared to 2011 increased by almost 60%. After the fifth growing period (2014) the growth reached average yield 28.60 t ha^{-1} of dry biomass. The plantations of the *Miscantus* × *giganteus* genotype planted from the rhizomes appear more productive.

Fast-growing poplars Italian provenance (Monviso, Pegaso, AF-2 and spreads) in the first three-year cycle in 2012 formed 51.47 t ha^{-1} of biomass. In 2014, the second year of the three-year harvest cycle was average yield 34.40 t ha^{-1}. Based on an assessment of production above-ground organs monitored varieties of poplar are more productive plantations of Monviso and Pegaso varieties.

The ability of energy plants plantations produce enough above-ground biomass for energy uses confirms the high provisioning services of this type of cultural ecosystem. The subject of further ecosystem research will be the whole spectrum of other ecosystem services that these cultural ecosystems of energy plants do provide.

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THE MAIN TENDENCIES IN ENERGY EFFICIENCY OF RENEWABLE ENERGY SOURCES IN UKRAINE

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Abstract

This article discusses the tendencies of sustainable development of renewable energy sources. The paper refers to the actual Energy strategies in Ukraine. As a conclusion, it is possible to implement the national Energy strategy by reducing the fossil fuel consumption and passing to renewable energy sources in the future. In 2035, about 50% of total energy consumption will covered by renewable energy sources.

Key words: *energy, renewable sources, strategy, trends*

INTRODUCTION

Energy is the basis of economy of any country. The successful development of all sectors of the economy depends on its state.
In recent years the domestic energy sector accumulated a lot of challenges that require quick and effective solution. Among these priorities is the problem of reliable and quality energy supply, improving of energy security of Ukraine, development of energy saving technologies, efficient and sustainable functioning of the unified energy system of the country, the search for new sources of energy, renewable energy, improving energy structure, reconstruction and renewal of the material base of the industry, diversification of sources of energy, energy integration of Ukraine with the European energy system, increasing operational safety of energy facilities.
There are many forms of renewable energy. Most of these renewable energies depend in one way or another on sunlight. Both wind and solar have grown significantly in recent years and can help to provide valuable sources of renewable energy for future generations.

MATERIALS AND METHODS

The paper is based on a bibliographic study regarding the global tendencies in sustainable development of renewable energy sources. In the given research data provided by Ministry of Energy and Coal Industry of Ukraine, Eurostat information, State Statistics of Ukraine and Energy strategy were used.

RESULTS AND DISCUSSIONS

The current state and prospects of renewable energy in the world

In recent years, the European Union has faced several important issues that have pushed energy towards the top of national and European political agendas. As to Energy statistics, Oil (crude oil and petroleum products) continues to be the most important energy source for the European economy, despite the long-term downward trend, while natural gas remains the second most important energy source [3].
With the growth of industrial production in the world the emissions of greenhouse gases in the atmosphere increased, which in turn led to global climate change. To prevent this, 192 countries, responsible for 64% of greenhouse gas emissions in the world, joined the Kyoto Protocol in 1997 (as of June 2013) [8]. Despite the efforts of many countries to implement the Kyoto Protocol, it was not enough to prevent global warming. In December 2015 at the next meeting of the Conference of Parties of the Framework Convention on Climate Change in Paris (COP21), 195 countries adopted the first-ever

universal, legally binding global climate deal.
The agreement sets out a global action plan to put the world on track to avoid dangerous climate change by limiting global warming to well below 2°C.
The agreement is due to enter into force in 2020 [1].
These measures will lead to the enhancement of the role of natural gas and alternative (renewable) energy sources.
As year 2014 demonstrated, the penetration and use of renewables are increasing as is the combination of renewables and energy efficiency. However the share of renewables in the overall energy mix is still under 20%. This needs to change if access to clean, modern renewable energy services for all to be assured by 2030 [10].
According to 2015 Energy outlook, by 2040, demand for electricity will shift to developing countries thanks to fast-growing economies and rising populations. In developed nations, demand will remain stable or even decrease as the link between economic growth and electricity consumption weakens.
To satisfy rising global demand, USD12,2 trillion will be invested in power plants by 2040. Renewables will make up two-thirds of that investment with a large chunk of that going to solar.
By far, the bulk of that USD12,2 trillion will be invested in Asia-Pacific which add more capacity in the next 25 years than the rest of the world combined.
And half of that will build in China which will attract USD 3.4 trillion of new investment – nearly double the total for all the Americas.
Around 70 % of capacity additions in China will be renewable – that's 989GW of solar photovoltaic and 703GW of wind power.
Despite weak growth in electricity demand, Europe will build 80 % more capacity small-scale solar over the next 25 years, almost entirely driven by renewable.
In 25 years, Europeans will see solar photovoltaics making up over a third of installed capacity while coal, gas and nuclear will decline by 30 %.
Despite significant growth in renewables, fossil fuels will maintain a 44 % share of generation in 2040 – albeit down from two-thirds in 2014. Some 1,291GW of new coal-fired capacity will be added to 2040, predominantly in developing countries where supply is relatively cheap and climate change policies weak or yet to be implemented.
As a result of these trends, CO2 emissions from the power sector will not peak until 2029 and by 2040 they will be 13 % above current levels.
By 2040, the world's power-generating capacity mix will have transformed: from today's system composed of two-thirds fossil fuels to one with 60% from zero-emission energy sources. Renewables will command just under 60% of the 9,786GW of new generating capacity and two-thirds of the USD12.2 trillion of investment [5].

Energy strategy of Ukraine

In recent years, growing overall energy consumption, thus surpassing the growth rate of GDP, negatively affects the pace of economic development of Ukraine. Trends of increasing consumption of non-renewable energy must change in trends in their conservation. Priority directions of the state policy in the field of energy should reduce the power consumption of individual industries and products, active use of alternative energy [4].
According to statistics [11], the supply of primary energy in 2014 is characterized by structural changes, the share of renewable energy amounted to 2.65%. The total supply of primary energy from biomass has increased to 1.934 million tons of oil equivalent, the equivalent of 2.25 billion m^3 of gas, and more than in 2013 at 3.15%.
In the electricity share of energy from renewable sources amounted to about 6%. The significant part in the production of electricity from renewables still occupies hydropower .
Most significant in the structure of renewable energy is biomass. The production of biomass for energy purposes as compared to 2013 increased by 24.75% and amounts to 2,399 million tons of oil equivalent, the equivalent of 2.8 billion. m^3 of gas.
Also the biomass exports increased 7.7 times from 0.065 million tons of oil equivalent in year 2013 to 0.502 million tons of oil

equivalent in year 2014. This is equivalent to 0.58 billion m^3 of gas.

This shows that:

1.Increased production of energy from renewable sources is an important area of the natural gas replacement.

2.The energy production from biomass continued to increase by high rates: 24.75% per year.

3.The big reserve for reorientation of exports of biomass to the domestic market is saved: equivalent to 0.58 billion m^3 of gas per year.

4.The total supply of primary energy from biomass directly to the domestic market in Ukraine is equivalent to 2.25 billion by 2014 m^3 of gas per year.

The question of reducing energy dependence is strategically important for Ukraine and needs urgent solution.

Ukraine as a member of the Energy Community implements the EU Directive 2009/28 / EC on the promotion of renewable energy. Ukrainian government has made a commitment to introduce a mandatory share of renewable energy in the structure of total consumption in 2020 at 11%.

Achieving this goal depends on the Energy Strategy of the country, the new version of which is being developed by the National Institute for Strategic Studies [9].

However, the proposed draft of energy strategy, despite the declared support of renewable energy in practice does not account for the overall development potential of renewable energy sources (RES) in Ukraine.

Developed by the Institute of Renewable Energy reasonable forecasts indicate possible achievable level of implementation of renewables by 2035, taking into account both global and domestic trends of the industry. Available indicators confirmed the results of the studies presented in March 2015 by the International Agency for Renewable Energy (IRENA) in its "Road Map for Ukraine" (REmap Ukraine 2030) (Table 1) [6].

Instead, the government expects low growth in electricity production based on wind and solar energy, explaining the limited capacity of the electric power system to compensate for power fluctuations.

Table 1. Potential of renewable sources in Ukraine

Annual technically achievable energy potential		
(TWh/yr)		(Mtoe/yr)
Wind	60	15
Solar	38.2	4.2
Electricity	5.7	1.4
Thermal	32.5	2.8
Hydro	28.9	7
Small	20.1	4.9
Large	8.6	2.1
Bioenergy	178	21.7
Electricity	27	7.2
Thermal	151	14.5
Geothermal	98.6	8.4
Energy of environment	146.3	12.6

Source: REmap 2035 Background paper**.** Renewable energy prospects for Ukraine. April 2015

It should be noted the projected increase capacity of hydroelectric power stations and biomass, which in turn can be a source of backup power. According to the Institute of Renewable Energy, total annual technically feasible potential of renewable energy of Ukraine is 68.9 million tons of oil equivalent [7].

Action Plan for the implementation of the Energy Strategy should include a clear timetable for reconstruction and upgrade units generating capacity of Ukraine to ensure the necessary level of spare capacity, development of distribution, transmission lines and thermal energy networks Ukraine, in particular given the introduction of new generating facilities from RES.

The plan must determine actual funding mechanisms, involving private investments and credit resources and the support of the state through measures it can really use.

Regarding implementation of levels of different types of renewable, can bring examples of individual EU Member States, which developed national action plans on renewable energy by 2020. For example, Poland relies only on the development of wind and bioenergy, and their share is practically identical. The plans of Germany's 2050 energy consumption through renewable energy should reach 50% by the end of the century - about 100%. The aim of Denmark on development of renewable energy by 2030 - 50% of total energy consumption and in 2050 - 100% [2].

Analyzing plans of the EU with renewable energy, we can say that the first place is the

development of energy technologies without fuel, namely wind and solar energy, especially when the investments at such stations are lower than other technologies, and investors are ready to invest heavily in the development of renewable energy.

The intelligent development and use of the existing potential of all renewable sources should be provided, as well as the cost-effective, open investment market conditions in the interests of consumers and energy security.

By signing and ratifying the Association Agreement with the EU, Ukraine has chosen the European path. As part of the implementation of the EU Directive 2009/28 / EC, our country is not only required to perform tasks for 2020, but should strive to follow this trend in the future, the more it suits its interests.

CONCLUSIONS

So, today in the world, among other energy technologies, renewable energy shows the most dynamic development. Ukraine has the potential of renewable energy sources. Effectively using this capacity to 2035 can provide about 50% of total energy consumption from renewable energy sources.

Renewable energies have benefited from rapid technological progress lowering production costs and making them almost competitive with fossil energies. But they continue to suffer from their inherent handicap of intermittence which can only be neutralised by big investments in energy storage.

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TRADITIONAL REGIONAL PRODUCTS AS PART OF UNIQUE SALES PROPOSITION IN FARM TOURISM IN POLAND

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Abstract

This paper presents the importance of traditional regional products as unique sales propositions in tourism. Apart from a critical analysis of the literature relating to its subject matter and presentation of information from websites, a research method using a questionnaire survey is also used. The survey was conducted in 2014, among 246 respondents – inhabitants of the province. A casual non-random selection was used. On the basis of the analysis of the literature carried out, and as the author's survey also showed, both manufacturers and potential tourists are interested in the use of traditional regional products in rural tourism. The preferences of tourists regarding the desire to consume traditional products when in rural areas strengthen with age and education.

Key words**:** *rural tourism, traditional products, unique selling proposition*

INTRODUCTION

The rising expectations of tourists coming into the countryside mean that beyond the scenic attributes of farm tourism another important attraction is getting to know the local culture, cuisine or tradition. An important element making farm tourism attractive is the availability of traditional regional products, whose high nutritional values have been confirmed by the relevant certificates. These products are one of the important factors determining the choice of a specific tourist destination in Western European countries, as well as in Poland. For example, tests carried out in Italy suggest that these products take second place in the order of reasons (after the desire for relaxation) for using the services of farm tourism. Tourists are interested both in eating dishes created on the basis of traditional foods, as well as the possibility of direct purchase [2].

The aim of the chapter is to present the importance of regional tourism products as unique selling propositions, improving the attractiveness of what farm tourism has to offer.

In the structure of the tourist product in accordance with the concept of Levitt we can distinguish a few complex layers, forming its core (centre), and the actual and extended products [5].

From the point of view of the competitive struggle the most important product level is the extended, which should include the *Unique Selling Proposition – (the so-called USP*). This characteristic distinguishes the product from other offers, therefore, it should be displayed in the promotional message. Thanks to this, a tourist service can be seen as unique, definitely outstanding compared to other offers. These can be, for example, visual sensations associated with the rural landscape (e.g. wild places, heathland) and audial (e.g. rustling of leaves, birds singing), rich cultural heritage, rich culinary heritage, or the opportunity to participate in the field work and everyday life of rural families.

Among the distinguishing characteristics increasing importance is played by the opportunity to eat traditional food associated with local culinary heritage. This includes,

inter alia, traditional regional products, based on which culinary trails are becoming more and more popular, and are a big attraction for tourists.

The development of traditional regional products is part of a general trend observed for more than ten years in the sphere of consumption. As shown by Bywalec [1], after a significant deterioration of the nutrition level of the majority of society in the early 1990s, in the second half of the decade there appeared a beneficial process making slow but steady improvements in nutrition. These trends have increased in the 21st century, leading to greater importance of values such as youth, health, physical form and good looks, which are closely related to the type and quality of food consumed.

The developments taking place at the turn of the century are part of a new consumer trend referred to as LOHAS *(Lifestyles of Health and Sustainability*). It is defined by a move away from rapacious consumption, promoting healthy living, organic nutrition, sustainability and respect for the environment [6]. This trend has had a fundamental impact on the solutions used in the food industry, preferring natural, safe methods of processing and preserving food without artificial additives or preservatives. Examples of such products are traditional regional products, which are finding wider and wider use in tourism.

MATERIALS AND METHODS

In the paper, apart from a critical analysis of the literature relating to its subject matter and presentation of information from websites, a research method using a questionnaire survey is also used. The survey was conducted in 2014, among 246 respondents – inhabitants of the province. A casual non-random selection was used, taking into account the gender (51.6% women and 48.4% men) and age of the interviewees (20-44 years – 51.2%, 45-64 years – 32.1%, 65 years and over – 16.7%). In addition, reference is made to the results of a survey conducted by one of the authors in 2010 among 19 regional manufacturers of traditional products registered in the Ministry of Agriculture and Rural Development, operating within the province. The results of the research have made it possible to demonstrate the capabilities and scope of the use of traditional regional products in farm tourism.

RESULTS AND DISCUSSIONS

An important stage in the development of Polish traditional regional products was the entry into force on 17 February 2005 of the Act of 17 December 2004 on registration and protection of the names and designations for agricultural products and foodstuffs and for traditional products. From that point on, Polish manufacturers after passing through a certain procedure also have the right to use symbols certifying the unique nature of the products. The identification of the products protects them against unfair misappropriation of the name or copying.

The National List of Traditional and Regional Products of the Ministry of Agriculture passes on information and promotes products that are formed on the basis of recipes and methods used continually for generations. Traditional products are entered on the list whose quality, unique characteristics and properties result from the use of traditional methods of production. They represent elements of the cultural heritage of the region in which they are produced. The distinguishing feature of traditional regional products is their unique smell and taste, obtained in a natural way, without using “flavour enhancers”, based on rich culinary traditions.

An important objective of entering a name on the list of traditional regional products is also formal-organization preparation of producers of this kind of products for potential registration at the European Commission.

In Poland the list of products enjoys great interest and appreciation among consumers. This is confirmed by a systematic increase in the quantity of registered products. In 2006, 499 products were registered, in 2009 – 700 products, while in 2015 – 1475. Over the past six years the number of registered products has more than doubled. The leading places on the list are taken by three provinces: Podkarpackie (198), Pomorskie (173) and

Lubelskie (153).

Activity in the field of development of traditional products is becoming more and more noticeable in the Podkarpackie province. Podkarpackie has a very rich culinary heritage; it is becoming fashionable to rediscover forgotten tastes as well as promote the regional culinary art. Podkarpackie occupies the leading position in terms of the number of registered products. The rich culinary range also stems from the fact that the Polish traditions of the Podkarpackie province mingle with the customs of neighbours over the eastern and southern borders of the region, which further affects the uniqueness of the products.

Traditional regional products have become a major attraction for the development of tourism, including farm tourism. Products purchased by tourists at the farm, the farmers' market or festival once tasted are considered to be unique delicacies that enhance the farm tourism offer. The interest of potential tourists in regional products produced on the basis of traditional recipes is shown in Table 1.

Table 1. The expectations of potential farm tourists in terms of the availability of traditional regional products according to education (percentage).

Description	Total	According to education			According to age		
		Basic	Medium	Higher	20-44 years	45-64 years	65 years or more
Taking into account when choosing tourist offers the possibilities of consuming traditional products	50.8	44.1	49.6	54.5	45.2	51.8	65.9
Willingness to pay higher prices for traditional products in the course of a trip	46.3	29.4	44.2	54.5	43.6	49.4	48.8
Declared loyalty to tourist facilities offering traditional regional cuisine	43.1	26.5	45.1	46.5	34.9	45.6	43.4

Source: Own elaboration based on surveys

Table 2. Tourism as a market outlet for traditional regional products in the opinion of their manufacturers

Description	Total	According to education	
		medium	higher
products are offered to tourists in their own tourist facilities, including farm tourism	16.7	25.0	12.5
products are offered to tourists thanks to close cooperation with farm tourism holdings	25.0	0.0	37.5
products are offered directly to tourists through cooperation with collective tourism	16.7	25.0	12.5
I intend in the future to create markets in this way	33.3	25.0	37.5
I don't see the connection	8.3	25.0	0.0

Source: elaboration based on Kuźniar W. [4]

According to the study, nearly half of the respondents said they take the possibility of consuming traditional products into account when choosing between offers. It is noteworthy that with an increase in education there is more interest in traditional products, which translates into a willingness to pay higher prices for higher quality food. It should be noted that in the group of people with the lowest education (basic/vocational) less than 30% of those polled expressed such a wish. This group also has the lowest declared loyalty to tourist facilities offering traditional regional cuisine (on average every fourth respondent). Declared loyalty increases with the level of education of potential tourists. The data presented shows that the older the respondents, the more they prefer traditional products during tourist trips in the countryside. Such preferences are expressed by on average two out of three of those surveyed over the age of 65. Some of them, however, remain cautious in terms of their willingness to pay higher prices for traditional products. The greatest willingness in this regard was expressed by subjects in the age group 45-64 years, who at the same time declare the highest loyalty to tourist facilities offering traditional regional cuisine.

The interest of tourists in traditional regional products is seen by their producers, who try to incorporate it into their offer. From the research carried out by the author in 2010 among the manufacturers of traditional regional products, it appears that a large group is beginning to perceive rural tourism as an important outlet for their products (Table 2).

As is evident from the data presented, in 2010

on average every sixth producer of traditional products was associated directly with tourist activity, and registered products are offered to their visitors. Almost half of the surveyed producers at that time cooperated with tourist facilities operating in the local market, and every fourth directly with farm tourism, and another with mass tourism facilities. It should be noted that, on average, one third of those surveyed declared a desire to extend the market for their products in the near future, and only a small percentage did not see a relationship between selling their products and the development of farm tourism services.

Analysing the studied phenomenon in terms of education no significant relationship was observed. In summary it can be concluded that regional manufacturers of traditional products are becoming more and more aware of the importance of tourism, including farm tourism as an important outlet for their products.

According to their declaration in the future cooperation between the tourism operators and manufacturers of traditional regional products will expand, resulting in the creation of enduring relationships between them [4]. Thanks to this producers of products will be provided with fixed outlets and tourist operators, in particular tourist farms, will offer tourists the highest quality food products, which will lead to an increasing group of tourists coming to the countryside.

CONCLUSIONS

One of the attributes of food is its quality and traditional recipes, which have a particularly important role for tourists wishing to relax in the Polish countryside. These are in fact original recipes, based on home cooking and natural ingredients of meals, which is a guarantor of high nutritional value and good, often unique taste. The offer of traditional regional products is an important element of the so-called extended product, whose task is to distinguish a product on the market by offering a unique selling proposition. The development of these products and their use in rural tourism promotes a change in lifestyle of today's consumers, including in particular the greening and servicisation of consumption.

It should be noted that local and regional food products, especially those classified as traditional, are very good promotion for the regions, becoming at the same time an important local tourist attraction, thus linking them to tourism, especially to farm tourism, appears to be fully justified. Offering this type of farm products in farm tourism, regional inns, or during organized events during the tourist season, greatly enriches the tourism and gastronomic offer of the region, increasing the profitability of local agricultural production. Potential tourists are interested in access to traditional regional products during holidays in the countryside. Their preferences regarding the desire to consume traditional products while in rural areas strengthen with age and education.

In the light of the results presented, as well as on the basis of the literature of the subject, it should be expected that the coming years will bring an increase in the availability of traditional regional products during holidays in the countryside. The consequences of this will be both greater satisfaction of visitors, as well as expanding markets for regional products, which may become a "showcase" not only for particular tourist farms, but also for specific towns or municipalities, promoting in this way, all forms of tourism activity carried out in the given area.

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IMPROVING CONSERVATION PRACTICES TO PROTECT SOIL AND WATER QUALITY IN AGRICULTURE OF MOLDOVA

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Abstract

The paper presents the information on quality state of soil and water resources of Moldova. Currently, over 50% of soils are degraded by different natural and anthropogenic factors. Annual economic damage from soil degradation and land degradation consists 1.5-3.0 billion lei (MDL). Due to anthropogenic activities the content of humus in soils decreased from 5.6% (1870) to 2.5-3.0% (2015), the surface of eroded soils increased up to 850 thousand ha, which represents over 35% of the agricultural land area. It increased land area affected by landslides, which constitutes over 55 thousand ha of active landslides and 350 thousand ha of stagnation landslides. The water quality of small rivers after hydro-chemical indices was worsened. Water quality of small rivers is characterized by a high degree of pollution with ammonium ions, nitrite, oil products, phenols, anion-active detergents, etc. Irrigation with unconditional quality of waters leads to salinization and alkalization of soil cover. Preventing the soil degradation and water pollution can be achieved only through profound changes of awareness, behavioral and population management of natural resources.

Key words**:** *agricultural land, soil degradation, soil management, water quality*

INTRODUCTION

The main objective of Moldova as agrarian country and also for the entire world community is long-term preservation of the quality status and production capacity of the soil cover, along with environmental protection. After their composition and natural fertility the soils of Moldova belong to the most valuable, chernozems - 3/4 of the surface. It is characterized by the large diversity and variations related to horizontal and vertical zonality of relief, climatic and geological conditions [1].

Taking into consideration the global trends in rates of depreciation and irrecoverable losses of fertile soils areas and agricultural development, the problem of preserving soil and agricultural land quality is a strategic concern for food security [5, 8]. Intensive exploitation of soil and water resources in the Republic of Moldova in recent decades has led to their increased damage. Soil degradation and poor quality irrigation of water resources in the Republic of Moldova are the most serious problems existing at present [14, 7].

Agriculture is one of the main branches of the economy of the Republic of Moldova. In 2015, it accounted for 13% of GDP [2]. This sector provides employment to 26% of the working population of the country and welfare depends on the quality status of soil and water resources. The level of soil quality largely depends on crop yields, livestock sector development, export of food products, welfare and ecological situation in the country [1]. Agricultural land continues to be irrationally used and deteriorated, which harms the agriculture sector and environment.

MATERIALS AND METHODS

Research regarding quality status of soil and water resources has been of great interest in connection with considerable increase the surface of their degradation and pollution. The qualitative research methods (the general modality, the strategic approach, the study of reality) were used for analysis the documents and data published by scientist, by the Bureau of Statistics and Land Cadastre on study issues and computer assisted.

RESULTS AND DISCUSSIONS

Quality status of soil resources (Figure 1)**.** According to the situation of 01.01.2015 the land fund of Moldova constitutes 3,384.6 thousand hectares (th. ha). Agricultural land area is 2,500 ha (73.9% of the total area), including arable land - 1,816 th. ha (53.7%), perennial plantations - 295.3 th. ha (8.8%), meadows and pastures - 350.1 th. ha (10.3%), forest plantations - 465.2 th. ha (13.7%). In the Republic of Moldova, as in other countries, take place the reduction of arable land per capita. According to recent data this area is 0.407 ha [3, 9].

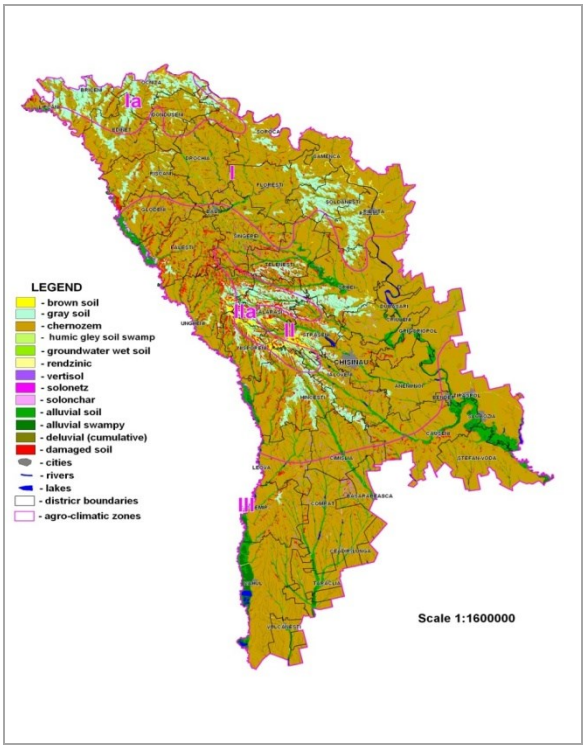

Fig. 1. Soil resources of Moldova

The current status of soil resources remains a concern, its use is inefficient, lack the measures of protection, improvement work is not performed. Thus, at present it is estimated follow facts [7]:

- The soils are subject to various land degradation processes, intensity and negative consequences of which grow from year to year;
- The soil surface affected by erosion processes, exceeding 1 million ha, annual increases by almost 1%;
-Periodically landslides activation occurs over an area of 80 th. ha;
-The humus reserves - the main source of energy and productivity of soils - are reduced, with about 1 ton per ha annually;
- As a result of deforestation of vineyards and orchards plantations over 200 th. ha of soils are used for other purposes, become the subject of active degradation processes, physical and chemical deterioration;
-The floodplain soils are in deplorable condition where they carried out the "leak adjustment";
- The areas under fallow soils (abandoned) increased, up to 250 th. ha.

The main forms of soil cover degradation are: erosion, dehumification, soil nutrient depletion, excessive compaction, salinization, alkalization, etc. Degradation processes and non application of agricultural technologies have led to reducing the production capacity of soils [14]. Dynamic of soil area in the period of 1965-2015 years showed a significant increase of surfaces with eroded land (Fig. 2).

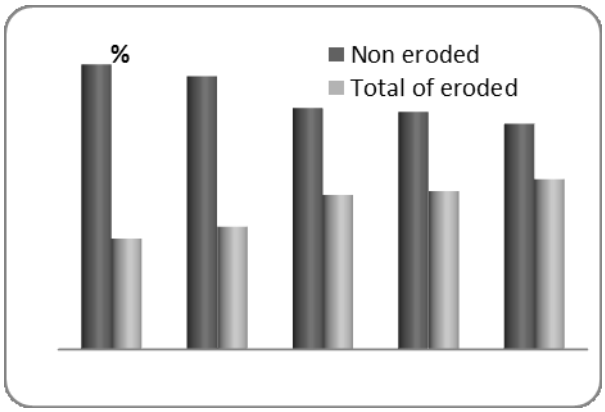

Fig. 2. Dynamic of degraded soils (1965-2015)

Soil erosion In terms of natural factor the soil degradation is caused by the placement of farmland predominantly on the slopes (about 80%), the torrential rains in the warm seasons, the predominance of weeding crops on slopes, emphasized relief. Surface and deep erosion, ravines, landslides, directly affect soil quality. The weak erosion reduces the productive potential (quality) of weakly eroded soil by 20%, moderately eroded - by 40% and strongly eroded - by 60-80% [6].

Over the past 30 years the surface of eroded soils increased by 224 th. ha, advancing by

about 6.4 th. ha annually, and representing currently about 880 th. ha or 26% of the total area. Highest level of agricultural land erosion is registered in Central Moldova - 43-56% [9]. The annual losses of fertile soil from agricultural lands due to erosion processes are estimated to 26 million tons, including: humus - 700 th. tons, nitrogen - 50 th. tons, phosphorus - 34 th. tons, potassium - 597 th. tones [1]. Indirectly, the erosion process has other consequences: siltation the ponds and other water bodies, soil and groundwater pollution by plant protection products and fertilizers, destruction of communication lines and hydraulic structures, etc. Due to the destruction of soil structure, saline and alkaline soils are more easily eroded by water and wind. Salinization induces desertification effects such as loss of soil fertility, soil structure destruction and compaction.

Soil dehumication. Reduction of soil quality is conditioned by dehumification processes (loss of organic substance). In cultivated soils due to the reduction of organic matter, the humus content decreases annually by 0.5-0.7 t/ha. At the same time, systematically reduces nutrient reserves by 150-180 kg/ha, which disturb the balance of nitrogen, phosphorus and potassium in the soils [15].The greatest losses of nutrients occur in the centre and south part of Moldova (Fig. 3).

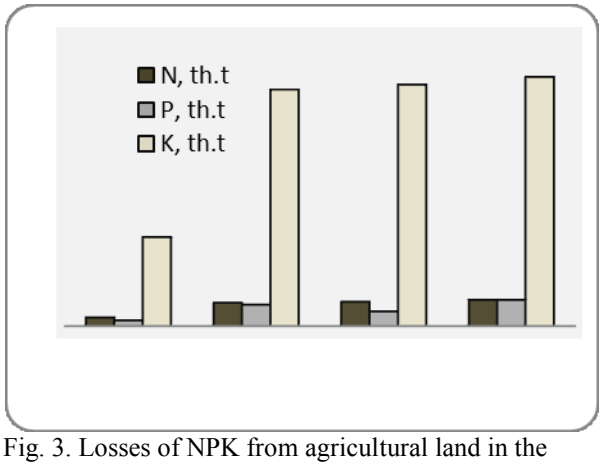

Fig. 3. Losses of NPK from agricultural land in the agropedoclimatical zones of Moldova

Negative balance of humus and nutrients cannot be changed and adjusted in terms of reducing the incorporation of fertilizers. In the 2000 yr. were applied 9 th. tons of fertilizers, in the 2014 yr. were used 53 th. tons, or more 44 th. tons, and organic fertilizers were used in a volume of 41.5 th. tons. At the same time, in many cases the livestock waste stored in landfills with other wastes or scattered on the banks of rivers and ditches in various unauthorized places [1, 7].

Excessive grazing is a specific phenomenon for the country with negative environmental impacts. Livestock of animals over prevail the rules set of heads on the 1 ha of pastures. However, most pastures, located on eroded land, are poorly productive. In these conditions no measures are taken to improve their quality due the lack of financial recourses.

Soil pollution. In addition to physical degradation and desertification processes in Moldova there is the problem of soil pollution. In recent decades the background of soils pollution became less important due to current sizeable reduction of diffuse sources of pollution. Were significantly reduced the quantities of fertilizers and pesticides in agriculture. No longer current the problem of pollution by nitrates and heavy metals. The content of lead in fuel used by transport was reduced, so diminished the soil pollution problem with this metal along the roads. It also produces at local level the soil pollution of farmland with mobile copper, the result of unregulated use of preparations containing copper [6].

But there is also the problem becomes more acute the local pollution of soils with different waste and harmful substances. Around localities is transported and stored chaotic waste of different categories and origin. Apart from waste deposited in places (ramps, platforms and polygons) approved and spontaneous, significant quantities of waste, predominantly solids are transported (thrown) in ditches, forest strips, canals and rivers, roadsides, damaged land. These wastes pollute the rural environment and, above all, the soil and water. Current still remains the local pollution of soils with persistent organic pollutants around former and current chemical deposits, resorts for preparation plant protection solutions. Thus, given the current state of soil resources and their quality the

following issues highlights in this sector [7]:
- Lack of the strategic and institutional framework for management and protection of soil resources;
- Inadequate management of soil resources characterized by a lack of agricultural crop rotation and anti-erosion measures, neglect best practices for soil conservation, excessive land parceling.
- Activation continues of soil degradation processes as erosion, compaction, salinization and alkalization, swamp, dehumification.
- Excessive soil pollution caused by waste and harmful substances, the irrational use of fertilizers and pesticides.
- Obsolete stockpiles of persistent organic pollutants and hazardous chemicals that lead to soil contamination.

But the greatest impact on soil quality favoring activation and intensification of degradation is caused by anthropogenic factor. Thus privatization and parceling of land, lack of agricultural crop rotation and anti-erosion measures, neglect good soil conservation practices, non-compliance of recommendation and necessary conditions to soil protection has complicated the possibility to implement an efficient and economic management of soil and water resources.

On narrow strips placed along the slopes, in the same direction is performed tillage (from hill to valley), which accelerates erosion. After landowners wanted, often with the best quality soils, considerable areas are excluded aside, others are left uncultivated and fallow.

Although, the environmental legislative framework is well developed, it is not correspond to international environmental initiatives and treaties and do not provide adequate management of natural resources to prevent environmental pollution and ensure the right to a healthy environment. This follows from the need for approximation of national legislation with EU directives.

Thus, in 2008 yr. was elaborated the draft of Law of Soil, for regulation the activities to provide protection, conservation and improvement of soil quality, based on scientific principles, agrotechnical and organizational mandatory for public authorities at all levels and landowners, but has not been approved so far.

Quality status of water resources for irrigation (Fig. 4). Compared to Eastern Europe and Romania the Republic of Moldova is a country with low water resources. Despite numerous accumulations achieve, the volume of surface water bodies and river flows is low. The density of the river system in the country is average 0.48 km/km^2. The main sources of supply the rivers are rainfalls and snowmelt precipitation. Rivers Dniester and Prut with corresponding portions of 630 km and 695 km make the border between Moldova, Ukraine and Romania. Annually, Moldova is crossed by 12 billion cubic meters of water on Transboundary Rivers Prut and Dniester.

This amount of water is more than sufficient for farmland irrigation works in our country. However, irrigation is in a deplorable state after 35 years of service.

The total area of irrigated land is 144.6 thousand hectares. Currently, there are 261 pumping stations for irrigation, of which 143 are functional and provide irrigation on the surface of 65 thousand hectares [4].

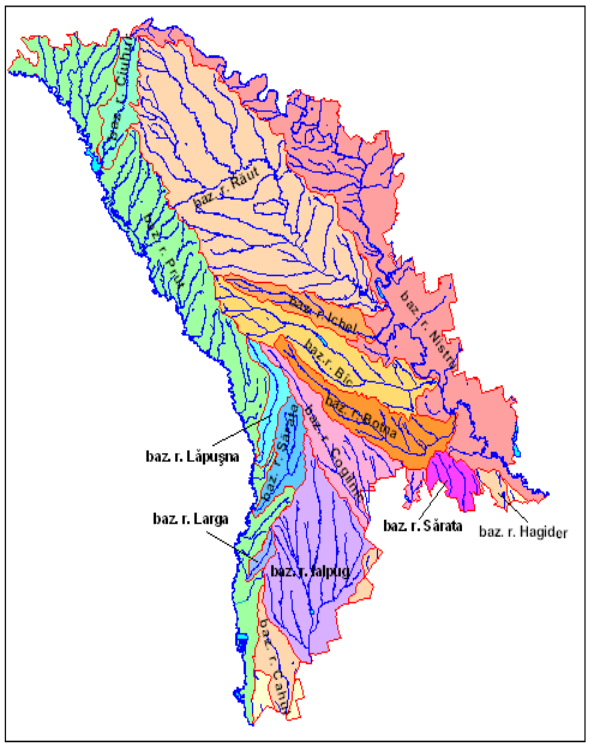

Fig. 4. Water resources of Moldova

It also can be used for irrigation the water from 400 of reservoirs across the country,

with which it can still irrigate 36 th. ha. For comparison, in dry years 2007 and 2009 were irrigated more than 30 th. ha of lands. In the 2012 year, only 14 th. ha are irrigated. A low level of irrigation potential is conditioned by the high price of water, price which in turn is dictated by the small number of users of this service [4].

The South zone of Moldova is most affected by drought and water supply to this area is the river Prut. By the 2020 years it is intend to increase irrigated areas to 300 th. ha, flood protected areas - to 95 th. ha, the irrigation rehabilitated areas - up to 121.6 th. ha, and those with new irrigation systems - up to 116 th. ha, and the creation of 32 water user associations [10].

Currently, however, just 34-36 th. ha are irrigated, i.e. only 2% of the total farmland. Do not use the total capacity due management model of irrigation systems and existing infrastructure. These systems have been designed under a centralized economy, where the irrigated surface was managed by a small number of farmers [10].

Improving agricultural practices of soil and water quality. Choosing improving practices within each category depends on the degradation factor, soil type, agropedo-climatically zone, water quality. Different type of soil and water respond differently to the same practices [13].

Organic matter management. Practices that increase organic matter include: leaving crop residues in the field, choosing crop rotation that include high residue plants and perennial herbs, using optimal nutrient and water management practices, growing cover crops, applying manure or organic residues, etc.

Local sources of organic matter and plant nutrition necessary substances consist of crop residues, organic fertilizers from livestock and individual households, organogenous waste from the processing industry of agricultural raw materials and urban communal household.

Tillage management. Reducing tillage minimizes the loss of organic matter and protects the soil surface with plant residue (alfalfa, sainfoin, ryegrass, and vetch).

Tillage system includes conservation measures for improving soil fertility, implementing on the experimental and production fields. The tillage system of soil fertility conservation are specified in each case, taking into account the total or periodic exclusion of the plowing with furrow return; keeping total or partial (30%) of plant residues on the soil surface; reducing the number of works; conducting the conservation the pedoameliorative works to improve the organic matter in the soils. Tillage system should provide the possibility of incorporating organic and mineral fertilizers in 20-30 cm layer and minimizing erosion processes on the slopes.

Chemical management. Efficient nutrient management means testing and monitoring soil properties, applying only the necessary chemicals at the optimal epochs and doses, and taking advantage of non-chemical approaches to nutrient management such as crop rotation, cover crops and manure.

Compaction management. Mini-till or subsoil tillage is only effective on soil with a clearly defined root-restricting plow pan. In the absence of plow pan, subsoil tillage to eliminate compaction can reduce yield. Prevention, not tillage, is the way to manage compaction [11].

Residue management. Ground cover protects soil, provides habitats for larger soil organisms, can improve water availability. Soil can be coved by leaving crop residue on the surface or by planting cover crops. In additional to ground, living cover crops increase organic matter, and continuous cover and food for soil biota [12]. Ground cover must be managed to prevent problems with delayed soil warming in spring, diseases, and excessive build-up of phosphorus at the surface.

Irrigation water management. Environmental requirements to quality irrigation water provide exclusion the development of degradation processes or worsening of soil properties. Not recommended to use for irrigation the water containing mineralization above 1 g/l.

Diversity management. Diversity is beneficial for several reasons. Each plant contributes a unique root structure and type o residue to the

soil. A diversity of soil organisms can help control pest population, and a diversity of cultural practices can reduce weed and disease pressures. Diversity across the landscape can be increased by using buffer strips, small fields, or contour strip cropping; by using long crop rotations [8, 12]. Changing vegetation across the landscape or over time not only increases plan diversity, but also the soil flora and fauna in the fields.

CONCLUSIONS

Preventing the soil degradation and water pollution can be achieved only through profound changes of awareness, behavioral and population management of natural resources. For reviving the agriculture, improving the land use situation and protection of natural resources are necessary actions for improving the system of tillage, to implement the comprehensive measures to prevent erosion and landslides, creating green protective housing, land improvement and soil fertilization.

Water quality of small rivers, is characterized by a high degree of salinity and pollution. Soil irrigation with unconditional water quality leads to soil and vegetation cover salinization.

Due to the deterioration of soil structure, saline and alkaline soils are more easily erosion. Salinization induces desertification effects such as loss of soil fertility, soil structure degradation and compaction.

For reviving the agriculture, improving the land use situation and protection of natural resources are necessary actions for improving the system of tillage, to implement the comprehensive measures to prevent erosion and landslides, creating green protective housing, land improvement and soil fertilization.

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THE IMPEDIMENTS EXISTING IN THE INVESTMENT PROCESS IN THE REPUBLIC OF MOLDOVA

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Abstract

This paper presents an analysis of the impediments that arise in the investment process in the Republic of Moldova. Although the investment in agriculture in the period 2009-2015 grew much faster than the investment in the economy and other areas, problems and obstacles that appear relate to several factors. Starting from the decisive role that agriculture plays in the sustainable development of the Republic of Moldova's economy, addressing the problems that hinder its development, in terms of investment, is very important as Agriculture and Food Industry in the Republic of Moldova are the most important sectors, designed to contribute to the increase of our economy.
Thus, the need to assess the existing impediments in the investment process of the agricultural sector defined the topic of our research.

Key words**:** *financial assistance, impediments, investment, international projects*

INTRODUCTION

Agriculture today enjoys special attention in all countries, regardless of their economic development. As a main branch of the Moldovan national economy, agriculture stands out as a particularly complex field; its complexity is determined by the role of agriculture in economic development and its economic and social peculiarities. The analysis showed that the number of investments for different areas from the EU and the US amounted to hundreds of millions of Euro; a big part of them being offered to agriculture.

The suspension of external financial assistance for the Republic of Moldova at the end of 2015 as a result of lack of reforms and corruption, combined with the Russian Federation's embargo on Moldovan food products, produced a devastating effect on the economy of the country.

However, we should mention that the increase of investments in agriculture is one of the basic factors that contribute to the economic growth, to the comprehensive improvement of the national economy, to solving the problems of retrofitting and modernization of agricultural enterprises in the Republic of Moldova.[9]

The issue of investment and economic growth has been researched by a large number of authors in their fundamental scientific works and publications in specialized journals, but some of the theoretical and methodological aspects are not sufficiently developed by renowned scholars in this field of research. Thus, having studied a large number of scientific papers on the subject we can see that the instruments of investment mechanism in agricultural sector, that will ensure sustainable economic growth, have not been finalized. Thus, the continued need for investment process in agriculture has defined the topic of our research that is influenced by the following factors:

a. scientific and practical importance of the problem and the need for further research of funding instruments in the agricultural sector to ensure the economic growth of the sector;

b. the need to improve and develop a viable mechanism for the growth of the agricultural sector in terms of investment.

MATERIALS AND METHODS

The material used for the undertaken research consisted in the research, analysis and

interpretation of data from specialty literature. There were used such research methods as: analysis, comparison, deduction, monographic method. The information was gathered from the sources published by the National Bureau of Statistics, the National Agency for Employment, reports of various national and international bodies.

RESULTS AND DISCUSSIONS

The investment process means all activities, works and operations carried out over a period of time, implying material, financial, human and information resources through the intervention of various political, economic, financial and social factors in order to achieve economic, social and other objectives,. "Investment is the primary factor in national economic development strategy, it is important for all branches and industries, for revenues increase, it is the condition of raising the standard of living" [8].

Before investing, any investor analyses the investment climate and the investment potential of the state and of its economic sector, which, we consider, reflects their investment attractiveness.

The concept of “investment attractiveness” can be formulated and applied both at the level of an enterprise and at the level of a sector. Being considered as a normative one, this concept is used as a criterion for assessing the competitiveness of the sector. Thus, the competitiveness of the national economy is determined by its investment attractiveness. The process of research related to determining investment attractiveness operates with such categories as:

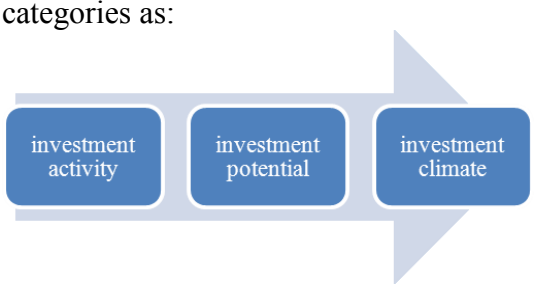

Fig. 1. The structure of investment attractiveness

The investment attractiveness reflects the subjective attitude of the potential investors towards the investment object.

The investment climate reflects the level of readiness of the social, environmental and economic system to the investment process or the objective situation of the external environment of the investment object.[1]

The notion of investment climate can be defined as the environment in which the investment process of economic units takes place, the totality of social, economic, political , legal, institutional, cultural premises that determine the attractiveness and usability level of investment implemented in an economic system. [3]

Most economists from the Republic of Moldova are of the opinion that the development of the country depends on the efficiency of all the components of investment sphere, supporting the idea of the positive impact of investments on economic development.

However, investment attractiveness of the Republic of Moldova, including the agricultural sector, has a downward trend due to the increasing number of factors that reduce the investment attractiveness of the country. [5]

However, according to the report "Doing Business 2015" ("Doing Business 2015"), and the study "Cost of doing business 2014" ("Cost of Doing Business Survey 2014 ') the Republic of Moldova has made substantial progress in simplifying the regulation of economic activity and in improving the investment climate and business environment, but this progress has been irregular. In the report "Doing business 2015: Beyond efficiency" the Republic of Moldova is rated 63rd of 189 economies, an improvement of 19 places comparing to the previous year. This increase is due to the fact that the Republic of Moldova has eased business start-up by cancelling the minimum capital requirement, has eased tax payment through the introduction of an electronic system for completing the documents and for the payment of social security contributions. On the other hand, it has increased the minimum wage used to calculate the amount of environmental tax. [2]

The main factors that make Moldova attractive for foreign investments are:

1. The advantageous location of the state - it is a link between the East and the West and it has a favourable geographic location in the centre of Europe.
2. Fertile soils (80% of the territory is the black soils) -Moldova is rich in fertile soils. We have opportunities for ecologically clean production of goods. Agriculture is one of the areas that would most interest the foreign investors.
3. Low and qualified labour force - Moldova has skilled labour force, available at much lower prices than in many other European countries.

In market economy the main source of investment financing are own funds formed on the basis of profit obtained from economic activity or other financial means.[10] In most cases, the agricultural enterprises own insufficient resources to finance the necessary investments. Thus the farmers use borrowed sources such as bank loans, deposits from the founders or other funding sources. It is obvious that the role of credits in financing investment projects is a positive one; they contribute to the modernization of agricultural enterprises. But at the same time the interest payment is a burden which leads to reduced economic efficiency of production during the period of loan repayment.

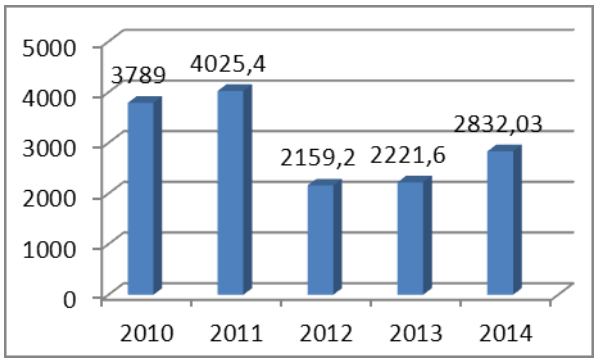

Fig. 2. The value of loans granted to the agriculture, mil. MDL

Analysing the data NBM (Fig.2), we can see a slow decrease of loans offered by commercial banks for the development of agriculture in 2010-2014.

However, in order to help increase the efficiency of the agricultural sector, there was introduced the concept of agricultural loans extended by commercial banks of the Republic of Moldova and agreed by donors. Loans are granted to farmers to support agricultural development.

Thus, in 2014, there were awarded 956.9 mln. lei (9.5%) for investments in agriculture less than in 2010. The main reason why farmers give up investments made from bank loans is the suffocating rate of interest on the loans offered by commercial banks and the value of the pledge required by the banks. Another reason why the value of the loans offered to agricultural and food sector constitutes only a very small part of total loans is the fact that low income and low financial strength make farmers a less attractive target for commercial banks. Analysing the loan portfolio we can see that in 2013 only 12% of total loans were granted to food sector, 4.4% less than in 2010. Of these only 7.18% are used for agriculture. The most active banks that offer credits in this area are Moldova Agroindbank (30.93%), ProCredit Bank (23.89%) and Victoriabank (19.17%). The volume of the loans in this area doesn't depend too much on the price of these loans, e.g. Moldova Agroindbank grants loans at interest of 12.74% in MDL and 6.84% in foreign currencies, Victoriabank - 10.9% in lei and 7, 03% in currency and t ProCreditBank grant loans at interest of 17.28% in lei and 8.26% in foreign currency.

The purpose of granting loans for agriculture is to make long -term investments in performance equipment, in irrigation equipment, in the establishment of adequate premises for livestock growing, in the maintenance of plantations and others, all of them designed to increase agricultural production.

Experts say that in recent years there have increased the dependence on external sources of financing capital expenditures in agriculture. "The imposing dynamics of capital allocations during 2010-2015 was provided predominantly by higher volume of external grants and credits for agriculture. The largest increase in this area was recorded in 2012 and 2013; the volume of capital expenditures from external sources exceeded the expenditures from internal sources".

The result of those trends was a sharp rise in

the share of external sources from about 39% at the beginning of the period to 58% in 2013.
From the total 43 projects, which were entitled to grant, only 27 projects or 56.2% have already been implemented and 10 projects are to be completed during 2016. Thus, in 2017- 2018 only 11 projects will be in working, which shows a rather low rate of contacting the new funds compared to previous years. A number of other donors have contributed to the implementation of vital projects in agriculture: United Nations (UN), World Bank (WB), and European Investment Bank (EIB). And several countries have granted individual assistance: the Czech Republic, Switzerland, Poland, Romania, the USA, Sweden, etc.
Despite the internal dissensions, a number of projects in agriculture had great success. They are:

- Compact Project (2010-2015), funded by the US through Millennium Challenge Corporation.
- "Competitive Agriculture" Project (MAC-P) from 2012 to 2017, the World Bank, the Government of Sweden.
- Agricultural Competitiveness and Enterprise Development Project (ACED) (2011-2016), funded by USAID and the Millennium Challenge Corporation.

Several other projects also contributed to improving certain subdomains of the country's agricultural sector, the most important are:

- IFAD 5 (2011-2016), financed by Denmark and the UN.
- IFAD 6 (2014-2020), Global Environment Facility funds and Denmark.
- ENPARD (2015-2022), funded by the EU.
- Assistance Project for unprivileged farmers 2KR funded by the Japanese Government.
- However, a number of projects remained at the "waiting" stage as for example:
- Support Program of the Government of Poland (initiated in 2014) amounting to 100 million EUR. The aim of this project relates to the agro-food production and development of poultry, meat and milk processing. Right from the beginning of the initiation dissensions arose referring to the project implementation.
- "Orchard of Moldova" Project, aimed to develop the horticultural value chain. Under the contract signed by the Republic of Moldova and the European Investment Bank (EIB) the implementation of the project with a budget of 120 mln. EURO was planned for 2014-2020. The project's authors estimated that about 300 businesses and 52,000 farms could benefit from the program. The big problem was, however, the transparency of banks in the Republic of Moldova, which didn't suit the funder.[7]

Meanwhile, a large number of international funding and donor agencies such as USAID, SIDA, IFAD, Soros Foundation, organizations in Japan (Moldovan-Japanese project 2KR), Poland, Germany and the Netherlands, have increased their efforts to support agricultural activities, including investment grants, low interest rate loans, bank guarantees and technical assistance.
However the share of FDI in agriculture remains quite small, although in 2011 it increased to 2.85% and constituted 4.36% of the total volume of investments in agriculture compared to 1.51% in 2009, having a slight reduction of 0.23% in 2012 which indirectly confirms the instability of foreign investments in Moldova's agricultural sector. Investment activity in the Republic of Moldova is coordinated by legislation in force. The first legislative act that stipulated investment activity was the Law on Foreign Investment, no. 998 of 01.04.1992. [6]. In 2002, the Government adopted the Decision on the investment strategy in the Republic of Moldova, which stipulated the activities related to the investment system:

- ensuring a favourable investment climate;
- attracting foreign and local investments;
- businesses access to investment loans for modernization of enterprises;
- implementing investment projects;
- creation of a database on investment programs. [4].

In order to increase investments there has been developed the State economic growth strategy, the Bank for Development and Investment of the Republic of Moldova and the National Agency were created to attract investments. Agrarian sector activity also is coordinated by a series of laws, decisions and programs meant to recover and streamline the

activities in the sector.
The Republic of Moldova could unlock additional investments solving other regulatory problems. These problems vary in the degree of restrictions, complexity and unpredictability. With the outbreak of the crisis, investments in the EU and in Moldova have decreased significantly.
Some economists believe that the level of investments will increase, but the recovery could remain low, reflecting weak demand, deleveraging of enterprises, stricter lending conditions. The identification and elimination of these obstacles to investment is a part of the efforts to improve framework conditions and to eliminate bureaucracy and regulatory bottlenecks, as a part of the so-called "third pillar" of the Investment Plan for Europe.

CONCLUSIONS

The carried out research allows us to highlight the following impediments that contribute to the decrease of investment attractiveness of the Republic of Moldova:
1. Political instability;
2. Bureaucracy, corruption and protectionism. For most foreign investors corruption is the main obstacle to doing business. Domestic and foreign investors are not satisfied that the bureaucratic formalities require a very long time and high costs;
3. The dependence of the economy on energy resources limits foreign investments in domestic-oriented sectors. The interruption of oil and gas supply will lead to halting economic growth, which will lead to the reduction of the country's attractiveness to foreign investors;
4. Instability of secure legislative basis. This phenomenon can lead to a high risk of change in legislation, to changes in economic and legal mechanism of regulation by the state of foreign investments, that doesn't correspond to reality;
5. The low level of business culture towards the investor;
6. Lack of confidence in the banking system. Low efficiency of other agents of the domestic financial market (insufficient development of the securities market, of insurance companies, of the pension funds);
7. Market information and limited market access;
8. Food quality and safety remains unsatisfactory.
9. Low level of technical assistance in project implementation.
10. Providing technology for storage and processing of agricultural production.
It should be noted that the main purpose of investment must be directed towards the recovery of agriculture and increasing the living standards of people living in rural areas. It is necessary that all opportunities for agricultural growth and the development of rural areas should be reviewed and valued, both by adequate investment and by developing or updating integrated rural development strategies. Thus, knowing the mechanisms of intervention in the policy of agricultural sector development policy and the efficient use of the agricultural practice of developed countries are the necessary premises to build a functioning market economy.
In many parts of the country, agriculture is at the limit of subsistence: productivity is very low, products competitiveness is modest, and the products are sold at very low prices. Among the causes of the poor state of agriculture is excessive land fragmentation, poor mechanization of agricultural enterprises, competition from foreign states, modest state support, insufficient financial resources and few opportunities to attract foreign investments.
Thus, attracting investment becomes a strategic priority of farmers at present moment because investment is the material support of economic growth. The modernization of agrarian sector and of production capacities can be made only on the basis of considerable investments. Increased investment in agriculture is one of the basic factors that contributes to economic growth and improvement of comprehensive national economy, solving the problems of retrofitting and modernization of agricultural enterprises in the Republic of Moldova.
Although in the past decade there were made massive investments in agriculture, they did

not contribute to the sustainable growth of the sector. Moreover, animal and plant production practically did not increase in real terms, according to the analysis prepared by the Expert Group. Experts believe that the cause of this stagnation is inefficient allocation of financial resources.

At the same time budgetary transparency is poor. While the institutional framework responsible for agriculture has progressed quite significantly, in terms of budgetary transparency and reporting to the institutions responsible for agriculture the results are more modest. In this regard, experts point out that the low level of budgetary transparency does not allow the analysis of the expenditures impact on the economic growth in the agricultural sector.

The study considers successful the launch of BOOST database in 2010 and the publication of quarterly and annual reports on MAIA budget execution since 2014. However, the overwhelming majority of public institutions and state enterprises operating in the sector do not publish progress reports. "Of all the institutions analysed in this category, only AIPA and MAIA publish such reports, but without being accompanied by any narrative explanation ", the authors of the analysis say.

The agricultural sector and the entire economy of the Republic of Moldova are facing increasing technical and scientific implications, whose "products" require for their application in manufacturing important investment funds. Mechanization, automation and robotics of production cannot become realities without spending by the state and the whole society major investment funds. For Moldovan economy investments are the key driver of sustainable growth and one of the main factors that can decrease the gaps between our country and economically advanced countries. Only through proper use of investment resources we can create new jobs, increase the gross national product per inhabitant, increase labour productivity and, as a result, the quality of life.

The EU Commission, EU countries and the US government gave assurances that they would continue to support Moldova's economy, but they conditioned their support with stronger measures to combat corruption, including high-level, and the recovery of banking system, which is currently in a very deplorable situation.

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THE CULTIVATION OF LUCERNE ON MINERALIZED PEAT SOILS IN BELARUS

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Abstract

The data on efficiency of a lucerne (Medicago sativa) of the sowing campaign cultivated on the antropogenically transformed peat soils of Polesye with the content of organic substance of 13-26% and the level of ground waters more than 0.8 m are submitted. Productivity of lucerne herbage can reach depending on applied agro- and biotechnological methods. It is established that efficiency of a lucerne herbage can reach 56.8-87.9 centner feed units per hectare depending on the applied agrobioprocessing methods. At cultivation of a lucerne on such soils without cover culture (the doubled norm of seeding) more effective in comparison than under winter pea and oat mix. This mode provides an increasing of feed units per hectare by 13.8-26.1; digested protein content by 1.4-2.6 and exchangeable energy by 15.83- 30.61 GJ per hectare.

Key words**:** *antropogenically transformed peat soils, Belarus Polesye, lucerne, productivity, ways of sowing*

INTRODUCTION

At the high level of efficiency of animal husbandry and its further building the main problem of a forage production demanding the fastest decision is imbalance of forages on protein. The lack of fiber in diet leads to the over-expenditure of forages and in a consequence to rise in price of animal industries production. Because of not equation of fodder diets on a protein in daily fodder balance on 20 % the shortage of cattle-breeding production reaches 30-40 %, and its cost price and the expense of forages increase 1.5 times. On scientifically proved norms on one fodder unit should have digested protein in diets of cows – 102 r, growing young growth of large horned livestock (Cattle) – 107. Actually in republic the maintenance of digested protein in forages is 25-30 %, below the zootechnical norms.

To solve a problem of fodder fiber it is possible by realization of a complex of actions: introductions in manufacture new, high-yielding bean, including long-term, cultures; cultivating them on soils, before considered unsuitable for cropping of long-term bean grasses, for example, lucernes; perfection of technologies of cultivation and increase of productivity of bean cultures; optimization of structure of areas under crops with increase in relative density of the bean cultures giving the greatest exit of fiber.

It is possible to increase balance of own forages protein in the region by expanded of the areas under a lucerne on antropogenically transformed peat soils. The peat soils transformed in the course of agricultural use have favorable water-physical and agrochemical parameters [2, 6, 7] and now are suitable for lucerne [3, 4].

The aim of study – to prove and develop a complex of the agrotechnical processes allowing to cultivate a lucerne effectively for forage on the antropogenically transformed peat soils of Polesye.

MATERIALS AND METHODS

Researches were run in the period 2010-2012 on peat-mineral and mineral residual-peat soils on Soligorsk area of the Minsk region. The agrochemical characteristic of soils: OB 13.0-26.0 %, pH_{KCl} – 5, maintenance P_2O_5 ~ 271 mg/kg, K_2O ~ 644 mg/kg of soil, CuO ~ 0.6 and ZnO ~ 5.2 mg/kg of soil, groundwater levels (GWL) 1.0-1.2 m. Capacity of arable horizon of 0.25-0.35 m,

from depth is spread by sand.

In experiment it was used the lucerne cultivar Birute. The scheme included integumentary and uncoated sowing of a lucerne against $N_0P_0K_0$ (control), $P_{60}K_{90}$ and $P_{90}K_{90}$. In experience it was estimated the influence of various ways of preseeding processing of seeds: a mix ammonium molybdate (25 g per centner) and boric acid (25 g per centner) (trace elements (TE)) or effective immuno- and growth-enhancement a complex of connections triterpenoid acids (BAS). Seeds without processing by preparations sowed against a starting dose of nitrogen – N_{30}. For prevention of the diseases, all seeds before crops have been treated with fungicide (a. i. benomil, 500). Integumentary culture was winter pea and oat a mix with the reduced norm of seeding on 40 %. Lucerne under a cover sowed at norm of seeding 12 kg per hectares, uncoatedly – 25 kg per hectares [1]. In the first year (under integumentary culture 1 hay crop) and the life of a lucerne second years was spent by 2 hay crops, for the third year of a life – 3 in a budding phase – the flowering beginning.

Influence of various agrobioprocessing methods on productivity and efficiency of lucerne herbage estimated by the following criteria: to quantity of the truncated vegetative runaways in the beginning regrowth for the second and third years of a life of grasses; to botanical composition of herbage, its productivity and efficiency; economic efficiency of various receptions.

The weather conditions in a year of crops (2010) and the third year of a life of grasses were close to the average long-term values of region of Polesye. The weather conditions of 2011 were not typical and at the water mode have considerably affected herbage formation. So at the raised temperatures of May and June the shortage of deposits is noted. 2-3 decades of May and 1-2 decades of June were without rain, and their basic quantity has dropped out in the end of a month, having exceeded the norm of 29 mm. The rainfall in July was 2.1 times higher in comparison with average long-term values. In August and September an amount of precipitation in 1.2 and 1.6 exceeded norm. Regular rains during the season provided the constant level of ground waters (GWL) 0.95 m. The temperature slightly (on 2-3 ^oC) exceeded average long-term values. Thus, in 2011 the lucerne after the first hay crop because of a lack of moisture was in a rest stage a long time, a large amount of rainfall and GWL in the second half of summer only 2 hay crops allowed to promote.

For calculation of economic efficiency of cultivation of a lucerne technological cards in which considered expenses for all kinds of works, and also cost of fertilizers, seeds and means of chemicalixation for 2010-2012 have been made. Tables included following works: the basic and preseeding processing of soil, crops, care of crops, harvesting, transportation of the crushed weight to a consumption place, thus gave attention to amount of works, structure of the unit and its development, work expenses, the fuel expense, material requirements, and also to operational expenses. For an estimation of economic efficiency of cultivation of cultures the indicator conditional (settlement) profit, as financial result of the conditional fact of economic activities has been made, which can change (abstract hectare without soil characteristics, without the VAT, etc. taxes etc.) [5]. Haylage lucernes counted cost of fodder unit through cost of fodder unit of oats.

RESULTS AND DISCUSSIONS

Data of long-term researches with a sowing campaign lucerne on the antropogenically transformed mineral residual-peat and postpeat soils with maintenance OB less than 10 % prove, that these soils are suitable for cultivation of this bean culture [3, 4]. However working with the cultivation technology which includes ways of preseeding processing of seeds and sowing, a dose of fertilizers was necessary for its wider distribution to manufacture. For this purpose on the antropogenically transformed peat soils with organic substance maintenance about 20 % multifactorial field experience has been put in pawn.

The influence of various biotechnological methods is noted at all stages of formation of

efficiency. At uncoated sowing within the first year of life for more developed plants which in the beginning of the vegetative period of the second year of a life have formed in 1.12-1.51 times more than the truncated vegetative runaways in comparison with the plants developing under integumentary culture (tab. 1) were generated. Even on a variant without fertilizers the quantity of runaways of a lucerne was on 140 pieces/m^2 more than sown under a cover winter pea and oat mixes.

Table 1. The vegetative truncated runaways (piece/m^2) sowing campaign lucerne

Variant	Under a cover		Uncoatedly	
	The beginning of the vegetative period 2011	The beginning of the vegetative period 2012	The beginning of the vegetative period 2011	The beginning of the vegetative period 2012
$N_0P_0K_0$	700	1,500	840	1,067
$P_{60}K_{90}$-N_{30}*	644	1,033	720	1,022
$P_{90}K_{90}$-N_{30}*	580	1,311	840	1,333
$P_{60}K_{90}$-TE*	520	1,191	632	1,211
$P_{90}K_{90}$-TE*	508	1,233	720	1,400
$P_{60}K_{90}$-BAS*	632	1,011	952	1,333
$P_{90}K_{90}$-BAS*	652	1,289	984	1,439
Least significant difference 05 t ha^{-1}	72	85	84	116

The note. * mineral nitrogen brought only in a year of crops, preseeding processing of seeds by trace elements (TE) or BAS

Influence of doses of fertilizers on formation of runaways in the second and third years of a life of a lucerne depending on ways of sowing are various. It is noticed, that the increase in a dose of phosphoric fertilizers with 60 to 90 kg a. i. ha^{-1} (kg of active ingredient) at uncoated sowing increased quantity of the truncated vegetative runaways by 120 pieces/m^2 on a variant of preseeding entering of starting doses of nitrogen, 88 pieces/m^2 on a variant of preseeding processing of seeds a mix of microcells and did not influence at processing of seeds BAS. At crops under a cover winter pea and oat mixes because of high productivity of its green weight the tendency of decrease in quantity of runaways and only on a variant of preseeding processing of seeds BAS the tendency to their increase (tab. 1, 2) is noted.

In the beginning of the vegetative period of the third year of a life of a lucerne the quantity of the truncated vegetative runaways at uncoated a way of sowing was authentically above on a variant of preseeding processing of seeds a mix of microcells against $P_{90}K_{90}$ (on 167 pieces/m^2) and preseeding processing of seeds BAS against $P_{60}K_{90}$ (on 322 pieces/m^2) and $P_{90}K_{90}$ (on 150 pieces/m^2). On other variants of distinctions in number of the truncated vegetative runaways it is not revealed. Thus, at crops under a cover at sufficient level of a mineral food within the second year of a life of a plant of a lucerne are capable to generate well developed run even at smaller norm of seeding of seeds in comparison with uncoated sowing with double norm of seeding.

Table 2. Productivity of green weight of lucerne herbage depending on biotechnological methods

Variant	Productivity of green weight, dt ha^{-1}				
	2010 r.		2011 r.**	2012 r.	average productivity a lucerne herbage
	winter pea and oat	lucerne			
under a cover winter pea and oat mixes					
$N_0P_0K_0$	294.7	163.6	464.3	766.7	464.9
$P_{60}K_{90}$-N_{30}*	296.0	240.9	434.8	872.0	515.9
$P_{90}K_{90}$-N_{30}*	336.0	178.8	515.8	821.3	505.3
$P_{60}K_{90}$-TE*	237.0	189.8	427.2	873.6	496.9
$P_{90}K_{90}$-TE*	299.0	275.0	460.3	855.2	530.2
$P_{60}K_{90}$-BAS*	297.0	234.1	450.9	942.9	542.6
$P_{90}K_{90}$-BAS*	293.0	195.5	498.3	828.9	507.5
HCP_{05}	25.3	18.2	40.1	73.5	42.2
uncoated sowing					
$N_0P_0K_0$	-	495.0**	430.1	786.7	570.6
$P_{60}K_{90}$-N_{30}*	-	560.0**	476.5	928.0	654.8
$P_{90}K_{90}$-N_{30}*	-	532.8**	556.8	855.9	648.5
$P_{60}K_{90}$-TE*	-	517.9**	426.2	999.2	647.8
$P_{90}K_{90}$-TE*	-	582.8**	539.4	986.7	702.9
$P_{60}K_{90}$-BAS*	-	600.4**	561.9	872.3	678.2
$P_{90}K_{90}$-BAS*	-	493.9**	506.1	1058.5	686.2
HCP_{05}		46.7	43.1	80.0	58.9

Notes: * mineral nitrogen brought only in a year of crops, preseeding processing of seeds by trace elements (TE) or BAS; ** total productivity for 2 cutting

Formation of plants on years of a life of a lucerne defines productivity, quality of a herbage (a share of a bean component in it) and according to its efficiency. It is established, that at integumentary crops productivity of green weight of a herbage more low in comparison with uncoated sowing on 106-179 dt ha^{-1} (tab. 2). In the first year at uncoated sowing the lucerne has generated 2 hay crops with productivity of green weight 494-600 dt ha^{-1} depending on applied biotechnological methods. At crops under a cover winter pea and oat mixes – one

hay crop in the beginning of September (164-275 dt ha^{-1}). The winter pea and oat mix has generated 237-336 dt ha^{-1} of green weight.

In the first year of a life of grasses the herbage consisted on 25-50 % of a bean component at crops under a cover and on 41-50 % at uncoated sowing depending on ways of processing of seeds and applied doses of fertilizers. The weed vegetation has been presented to the life first year of annual plants: *Amaranthus spp.*, *Galinsoga parviflora L.*, *Chenopodium album L.*, *Sinapis arvensis L.*, *Matricaria spp.*, *Echinocloa crussgalli L.*) and biennials – *Melandrium album Garcke*. The next years the lucerne share considerably increased and reached more than 70 % depending on applied biotechnological methods (tab. 3).

It is noticed, that in the first hay crop the share of weed vegetation was in 1.5-2 times above, than in the second and the third. It is feature of the antropogenically transformed peat soils in which in the spring in soil the superfluous quantity of mineral nitrogen is formed and at the sufficient maintenance of mobile forms of phosphorus and potassium, weeds well develop till the regrowth moment a lucerne herbage. For 2 and 3 years of a life of a lucerne the weed vegetation is presented basically by cereal grasses: *Poa praténsis*, *Echinocloa crussgalli L.*, *Elytrígia répens*). The botanical structure of weeds did not depend on a way of sowing.

Lucerne crops under a cover winter pea and oat have rendered to a mix beneficial effect (for the account phytocoenotic effect) on botanical structure of a herbage only on a variant without fertilizers. The share of a bean component on this variant on the average was above on 11 % and 3 % in comparison with a variant uncoated sowing (tab. 3). The variation on hay crops and years of researches was within 3-13 %. On variants of entering of mineral fertilizers the opposite tendency is noted. Improvement of a mineral food stimulated lucerne growth. So at uncoated sowing the share of a bean component in a herbage has on the average increased by 8 % in the second year of a life of grasses and on 7 % in the third.

Table 3. Influence biotechnological methods on botanical structure of a lucerne herbage

Variants		Botanical structure, %					
		2011		2012			average for 2 years
		I cutting	II cutting	I cutting	II cutting	III cutting	
		under a cover					
$N_0P_0K_0$	lucerne	56	91	61	85	90	76
	weeds	44	9	39	15	10	24
$P_{60}K_{90}$-N_{30}*	lucerne	52	79	58	87	82	71
	weeds	48	21	42	13	18	29
$P_{90}K_{90}$-N_{30}*	lucerne	61	87	67	81	71	74
	weeds	39	13	33	19	29	26
$P_{60}K_{90}$-TE*	lucerne	31	91	64	78	66	65
	weeds	69	9	36	22	34	35
$P_{90}K_{90}$-TE*	lucerne	40	76	76	87	68	68
	weeds	60	24	24	13	32	32
$P_{60}K_{90}$-BAS*	lucerne	52	92	60	78	74	71
	weeds	48	8	40	22	26	29
$P_{90}K_{90}$-BAS*	lucerne	49	97	71	87	91	78
	weeds	51	3	29	13	9	22
		uncoated sowing					
$N_0P_0K_0$	lucerne	44	80	68	82	77	69
	weeds	56	20	32	18	23	31
$P_{60}K_{90}$-N_{30}*	lucerne	53	93	55	79	100	75
	weeds	47	7	45	21	0	25
$P_{90}K_{90}$-N_{30}*	lucerne	57	88	62	88	86	76
	weeds	43	12	38	12	14	24
$P_{60}K_{90}$-TE*	lucerne	38	90	60	81	75	68
	weeds	62	10	40	19	25	32
$P_{90}K_{90}$-TE*	lucerne	71	92	84	92	77	83
	weeds	29	8	16	8	23	17
$P_{60}K_{90}$-BAS*	lucerne	59	95	85	74	83	79
	weeds	41	5	15	26	17	21
$P_{90}K_{90}$-BAS*	lucerne	70	96	80	91	98	86
	weeds	30	4	20	9	2	14

Notes: * mineral nitrogen brought only in a year of crops, preseeding processing of seeds by trace elements (TE) or BAS

The most effective receptions improving quality of a herbage were – preseeding processing of seeds by a mix of microcells against $P_{90}K_{90}$ and BAS on $P_{60}K_{90}$ and $P_{90}K_{90}$. On variant $P_{90}K_{90}$-TE in the second year of a life of grasses the lucerne share in a herbage was up to standard of 71 % in I hay crop and 92 % in II hay crop, for the third year of a life – 84, 92 and 77 % in I, II and III hay crops accordingly. On variant $P_{60}K_{90}$-BAS the lucerne share was 59 % in I hay crop and 95 % in II hay crop, for the third year of a life – 85, 74 and 83 % in I, II and III hay crops accordingly. On variant $P_{90}K_{90}$-BAS: in the second year of a life – 70 % and 96 % in I and in II hay crops, for the third year of a life – 80, 91 and 98 % in I, II and III hay crops

according to (tab. 3).

Quality of herbage in general defines its efficiency. It is established that the share of a bean component in herbage is higher, the exit of fodder units and protein content is more. The estimation of level of productivity and quality of a herbage has shown, that the most effective reception of cultivation of a lucerne is uncoated sowing. Efficiency a lucerne herbage in this variant in 1.17-1.43 times (depending on biotechnological methods) above in comparison with crops under a cover winter pea and oat mixes (tab. 4). As on variants with preseeding processing of seeds by a mix of microcells against $P_{90}K_{90}$ and BAS on $P_{60}K_{90}$ and $P_{90}K_{90}$ the share of a bean component was on the average 79-86 % also efficiency on these variants was up to standard 80.7-87.9 dt f. u. (feed units) ha^{-1}.

Table 4. Average for 3 years agroeconomic efficiency of lucerne sowing campaign cultivation and manufacture from it haylage

Variants	Productivity, dt f.u. ha^{-1}		Exchangeable energy, GJ ha^{-1}		Digested protein, dt ha^{-1}		Conditional profit, $ ha^{-1}
	cover culture**	lucerne	cover culture**	lucerne	cover culture**	lucerne	
under a cover winter pea and oat mixes							
$P_{60}K_{90}$-N_{30}*	37.7	58.9	33.55	68.30	5.0	6.2	125.8
$P_{90}K_{90}$-N_{30}*	38.1	60.8	33.89	70.53	5.1	6.5	97.3
$P_{60}K_{90}$-TE*	30.2	56.8	26.86	65.75	4.0	6.0	100.2
$P_{90}K_{90}$-TE*	42.8	60.8	38.08	70.45	5.7	6.4	111.0
$P_{60}K_{90}$-BAS*	37.9	64.8	33.66	75.16	5.0	6.9	172.8
$P_{90}K_{90}$-BAS*	37.4	63.7	33.21	74.08	5.0	6.8	129.9
uncoated sowing							
$P_{60}K_{90}$-N_{30}*	-	72.7	-	84.13	-	7.6	129.0
$P_{90}K_{90}$-N_{30}*	-	77.7	-	90.15	-	8.3	121.0
$P_{60}K_{90}$-TE*	-	70.8	-	81.89	-	7.4	111.4
$P_{90}K_{90}$-TE*	-	86.9	-	101.06	-	9.3	175.3
$P_{60}K_{90}$-BAS*	-	80.7	-	93.64	-	8.6	186.5
$P_{90}K_{90}$-BAS*	-	87.9	-	102.42	-	9.5	185.3

Notes: * mineral nitrogen brought only in a year of crops, preseeding processing of seeds by trace elements (TE) or BAS; ** efficiency, exchange energy and digested protein of integumentary culture only in a year of crops, 2010

These variants can be noted and at lucerne crops under a cover. Efficiency level on them was 60.8; 64.8 and 63.7 dt f. u. ha^{-1} accordingly at preseeding processing of seeds by mix TE against $P_{90}K_{90}$ and BAS on $P_{60}K_{90}$ and $P_{90}K_{90}$. The analysis of data on efficiency shows, that at lucerne crops under a cover influence various biotechnological methods (processing of seeds, entering of various doses of fertilizers) is levelled, and average efficiency of a lucerne for 3 years of a life of grasses makes 57.5-64.8 dt f. u. ha^{-1}. Authentic increases are received only on effective variants in comparison with the control. At lucerne crops in the pure state uncoatedly efficiency of the most effective variants on 13.4-20.6 dt f. u. ha^{-1} above in comparison with the control and on 9.2-10.3 dt f. u. ha^{-1}, than on variants of entering N_{30} against $P_{60}K_{90}$ and $P_{90}K_{90}$ or preseeding processing of seeds TE against $P_{60}K_{90}$. Reception of preseeding processing of seeds BAS against entering $P_{60}K_{90}$ allows to receive efficiency (80.7 dt f. u. ha^{-1}) similar as on a variant of preseeding entering of starting doses of nitrogen against $P_{90}K_{90}$ (77.7 dt f. u. ha^{-1}).

In the first year of a life of a lucerne at the expense of efficiency winter pea and oat mixes total efficiency surpasses it on 2.0-15.1 dt f. u. ha^{-1} in comparison with uncoated sowing and makes 49.8-64.1 dt f. u. ha^{-1} depending on biotechnological methods. It defines also average efficiency for years of researches. However on the second and the third, probably, and the next years lives efficiency a lucerne herbage on 1.7-27.8 and 6.2-35.9 dt f. u. ha^{-1} above in comparison with crops of grasses under a cover.

The defining factor in a choice of a way of sowing, processing of seeds and doses of fertilizers is economic efficiency of cultivation of a lucerne and manufacture from it haylage, and also gathering digested protein and exchange energy. It is established, that on the basic agroeconomic parametres at uncoated sowing better forages are received: the exit digested protein and exchange energy from a lucerne herbage was on 1.4-2.9 dt ha^{-1} and 15.83-30.61 GJ ha^{-1} above in comparison with crops under a cover (tab. 4).

At crops under a cover variants of processing of seeds BAS against entering $P_{60}K_{90}$ and $P_{90}K_{90}$ are noted. At uncoated sowing by the most effective on nutritiousness variants of processing of seeds microcells and BAS against entering $P_{90}K_{90}$ are. Reception of processing of seeds BAS against $P_{60}K_{90}$ allows to receive forages on nutritiousness same, as on a variant of preseeding entering of

starting doses of nitrogen against $P_{90}K_{90}$ (tab. 4).

Uncoated lucerne sowing on the antropogenically transformed peat soils is also more economic reception, despite the raised norm of seeding. The conditional profit was 3.2-64.3 $ ha^{-1} higher in comparison with crops under a cover and depending on ways of processing of seeds and doses of fertilizers. The highest conditional profit 172.8 and 129.9 $ ha^{-1} is received on variants of processing of seeds BAS against entering $P_{60}K_{90}$ and $P_{90}K_{90}$ accordingly at crops under a cover. These options were effective and at uncoated sowing, the profit made 186.5 and 185.3 $ ha^{-1} that for 11.2 and 10 $ ha^{-1} is higher in comparison with option of processing of seeds microcells against $P_{90}K_{90}$ (tab. 4).

CONCLUSIONS

On the antropogenically transformed peat soils of Polesye it is possible to cultivate effectively a lucerne a sowing campaign and to receive 56.8-87.9 dt f. u. ha^{-1} of high-quality forages depending on application biotechnological methods.

At lucerne cultivation on these soils uncoated sowing with the doubled norm of seeding is more effective in comparison with crops under winter pea and oat a mix. At uncoated sowing of a lucerne an exit of fodder units from hectare above on 13.8-26.1; digestible a protein – on 1.4-2.9 dt ha^{-1}and exchange energy – on 15.8-30.6 GJ ha^{-1} in comparison with crops under a cover.

The application of various biotechnological methods has effectively affected only the uncoated sowing.

4. The assessment of agroeconomic efficiency of lucerne cultivation showed that perspective option is processing of seeds BAS against introduction of against entering $P_{60}K_{90}$ and $P_{90}K_{90}$. This reception provides efficiency 80.7 both 87.9 dt f. u. ha^{-1} and conditional profit 186.5 and 185.3 $ ha^{-1} accordingly. Processing of seeds BAS against entering $P_{60}K_{90}$ by efficiency (an exit of fodder units, digested protein and exchangeable energy) is comparable to a variant of entering of starting doses of nitrogen against $P_{90}K_{90}$, however conditional profit on this variant on 65.5 $ per ha above.

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ANALYSIS OF THE IMPORTANCE OF AGRICULTURE SECTOR IN ROMANIAN ECONOMY

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Abstract

Agriculture has been and remains the support of the human existence, which is an important pillar of the Romanian rural economy. This paper proposes an analysis of the main factors involved in the development of the agriculture in Romania: the share of agriculture in GDP, the land use, labor force in agriculture, farming and the production of agriculture in Romania. The used research methodology was based on analysis and synthesis of the information on the economic and social aspects of the development of the agriculture. In conclusion, the authors of this paper wanted to emphasize the necessity of the agriculture in ensuring the food security of the population, highlighting the need of strengthening the exploitation farms, of upgrading the technology and the overall improvement of the farmers work.

Key words**:** *agriculture, evolution, farms, production, Romania*

INTRODUCTION

Agriculture has been and remains of great importance at the global and the European levels, and as for Romania, it has an even greater national importance.

According to the specialists, "agriculture is a complex issue", regarding the openness and the interaction with other activity sectors [4] and is "the core around which is constituted the ensemble of branches and activities upstream and downstream ". [8,9]

Agriculture, in predominantly agricultural areas, represents the pillar of the rural area, which means that there cannot be conceived any rural development program without agriculture holding a key role. Although, lately, there intervened some significant changes in the role and in the functions of agriculture (which remains the main component of any rural development program), such as appearing the issue of a new philosophy in developing the agriculture system, which leads to the idea of changing the center of gravity of the productivist aspect on its multifunctional aspect. [5]

The availability and stability of the food supply chain and agriculture are major factors for ensuring the food security of the population, at a macroeconomic and microeconomic level. Although it has important agricultural resources, Romania is one of Europe's most vulnerable countries in terms of ensuring security of the population, according to the assessments made by various international organizations.[1]

Defining the place of agri-food economy in general, and of agriculture in particular, in the national economy, it can be achieved through a panel of relevant synthetic indicators related to resources and inputs, ensuring on the one hand results and on the other hand outputs. [10]

In this paper, the authors wanted to highlight the importance and the role of agriculture in the Romanian economy by analyzing the following indicators: the share of agriculture in GDP, the land use, labor force in agriculture, farming and agriculture production in Romania.

MATERIALS AND METHODS

The analyzed data were collected by documentary study of specialized literature

(books and volumes of scientific papers) in the agricultural field. The methodology included primary statistical analysis of the data, using as a tool for the quantitative analysis the software Microsoft Excel (for tables and graphs). The data used in this analysis covered the period of 2007-2014.

RESULTS AND DISCUSSIONS

Regarding the ***contribution of agriculture to GDP,*** we find that this is one of the major branches of the Romanian economy, through the land resource which it owns (0.41 hectares of arable land/ capita compared to 0.21 as the average EU-27), but also through the contribution of this sector to the gross domestic product (GDP). It lies around 6% of GDP, ranging between 5.8% in 2007 and 4.7% in 2014, while in EU member states it is approximately 1.7%. [6]

Table 1. Share of agriculture, forestry and fishing in GDP (Lei Mil. current prices)

The gross domestic product (GDP)	**2007**	**2008**	**2010**	**2011**	**2013**	**2014**
Agriculture, forestry and fishing	23,992.2	34,126.3	29,915.7	36,363.1	34,402.8	31,582
TOTAL GDP	416,006.8	514,700	533,881.1	565,097.2	637,456.0	666,637.3
% of GDP	5.8	6.6	5.6	6.4	5.4	4.7

Source: Official website of the Ministry of Agriculture and Rural Development (www.madr.ro)

With regard to the **land resources,** of the 23.8 million ha as sums the Romanian territory, the agricultural area in 2013 was 14.6 mln. ha (61.3 %), of which about 9.3 mln. ha represents arable land.

By use, arable land covers about 64.3 % of the agricultural areas, followed by 22.4 % pastures, 10.6% meadows and vineyards and orchards hold together only 2.7 %.

Table 2. Land fund by use

Specification	**2007**	**2009**	**2010**	**2012**	**2013**	**%**
Agricultural area, of which:	14,709.3	14,684.9	14,634.5	14,615.1	14,611.9	**100**
Arable	9,423.3	9,422.5	9,404.0	9,392.3	9,389.2	**64.3**
Pastures	3,330.0	3,313.8	3,288.7	3,270.6	3,273.9	**22.4**
Meadow	1,531.4	1,528.0	1,529.6	1,544.9	1,541.9	**10.6**
Vineyards	218.0	215.4	213.6	210.5	210.3	**1,4**
Orchards	206.6	205.2	198.6	196.8	196.5	1.3

Source:Own processing after the official website of the Ministry of Agriculture and Rural Development (www.madr.ro)

In 2007-2013, the areas of the agricultural and arable land in Romania have not changed significantly, registering only modest reductions due to the transfer of land to forestry and construction sectors.

In regard to **the labor force**, it shows that in terms of numbers it represents an important resource for our country's agriculture, through which agriculture may increase its contribution to the production of added value in the national economy.

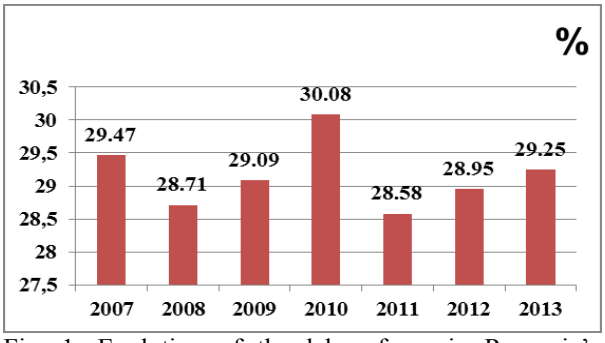

Fig. 1. Evolution of the labor force in Romania's agriculture

Following the evolution of the labor force in Romania, it may be seen a downward trend, both in the total employed population (from

9,353 thousand people in 2007 to 8,549 thousand people in 2013), also in the employed population in agriculture (from 2,757 thousand people in 2007, to 2,501 thousand people in 2013), but the share of employed population in agriculture in the total population is still high (29.25 %).

Table 3. Evolution of labor force

Specification	2007	2008	2009	2010	2011	2012	2013
Total employed population (thousand)	9,353	9,369	9,243	9,240	9,138	9,263	8,549
Employed population in agriculture, forestry and fishing (thousand)	2,757	2,690	2,689	2,780	2,612	2,682	2,501
% of the employed population	29.47	28.71	29.09	30.08	28.58	28.95	29.25

Source: Official website of the Ministry of Agriculture and Rural Development (www.madr.ro)

Depending on the legal status, the agricultural exploitation farms are comprised into two categories: unincorporated farms and farms with legal personality.

In 2013, in Romania there were 3.63 million agricultural exploitation farms in which 3.602 thousand are unincorporated farms and only 28 thousand have legal personality, which determines their dual character.

Analyzing the number of the farms, it can be seen that in 2013 they were reduced by approximately 6% compared to 2010, due to the process of land merging.

The number of unincorporated farms in 2013 was lower than 2010 by 5.9% (those with area less than 1 ha decreased in 2013, in comparison to 2010 with about 3.8%) and the number of farms with legal personality in 2013 was lower than in 2010 by 9.2%.

As for the utilised agricultural area with the average cover per farm, it have increased from 3.11 ha in 2002 to 3.45 ha in 2010, and in 2013 the average area per exploitation has reached 3.6 ha.

Table 4. Evolution of agricultural exploitation farms

Indicators	MU	Total exploitations			Expl. without legal entity			Expl. With legal entity		
		2002	2010	2013	2002	2010	2013	2002	2010	2013
Nr. agric. exploit. farms	thousand	4,485	3,859	3,630	4,462	3,828	3,602	23	31	28
Utilised agricultural area (UAA)	thousand ha	13,931	13,056	13,306	7,709	7,450	7,271	6,222	5,856	5,785
UAA /exploitation	ha	3.11	3.45	3.60	1.73	1.95	2.02	274.4	190.7	207.4

Source:Own processing after the official website of the Ministry of Agriculture and Rural Development (www.madr.ro)

Analyzing the data in the Table 4, it shows that the most of the agricultural exploitation farms represents small farms below 2 ha (99.2 % as number and 55.7 % of UAA), at the opposite side having **the large agricultural exploitation farms of over 200 ha, although numerically represents only 0.8 % of the total farms, holding 44.3 % of the utilized agricultural area**.

The existence of the large number of small farms in parallel with very large farms reveals the structural imbalance which affects the agriculture in our country and its competitiveness.

From Table 4 it can be seen that the number of farm holdings is very high, but shows a decreasing trend, and once with the decrease the number of agricultural holdings increases the average area of agricultural holdings.[3]

The agricultural production includes two main branches: crop branch and livestock branch. In the **plant production**, the production of cereals, analyzed during 2007-2014, holds permanently the largest share.

Regarding the structure of the grain production, the first position is occupied by corn, followed by wheat and rye, barley and two row barley, and at the last positions we

find oat and rice with much smaller shares.

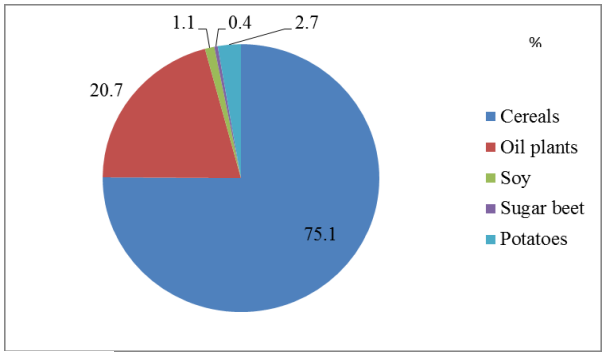

Fig. 2. Structure of the main crops cultivated in Romania

Source: Own processing after the official website of the Ministry of Agriculture and Rural Development (ww.madr.ro)

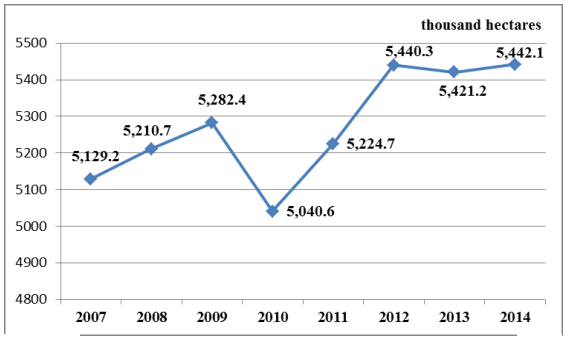

Fig. 3. Evolution of surface planted with cereals s in Romania

Source: Own processing after the official website of the Ministry of Agriculture and Rural Development (ww.madr.ro)

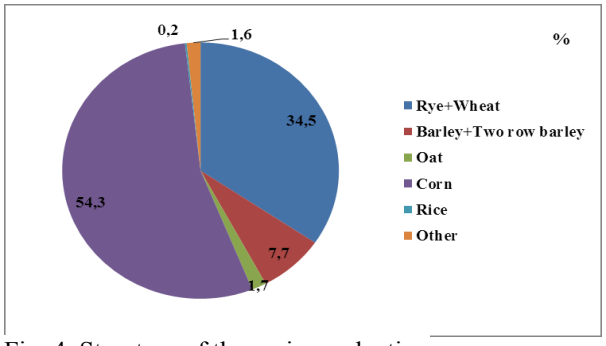

Fig. 4. Structure of the grain production

Source: Own processing after the official website of the Ministry of Agriculture and Rural Development (ww.madr.ro)

The cereal grain production in 2014 increased by 3.4 % over the previous year, due to the increased outputs per hectare as follows: corn (+ 7.2%) , barley and two row barley (+ 6.3%), wheat (+ 3.8%), and oat (+ 1.5%).

The oil plants production increased by 15.1% due to both the increase of the cultivated surface (+ 4.7%) and to the yield per hectare. Some production increases were registered for: rapeseed (61%) and soybeans (+ 35.3%) mainly due to increased of the cultivated surface (48.4% and +17.6%).

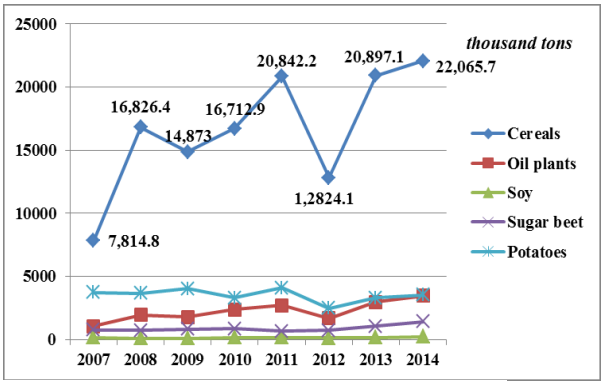

Fig. 5. Main crops total production in Romania

Source: Own processing after the official website of the Ministry of Agriculture and Rural Development (ww.madr.ro)

The area planted with sunflower decreased by 7.6%.

The sugar beet production increased by 31.9%, mainly due to increased efficiency per hectare by 19.1% and 10.7% of the cultivated area.

The potatoes production increased by 7% due to increased efficacy per hectare (+ 9.1%) while the cultivated area decreased (-2%) over the previous year.

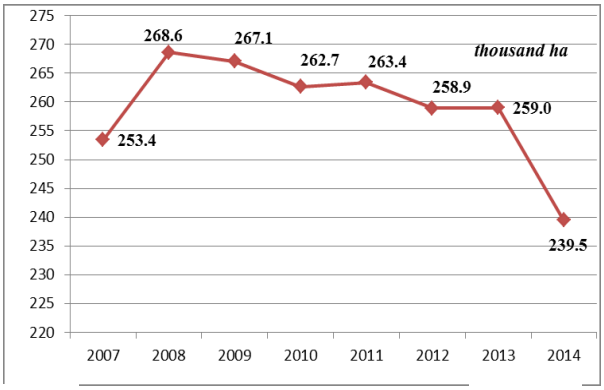

Fig. 6. Evolution of surface cultivated with vegetables in Romania

Source: Own processing after the official website of the Ministry of Agriculture and Rural Development (ww.madr.ro)

The leguminous plants for beans and the oil plants have smaller shares in both the cultivated surface and in the agricultural production obtained.

The 2014 vegetable production to 2013 was lower by 3.9 % due to the decrease in cultivated area by 7.7 % .

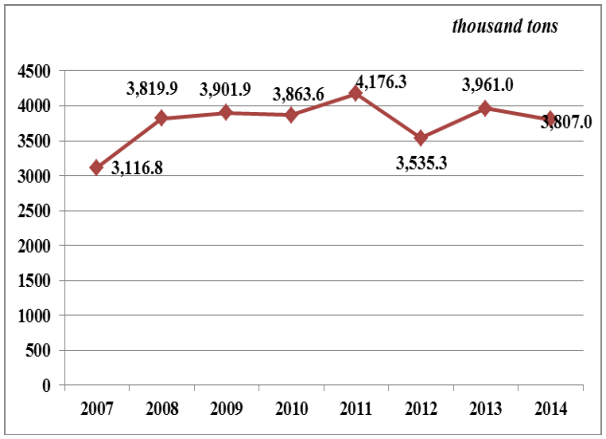

Fig. 7. The total vegetables production obtained in Romania
Source: Own processing after the official website of the Ministry of Agriculture and Rural Development (ww.madr.ro)

In 2014, the level of vegetable production was higher for cucumbers (+ 7.1%), carrots (+ 2.7%), peppers (+ 0.4%) and lower for melons and watermelons (-16.5%), tomatoes (-5.1 %), cabbage (2.9%) and onion (-1.3%).

The livestock sector is the second largest component of agricultural production, which, although in our country benefits from favorable natural conditions, holds a small share in the overall total production.

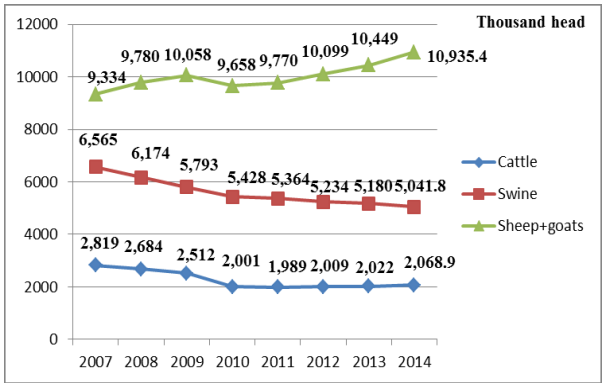

Fig. 8. Livestock in Romania
Source: Own processing after the official website of the Ministry of Agriculture and Rural Development (ww.madr.ro)

Considering the table, it can be seen that at species as cattle, swine and poultry are recorded consecutive declines, and species as sheep and bees (from 982 thousand families in 2007 to 1,497 thousand families in 2014) have some small increases.

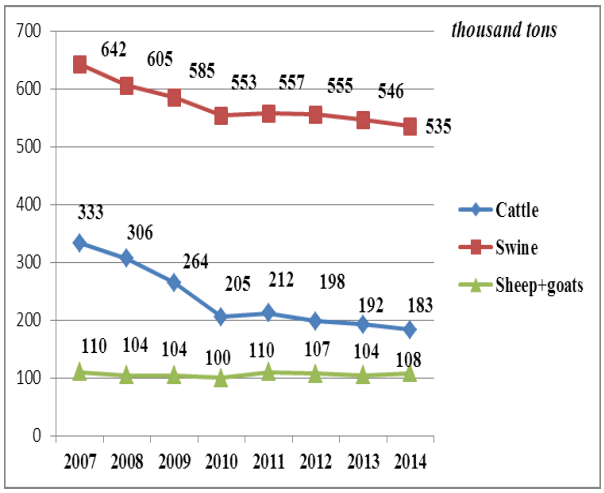

Fig. 9. Livestock production in Romania
Source: Own processing after the official website of the Ministry of Agriculture and Rural Development (ww.madr.ro)

At the level of 2014, the weight of animals and poultry raised for human consumption increased by 1.2%, thus: 6.8% from poultry and 3.8% from sheep and goats.
The weight of cattle decreased by 4.7% and of swine by 2.0%. T
he total milk production was by 3.7 % higher. The wool production increased slightly and the total production of eggs increased by 3.9 % compared to 2013.

The production of agricultural goods and services represent the producer prices, plus product subsidies and less taxes on products.
Within agricultural production, the crop production was predominant, in 2014 held 65.8% of the total production, compared to 32.9%, which represented the animal production and only 1.3% of the agricultural services.
Therefore, the authors emphasize that Romania's agricultural production is not optimally structured, which requires a conversion as high as possible to the crop production and animal products in order to increase profitability.

Table 5 .The value of agricultural production (Lei Mil.)

Specification	2007	2009	2011	2013	2014	%
Crop	28,723.4	35,735.5	54,179.8	53,843.8	49,058.3	65.8
Animal	18,291.6	23,441.6	21,784.1	23,876.5	24,481.6	32.9
Agr. services	684.8	751.3	544.8	744.0	984.5	1.3
Total	**47,699.9**	**59,928.4**	**76,508.7**	**78,464.4**	**74,524.4**	100

Source: Official website of the Ministry of Agriculture and Rural Development (www.madr.ro)

CONCLUSIONS

Following the analysis, the authors of the paper have emerged the following conclusions:

•The share of agriculture in GDP was maintained at a high level, well above the EU average, in the analyzed period 2007-2014 (4.7 % in 2014 compared to EU average of 1.7%).

• As regards the land fund structure there were no significant changes, only some reductions in the agricultural area due to the transfer to other sectors, but that does not negatively affect agricultural development; Romania standing well to the land resources chapter, as development potential.

• Regarding Romania's agriculture labor force, it was found that numerically remains at a high level, even if there is a downward trend. To note that in this period we are witnessing the change of the generations of farmers. Mainly, to this process, a large contribution have the financed projects from EU funds, especially those that support the setting up of the young farmers.

• One of the main factors limiting the increase of the Romanian agriculture competitiveness is the accentuated bipolarity of the agricultural exploitation farms.

• Romania's agricultural production varies from year to year and related to the crop production it was observed an increasing trend of cultivated areas with major crops in the analyzed period between 2007-2014. Regarding to the livestock analysis, in the same period, there was recorded a downward evolution, being registred a trend of reorientation of the livestock production to the raise of small livestock.

• In the agricultural production, the crop production is predominant. Achieving the equilibrium between the plant sector and the animal sector is still a goal of Romanian agriculture. It aims to increase and improve the livestock raised for meat and milk, to increase the areas cultivated with fodder and protein plants for the growth of the production yields to livestock, which in turn, will lead to the development of the food processing units. Thus, Romania's agricultural production has a sub-optimal structure, being among others a cause of the reduction of the profitability of the agriculture. It requires the conversion of a bigger section of the crop production in the animal products, being the safest and the most economical way to increase the profitability of agricultural production in general.

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ANALYSIS OF POPULATION TRENDS IN ROMANIA. CASE STUDY - ANALYSIS OF THE RURAL POPULATION IN THE SUBURBAN AREAS OF TIMIȘOARA MUNICIPALITY

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Abstract

In this paper, the authors analyzed the demographic evolution, given that, currently, our country's population, especially the rural is in an constant decline and in an aging process. The decrease is due to the declining birth rates and to the young people external migration. Another big part comes from the massive reduction in birth rates, although any aspect of migration is not negligible either, because those who have gone probably will not return back, accelerating the effects of the decline in births. The research methodology used was based on study of resources and documents and also on analysis and synthesis of the information on population evolution in our country. At the end of the paper, the authors founded that the persistence of an aging population, due to the decrease of it, has dramatic consequences over the fewer active people, which will have to maintain more inactive ones, and is a threat for any social protection system.

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Key words**:** *population, evolution, rural, demographic*

INTRODUCTION

In the last decades, most of the European countries have experienced a worrying demographic phenomenon, having the main characteristics of declining birth rates and an aging population. Romania is no exception to the trend registered in Europe, the last decades being marked by a continuous and significant population decline.

The changes that have occurred in the dynamics of the population are the direct result of the trends registered in the demographic phenomena which establish the number and the structure of the population: birth rate, mortality and migration. [5,2]

External migration is a demographic phenomenon whose evolution depends directly on the level of economic development of a country. As long as there is an economic gap between our country and developed countries, the phenomenon of emigration will not diminish. The possibilities to mitigate the negative consequences of emigration are the economic growth and creating jobs with attractive salaries in Romania.

The economic-financial crisis reflects a strong interdependence between the change in the economic conditions and the development of unemployment among youths. [1]

Mortality is another component which has a high contribution to the population decline, although with a downward trend, remained relatively high in Romania, in comparison with developed countries, the big differences being seen especially on certain age categories (like 0-5 years) and on specific causes of death in areas where there is potential for improvement.

Birth rate, another component of population dynamics, recorded in last years a slight recovery after the decline of the '90s, although it still maintain a negative growth of the population. [8]

External migration and mortality can not contribute significantly in short and medium terms at the regression of the demographic decline in Romania, but the birth rate remains the only component that can work with

effective results, visible on short-term and with positive and lasting effects.

MATERIALS AND METHODS

For the analysis of the demographic trend were analyzed the following indicators: the total population structure by area, by age range and population movement indicators such as: birth rate, mortality and migration. The logical study route started with the study of an analysis of the population evolution in Romania, with its evolving structure by sex, age range and area of residence, followed by an analysis of human potential employed in the agriculture.
At the end of the paper it was analyzed the evolution of the rural population during 2002-2012 in rural areas of Timișoara Municipality. The analyzed data were processed using tables and charts, with the analysis program Microsoft Excel, for a quantitative analysis

RESULTS AND DISCUSSIONS

Romania recorded in the period 2002 - 2011 the most drastic population decline across the European Union.

Table 1. Evolution of the population of the EU

Crt. Nr.	Country	Population		Variatiom (%)
		2002	2011	
1	Romania	21,680,974	19,042,936	-12.00
2	Lithuania	3,475,586	3,244,601	-7.00
3	Bulgaria	7,891,095	7,504,868	-5.00
4	Latvia	2,345,768	2,229,641	-5.00
5	Estonia	1,361,242	1,340,194	-2.00
6	Greece	10,968,708	10,787,690	-2.00
7	Hungary	10,174,853	9,985,722	-2.00
8	Germany	82,440,309	81,751,602	-0.80
9	Poland	38,231,000	38,186,860	-0.10
10	Slovacia	5,378,951	5,379,455	0.01
11	Slovenia	1,994,026	2,011,473	0.90
12	Czech Republic	10,206,436	10,532,770	3.00
13	Finland	5,194,901	5,375,276	3.00
14	Netherlands	16,105,285	16,655,799	3.00
15	Portugal	10,329,340	10,636,979	3.00
16	Austria	8,063,640	8,404,252	4.00
17	Denmark	5,368,354	5,560,628	4.00
18	UK	59,216,138	62,435,709	5.00
19	Belgium	10,309,725	10,951,665	6.00
20	France	61,424,036	65,075,373	6.00
21	Italy	56,993,742	60,626,442	6.00
22	Malta	394,641	417,617	6.00
23	Sweden	8,909,128	9,415,570	6.00
24	Spain	40,964,244	46,152,926	13.00
25	Cyprus	705,539	804,435	14.00
26	Ireland	3,899,702	4,480,858	15.00
27	Luxembourg	444,050	511,840	15.00

Source: Own processing after Econtext www.old.econtext.ro

From 21,680,974 inhabitants in 2002 and up to 19,042,936 inhabitants in 2011, (namely, a decline of 12%), it was the most brutal decline in the EU. [11]
The resident population of Romania on 1 January 2013 was 20,020,074 inhabitants, of which 9.7 million men (48.8 %) and 10.2 million women (51.2 %).
The population diminishing in 2010-2013, with 226,700 people, was caused by negative values of the natural growth, combined with the balance of the external migration. (Figure 1)

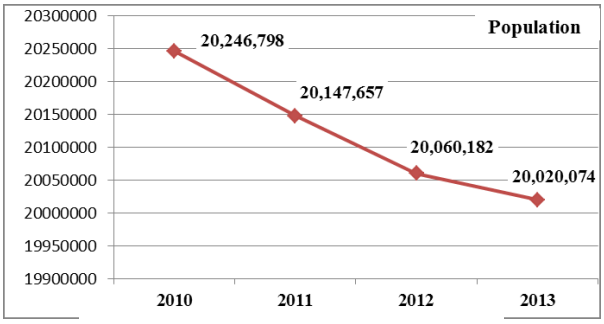

Fig. 1. Evolution of the population in Romania
Source: Own processing after Statistical Breviary, Romania in figures 2014

During the analysis of the age structure of the population was found an accentuated aging process, marked mainly by the declining birth rates, which has reduced the absolute and relative number of young population (0-14 years) and the increase of the elderly population (60 years and over). In 2013, compared to 2010, it stands out the decrease of the share of young population (0-14 years) from 15.8 % to 15.7 % and the growth of the senior population (60 and over), from 22.3 % to 22.8 %.
The adult population (15-59 years) represents 61.5% of the total population, decreasing by 219 thousand people compared to 2010. In the adult population, it increased the share of age groups: 25-29 years, 35-39 years, 45-49 year , 55-59 years and it decreased in the age groups of 15-19 years, 20-24 years, 30-34 years, 40-45 years and 50-54 years. (Figure 2)
Romania's population has a high level of rurality [6], respectively 46.1% in 2013. (Figure 3)

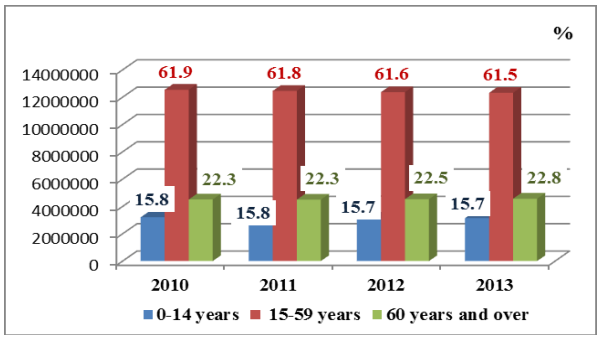

Fig . 2. Population evolution by age range

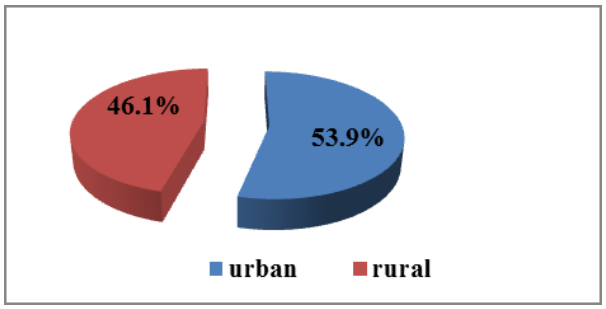

Fig . 3. Population structure by residence areas, 2013

In 2013, the number of alive newborn babies residing in Romania was of 176.0 thousand, (lower by 4.7 thousand compared to 2012).
In 2013, 246.8 thousand people residing in Romania died, (with 6.9 thousand fewer individuals than in 2012). (Figure 4)

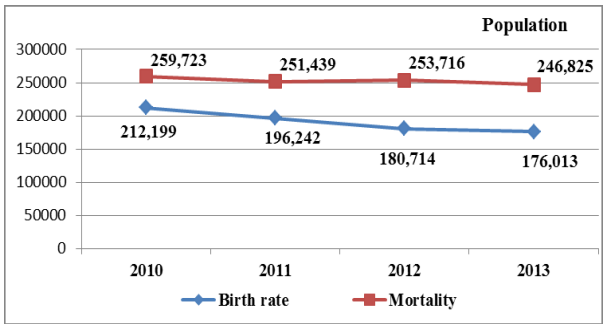

Fig . 4. Evolution of births and deaths in Romania's population
Source: Own processing after Statistical Breviary, Romania in figures 2014

In 2013, 350.6 thousand people have moved in the country. As in the previous year, urban migration flows (in rural and in urban) have the largest shares in the structure of the internal migration. (Table 2)
In 2010-2012, the number of people who established their residence abroad, increased from 7,906 in 2010 to 18,001 people in 2012. (Figure 5)

Table 2. Internal migration

Specification	2010	2011	2012	2013
Total	**458,995**	**324,626**	**372,197**	**350,556**
From rural to urban	96,201	66,784	74,470	74,023
From urban to urban	140,301	97,235	106,724	108,370
From rural în rural	89,441	635,94	72,620	65,453
From urban to rural	133,052	97,013	118,383	102,710

Source: Own processing after Statistical Breviary, Romania in figures 2014

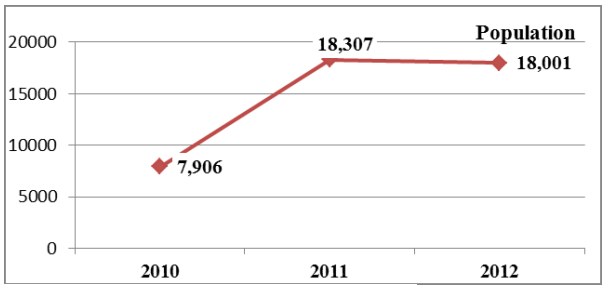

Fig. 5. Evolution of external migration
Source: Own processing after Statistical Breviary, Romania in figures 2014

At the level of 2012, the migration flows were orientated mainly to Spain (4,605 people), Israel (2,290 people), Italy (2,097 people). (Figure 6)

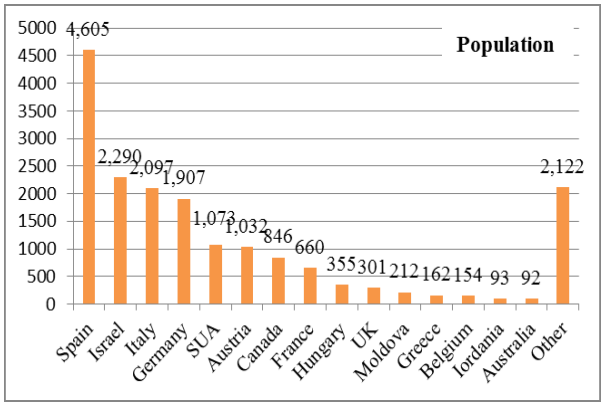

Fig. 6. The migration flows, 2012

Regarding the population structure by age groups who immigrated, it can be seen that the age group 18-40 years is the largest, respectively 9,572 people. (Figure 7)
In the context of the economic transition, the labor market in Romania has undergone significant changes in the volume and structure of the main indicators of labor. This process was characterized by the decrease of the active population and employed population, and by maintaining the

unemployment rate at relatively constant values.

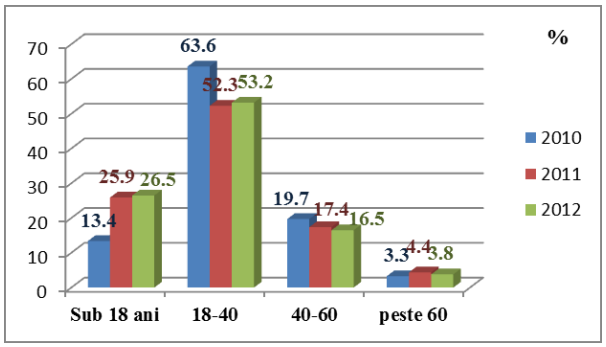

Fig. 7. The population structure by age groups who immigrated

The financial crisis, when started in the second half of 2008, had negative effects on the structure of the workforce, causing at the same time the reduction of employed population and also the growth of unemployment. If during the last half of the '90s, **the active population** remained at high levels (over 11 million people), the new millennium began with a significant decrease of the value indicator. Later in 2002, the employed population fluctuated around 10 million.

In 2013, the active population numbered 9.977 million people, 96.4% of which belonged to the working age group 15-64 years. [9]. (Table 3)

Tabelul 3. The active population, employment and unemployment

-thousand people-

Specification	2010	2011	2012	2013
Active population - total	**9,965**	**9,868**	**9,964**	**9,977**
Women	4,416	4,411	4,418	4,409
Men	5,538	5,563	5,553	5,552
Employed population - total	**9,240**	**9,138**	**9,263**	**9,247**
Women	4,128	4,112	4,137	4,119
Men	5,032	5,072	5,078	5,058
Unemployed ILO – total	**725**	**730**	**701**	**730**
Women	288	299	281	290
Men	506	491	475	494

Source: Own processing after Statistical Breviary, Romania in figures, 2014

After a continuous growth recorded in 2005-2008, from 2009 the employed population began to decline, reaching in 2011 the lowest recorded value (9,138 thousand people). In 2013, the employed population was of 9,247 thousand people, in decrease from the previous year (9,263 thousand people). Of the employed individuals, 55.5% were men. Until 2002, the majority of the employed population was rural. Since 2003, most of the employed population resides in urban areas, respectively 54.7% in 2013. The employees category prevail among the employed population, respectively 67.8% in 2013.

In Romania, the share of the active population employed in agriculture has been quite stable until 1990, with about 3 million people employed in this area. Structural economic reforms and the deconstruction of the Agricultural Production Cooperatives of the early '90s led to a drastic increase in labor force employed in agriculture. The labor force in rural areas is occupied mainly in the agricultural sector, which is one of the major constraints of the country's economic development.

The share of the agricultural population of the total rural population has increased significantly since 1990 when it was 28.8%, to 35% in 2000, after which decreased slightly in 2002 to reach 29.7% and 28.8% in 2010. (Table 4)

Table 4. Evolution of the human potential in Romania

Year	Total population (thousand)	Employment of rural population (% of total population)	Employment in agriculture (% of rural population)	Employment in agriculture (% of total population employment)
1990	23,207	45.7	28.8	28.2
1991	23,185	45.9	29.3	28.9
1992	22,789	45.7	32.2	32.1
1993	22,755	45.5	34.2	35.2
1994	22,731	45.3	43.6	35.6
1995	22,681	45.1	31.2	33.6
1996	22,608	45.1	31.9	34.6
1997	22,546	45.0	33.4	37.5
1998	22,503	45.1	33.0	38.0
1999	22,458	45.2	34.1	41.2
2000	22,435	45.4	35.0	40.8
2001	22,408	45.4	34.4	40.4
2002	21,795	46.7	29.7	36.3
2003	21,733	46.6	28.4	39.5
2004	21,673	45.1	27.0	31.6
2005	21,624	45.1	27.4	32.1
2006	21,584	44.8	26.0	30.5
2007	21,538	44.9	25.5	29.5
2008	21,504	45.0	24.9	25.7
2009	21,469	44.9	25.0	26.1
2010	21,431	44.9	28.8	30.0
2011	21,354	45.1	27.1	28.6
2012	21,316	45.2	27.8	28.9

Source: Own processing after Statistical Breviary, Romania in figures 2013

Approximately the same evolution had also the share of population employed in agriculture from the total employed population, which increased from 28.2% (1990) to 40.8% in 2000 and decreased slightly, representing 39.5% in 2003 and 30% in 2010, and decreasing to 28.9% in 2012.

The labor force employed in agriculture follows the general trend of the countries with economies undergoing modernization, the trend of absolute and relative reduction. The phenomenon of diminishing the number of labor resources employed in agriculture, practically began after cooperativization, and knew an increasing intensity especially after 1965.

The labor force from the agricultural sector began in 1990 to have a tendency - the reverse of the normal – of growth, from 28.2 % in 1990 to 40.8% in 2000, then decreased slightly, reaching 28.9 % in 2012.

Employment growth in agriculture was determined not so much by the needs of agriculture, but mostly due to the workforce layoffs in other sectors of the economy. [8].

The share of employment in agriculture in Romania is much higher than the average in the EU 28, although the trend is downward. (Figure 8)

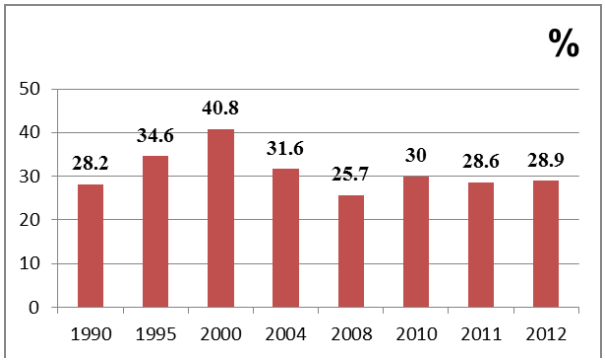

Fig. 8. The share of employment in agriculture in total employment

Case Study - Analysis of the rural population in the suburban areas of Timişoara Municipality

The population decline was also manifested in the rural population, and the process will continue at a moderate pace, according to demographic forecasts. The main factors of the decreasing population in the rural areas are nationally the same: negative natural increase and migration. However, currently, in the suburban areas of the major cities, was recorded a growth of the population due to the migration phenomenon of urban population, and not only, to those areas.

The paper presents the trend of the rural population during 2002-2012 in suburban areas of the Timişoara Municipality.

Timişoara is a city which always represented an important pole of labor to other regions with demographic excess, particularly for counties from northern Moldova, from northwestern Transylvania and southern Oltenia (Mehedinţi county). To this phenomenon, contributed, first, its economic dynamism and the fact that, traditionally, the natural demographic balance in Timiş county is negative, both in urban and in rural areas.

The internal demographic dynamics regression was this way compensated by migratory flows from the mentioned regions, attracted by the economic potential and by the civilization model offered by Banat region, and especially by the polarizing center of it, Timişoara.

Timişoara, as a growth pole, has an administrative-territorial cover, as follows: Timişoara - *an urban center* and its area of influence and *14 administrative units of rural localities:* Becicherecu Mic, Bucovăţ, Dudeştii Noi, Dumbrăviţa, Ghiroda, Giarmata, Giroc, Moşniţa Nouă, Orţişoara, Pişchia, Remetea Mare, Săcălaz, Sînmihaiu Român, Şag. [10]

Analyzing the rural population around Timişoara, the authors discovered that urbanistic influence of the city is felt selective: stronger on villages in the immediate vicinity, such as: Dumbrăviţa, Giroc, Ghiroda, then less intense on: Moşniţa Nouă and Sânandrei, and limited in the villages as: Sânmihaiu Român, Dudeştii Noi, Săcălaz or Şag.

Therefore, we can say that in the rural areas of the north, east and south-east of Timişoara is a clear dynamic pace of demographic growth and a remarkable urban renewal. In the western area, on the axes Sânnicolau Mare, Jimbolia and Moravia, the developments are slower but sustainable.

Table 5. Localities network around the Timişoara municipality. (Growth pole Timişoara)

Crt. Nr.	Localities	Population	
		2002	2012
1	Timişoara city	317,660	306,466
2	Becicherecu Mic	2,417	2,834
3	Dudeştii Noi	2,395	2,890
4	Dumbraviţa	2,693	5,555
5	Ghiroda	4,907	5,802
6	Giarmata	5,407	6,456
7	Giroc	4,295	7,484
8	Mosniţa Nouă	4,298	5,810
9	Orţişoara	4,080	4,337
10	Pişchia	3,006	2,958
11	Remetea Mare	2,111	2,174
12	Bucovăţ	1,410	3,353
13	Săcălaz	6,273	7,728
14	Şag	4,506	2,976
15	Sînmihaiu Roman	4,396	6,065

Source: Own processing after the Timiş Department of Statistics, 2002 and the Localities Sheets on the year 2012, www.cjtimis.ro

Currently, we find that in the closest rural area to major cities was recorded an increase in population, while in the distant localities of the city is met the phenomenon of population decline. In remote areas predominate the population over 60 years, while the birth rate is low and in time, their tendency will be of depopulation.

CONCLUSIONS

• Romania is facing drastic declines in the population numbers, the main reasons being decreasing the birth rates and increasing external migration.
• The persistence of a phenomenon of aging population, due to decreasing population has a dramatic consequence over the fewer active people who will have to maintain more inactive people, which is a threat to any social protection system.
• The negative effects of aging process on the development of economic and social life, and also on future demographic trends, are visible but will deteriorate even more, causing disturbances at the level of school population, of fertile population, of working age population and of elderly population.
•There is an expansion on rural areas surrounding the city.
•The economic crisis and unemployment have slowed down the migration to cities, but increased external migration.
•Currently, half of the rural communities (the periurban) are in the process of revitalization, and the other half continue to lose population.
•The disparity continues to widen between the villages located in attraction areas of a city or those who are in the vicinity of an industrial center, and the poor rural areas where demographic and economic decline continues.

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RICE BALANCE SHEET IN ROMANIA

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Abstract

Rice is one of the cereals grown in Romania, along with corn, wheat, barley, rye. Rice is grown in a small area (701.5 thousand ha - average for the period 2009-2011), is characterized by a total production of 66422,33 tones and an average production of 5181 kg / ha. Presentation of food balance we consider interesting in terms of supply and demand components: production, imports, stocks, exports, seed material, food, industrial raw materials, other uses, losses. Based on the volume of total supply and demand, it could determine the balance of that product at national level.

Key words: *consumption, demand, export, import, losses*, *rice, stock, tender*

INTRODUCTION

Romania is at the Northern limit of the rice crop in Europe [5].
Rice production is important for food, agricultural technology industry and technology [1].
Rice is one of the oldest and most important agricultural plants, constituting the main food for about 3.2 billion people in China, Japan, Philippines, India, Vietnam, Indonesia, Thailand and Cambodia, where the annual per capita consumption ranges from 120 - 150 kg.
In our country, the first paddy was founded in 1786 Banloc (Jud. Timis), but the most important area was cultivated after 1938 [9].
In terms of soil rice is cultivated on alluvial floodplain soils, normal and salty (saline - alkaline) ameliorating and ameliorated. [7]
The purpose of profitable culture in rice farms in Romania, the following factors must be considered - the average yield, production and marketing costs [4].
Rice harvest is a separate branch of conditioning, processing and marketing [6].
The offer for one product "X" is represented by amounts that producers are willing to produce at a cost "K", taking into account the profit you will get. It becomes important to anticipate rationality that the manufacturer are choosing producing goods and that combination (X1, X2, ... Xn) which provides maximum return on the resources available. In this case we must consider the benefits and costs that firms will record producing different quantities of goods or using various production methods [8].
Food demand can be expressed in many forms [3]: the total value of food principles necessary for meeting the food of the studied population (based on physical units and / or energy); quantifying components assortment of food demand by indicating the needs of each group assortment periods; Equivalence by converting suitable indicators, the necessary food production and distribution potentials (taking into account the production capacity and consumption, seasonal factors influencing consumer incomes, the possibilities for correlation through storage links etc.).
Valid for Agro-marketing the relationship between the supply and demand is considered a fundamental aspect of the functionality of markets in agricultural products [2].

MATERIALS AND METHODS

Carrying out the work involved documenting, through the use of statistical reporting data [10]. For the preparation of the study was used a system of specific indicators, and recommended system used by the United Nations Food and Agriculture Organization -

FAO.
When setting up the total demand are used: food consumption, seed, food consumption, raw material uses other losses (expressed in thousands t). FAO methodology on setting the overall level of demand is made by adding any of the foregoing.
Determining the balance is made on the difference between total supply and total demand. Based on the values of total demand and total supply balance may be legally surplus, deficit, or may encounter a situation of equilibrium.
Is established in the paper, both total supply and total demand for one percentage structure.
It then goes to the processing of data by using time comparison method. The data collected and analyzed, covers the period 2009-2011, operating with the average period.
We used two types of indices, fixed base and mobile base.

RESULTS AND DISCUSSIONS

Table 1 shows the components of the national balance sheet of rice.
From the beginning must be stressed that that if the total supply consists of specific elements mentioned at world and European level, in terms of supply components it notes that they are reduced in number - compared to the state of world and European - talking only food consumption other uses, losses and seeds.
For 2009 it can be seen that the balance was positive, the supply exceeded demand by 1 t. This was a total supply of 80,709 t rice tender is based on: 48,303 t production (59.85%), 43,442 t imported (53.83 %) -98 t stocks (-0.12%), t 10,938 exports (-13.56%). When setting up the total demand have contributed 80,708 t: losses - 2003 t (2.48%), seed – 2,671 t (3.31%), other uses – 4,293 t (5.32%) and food consumption – 71,741 t (88.89%),.
In 2010 the total supply was 50,578 t at which constituent elements had the following percentage rates of participation: 81.23% production (41,079 t), 92.33% imports (46,702 t), 0.19% stocks (98 t), - 73.75% exports (37,302 t). Total demand was 50,579 t, this showing as components the following items: 2.92% losses (1,476 t), 4.91% seeds (2,483 t), 10.48% other uses (5,299 t) and 81.69% food consumption (41,321 t). A result of this situations the balance is deficient -1 t.
For 2011, there is a balance between total supply and total demand, each indicator reaching 93,637 t. In order to establish total supply have acted: production – 43,529 t (46.49%), import – 96,068 t (102.59%) and exports – 45,960 t (-49.08%).

Table 1. Rice: national balance sheet structure - tons (2009-2011)*

No	Specification	YEAR						Average 2009-2011	
		2009		2010		2009			
		Effective*	%**	Effective*	%**	Effective*	%**	Effective**	%**
1	Production	48,303	59.85	41,079	81.23	43,529	46.49	44,303.67	59.09
2	Import	43,442	53.83	46,702	92.33	96,068	102.59	62,070.67	82.79
3	Stock	-98	-0.12	98	0.19	0	0	0	0
4	Export	10,938	-13.56	37,302	-73.75	45,960	-49.08	31,400	-41.88
5	Offer total	80,709	100	50,578	100	93,637	100	74,974.66	100
6	Seeds	2,671	3.31	2,483	4.91	2,536	2.71	2,563.33	3.42
7	Food	71,741	88.89	41,321	81.69	85,167	90.95	66,076.33	88.13
8	Other uses	4,293	5.32	5,299	10.48	3,237	3.46	4,276.33	5.70
9	Loss	2,003	2.48	1,476	2.92	2,697	2.88	2,058.67	2.75
10	Total demand	80,708	100	50,579	100	93,637	100	74,974.66	100
11	Balance sheet	+1	-	-1	-	0	-	0	-

*http://faostat3.fao.org/faostat-gateway/go/to/download/FB/BC/F
**own calculation

Formation of the total demand for rice is based on varying amounts of rice used in a number of ways such as: 85,167 t food consumption - 90.95% 3,237 t other purposes

- 3.46%, 2,697 t loss - 2.88%, 2,536 t seeds - 2.71%.

Determining average of period analyzed, there is unity of rice in stock. This offer starts from a total of 74,974.66 t, which had the following structure (Fig. 1): 59.09% Production (44,303.67 t); 82.79% imports (62,070.67 t); - 41.88% Exports (31,400 t).

Total demand reached 74,974.66 t, thus presenting its structure (Fig. 2) 2.75% loss (2,058.67 t); 3.42% seeds (2,563.33 t); 5.70% other uses (4,276.33 t); 88.13% food (66,076.33 t).

Mode of balance development of the component elements of national rice is presented in Table 2.

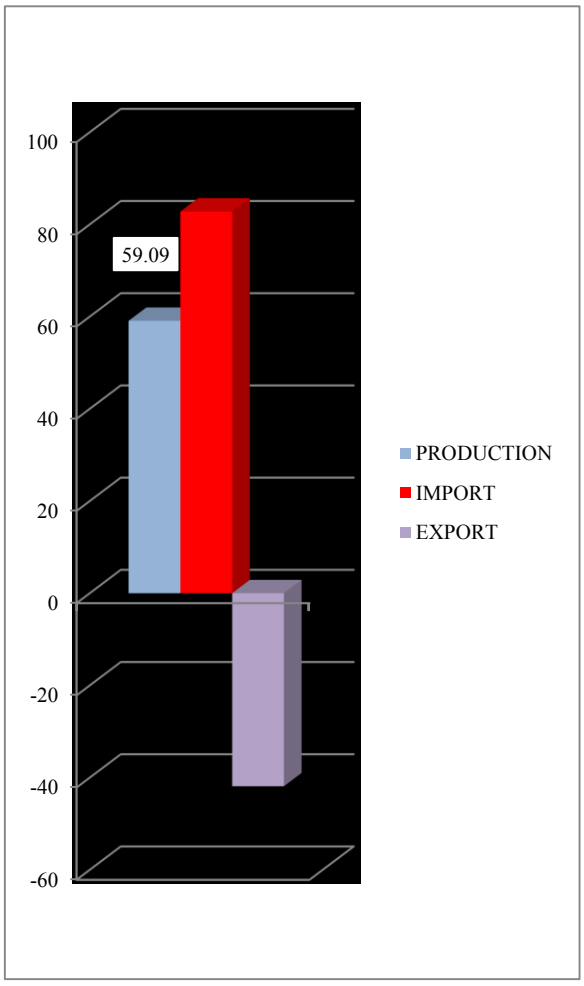

Fig. 1. The total supply - structure, period average (%)

Production decreased by 15.0% in 2010 compared to 2009, after which he recorded in 2011, a slight recovery compared with the previous term of the series dynamic (+ 6.0%). Average of period, was lower than first reporting base by 8.3%, but surpassed the second by 1.8%.

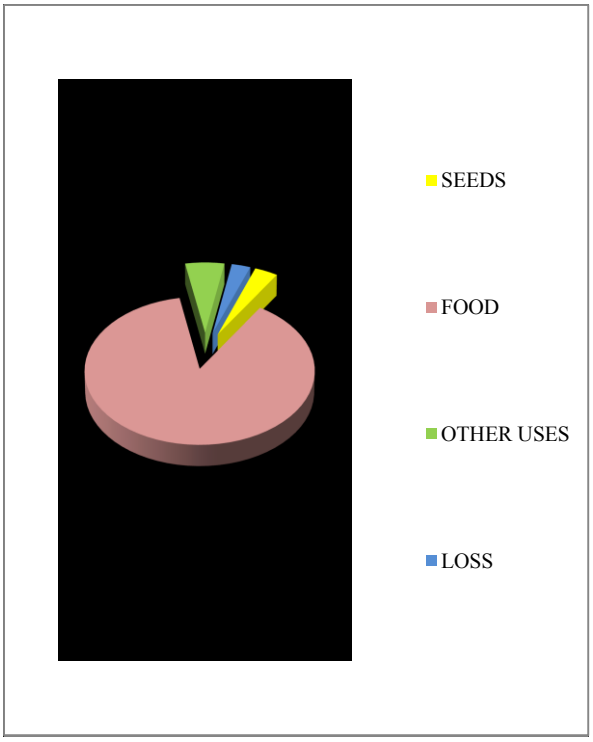

Fig. 2. Total demand - structure, period average (%)

Regarding imports, the rising evolution can be seen even stronger. Such spikes occur in 2010 compared to 2009 (+ 7.5%), and higher growth of 105.7% in 2011 compared to the previous term of dynamic series. Average of period surpasses the first base of reporting 1.42 times, but is inferior to the second by 35.4%.

Romanian exports of barley, has convenient evolved from 2009 to 2011 (annual successive increases of 3.41 times in 2010, respectively 4.20 and 1.23 times in 2011 - compared with the terms of reference). For the average period are found levels of the indices above par for fixed base (2.87 outrunning the base of reporting) and subunit levels for those with mobile base (-31.7%).

In the case of total supply, there is a sinuous evolution, specific declines of 2010 (-37.3%) compared to 2009 followed by increases in 2011 (+16.0 and + 85.1% compared to the terms of reference). In these circumstances the average period was below par compared to both base reporting: -7.1 and -19.9% respectively.

Table 2. Rice: Dynamics of national balance sheet items (2009-2011) *

No.	Specification	YEAR						Average 2009-2011	
		2009		2010		2009			
		I_{bf}	I_{bm}	I_{bf}	I_{bm}	I_{bf}	I_{bm}	I_{bf}	I_{bm}
1	Production	100	100	85.0	85.0	90.1	106.0	91.7	101.8
2	Import	100	100	107.5	107.5	221.1	205.7	142.9	64.6
3	Stock	-	-	100	100	0	0	0	0
4	Export	100	100	341.0	341.0	420.2	123.2	287.1	68.3
5	Total offer	100	100	62.7	62.7	116.0	185.1	92.9	80.1
6	Seed	100	100	93.0	93.0	94.9	102.1	96.0	101.1
7	Food	100	100	57.6	57.6	118.7	206.1	92.1	77.6
8	Other uses	100	100	123.4	123.4	75.4	61.1	99.6	132.1
9	Loss	100	100	73.7	73.7	134.6	182.7	102.8	76.3
10	Total demand	100	100	62.7	62.7	116.0	185.1	92.9	80.1

*own calculation

If we refer to trends consumption of seeds, it can be seen the uneven trend of its, specific decreases by 7.0% in 2010 (compared to 2009), followed by increases in the amount of 2.1% for 2011 - compared to the previous term of dynamic series.

In these circumstances the average period is lower by 4.0% compared to the first term of the dynamic series, but exceed 1.1% specifies the situation of 2011.

At the level of consumption it is worth mentioning uneven progress, decreases by 42.4% in 2010 (compared to 2009), followed by increases of 18.7 and 106.1% in 2011 - compared with the terms of reference (2009 and 2010 respectively). Following this situation, the average period is below par compared to both terms: -7.9 and -22.4% respectively.

Different uses of rice have increased in 2010 compared to 2009 (+ 23.4%), then declined in 2011 compared to both base of comparisons with 24.6 and 38.9%. Average of period was substantially equal to the first comparison term (99.6%) and overtook the second of 1.32 times.

Regarding the losses, it is highlighted uneven developments, decreases in 2010 (-26.3% compared to the specific situation of 2009), followed by increases in 2011 (+34.6 and + 82.7% compared with the terms of reporting). The average period known values above par for fixed base index (102.8%) and subunit values for mobile base index (76.3%).

Regarding the total demand dynamics, there is an uneven trend. Thus, in 2010 demand falls by 37.3% compared to 2009, then in 2011 increased by 1.16 and 1.85 against the terms of reference. Following this situation, the average period is below both bases of reporting by 7.1 and 19.9% respectively.

Graphic evolution total supply and total demand is shown in figure 3 (since the two indicators have identical values).

CONCLUSIONS

Based on this study, the following conclusions could be drawn:

- in terms of components of balance it is worth mentioning equal nature of its situation different from the world and European (characterized by recording surpluses);
- total supply (74,974.66 t) representing 1.79% of the European level of the indicator and is in particular based on imports - 82.79%, but production has a significant share - 59.09%. Are noted exports (-41.88%), which in terms of quantity means almost 75% of imports. The components of total supply, analyzed in a European context were: 1.35% exports, 1.54% production, imports 1.67%;
- total demand, is entered with a percentage contribution of 1.85% in continental level of the indicator. As global and continental, and in Romania the demand structure is dominated by food consumption (88.13% - higher weight than the global and somewhat closer to the continental one). Otherwise, the shares held by other components of total demand were definitely lower: 5.70% other uses, 3.42% seeds and 2.75% losses. If we analyze Romania's contribution to the achievement of the indicators continental levels, weights are found as follows: 1.88% for food, 2.59% in seeds, 3.92% loss;

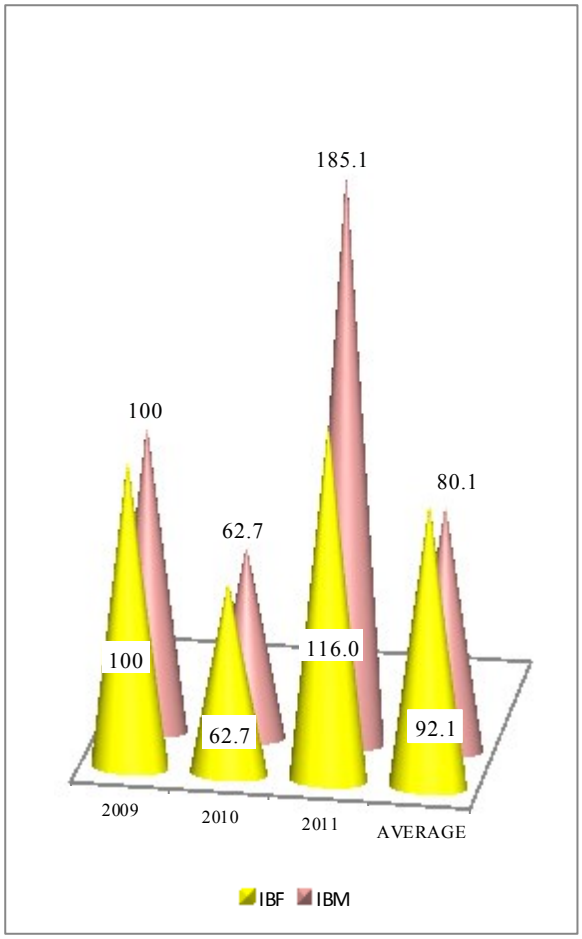

Fig. 3. The dynamics of supply and total demand (%)

- the vast majority of balance sheet items have uneven developments, distinguishing imports and exports showing upward trend strictly;
- for Romania, it should be noted the need for superior capitalization of the existing potential for growing rice (with reference to the extension surfaces) and better administration of component elements total demand - especially increased consumption of raw materials used in industry, reducing losses and enhancing the possibilities for use by finding new outlets of capitalization.

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ASSESSMENT OF SOCIAL INCLUSIVENESS OF VULNERABLE AND MARGINALIZED GROUPS IN FADAMA II PROJECT IN YOLA NORTH LOCAL GOVERNMENT AREA OF ADAMAWA STATE, NIGERIA

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Abstract

This is a Project Performance Assessment of the Second National Fadama Development Project implemented between 2004 and 2009. The study assessed the level of social inclusion of vulnerable and marginalized groups in the project in Yola North LGA of Adamawa state, Nigeria. Multi stage sampling technique was used to select 88 vulnerable and marginalized persons from 10 participating FUGs in the study area. The study relied on primary data collected using structured questionnaire and secondary data from the local Fadama desk office. Descriptive statistics was used to analyse the data. The study revealed that, 49% of the respondents were young, female (68%), married (57%) and educated (77%). Vulnerable and marginalise based FUGs constituted 37% of the FUGs that participated in the project in the area. All the FUGs sampled patronized both the capacity building and the pilot asset components most, compared to other project components. Majority (90%) of the respondents benefited from the project, but they rate their level of participation as average (67%). The main constraints to the respondents' participation in the project were; low matching grant and internal conflicts. It was recommended that, counterpart fund share of people in this group should be reduced. Furthermore, adequate sensitization on the entire goal of the project is necessary for promoting inclusion and reducing conflict among participants.

Key words**:** *Adamawa State**,** Fadama II, social inclusion, vulnerable and marginalized people,*

INTRODUCTION

Traditionally, a number of groups within our societies face higher risk of poverty and social exclusion compared to the general population [3]. These vulnerable groups are effectively excluded from decision-making processes and their need for development are mostly neglected. Consequently, their opportunities to make social contributions may be limited because of their relatively limited access to valued social resources.

The exclusion of vulnerable and marginalized groups in the scheme of things is best viewed as a social problem that requires social solutions. Social inclusiveness in the context of poverty reduction programmes implies the identification and inclusion of all social groupings, structural constituents that make up the society (which includes widows, elderly, physically challenged, youths, people living with HIV/AIDS etc.) from the point of project identification to the implementation stage [11]. The purpose of social inclusions is to build the capacities of the vulnerable and marginalized persons so that they are not only capable of managing risk but, they are also capable to overcome poverty.

Poverty is being considered among the main causes of vulnerability and results marginalization [3]. The Millennium Development Goals (MDGs) considered poverty eradication as a major vehicle for advancing development; however, no tangible progress will be made in that regard with persistent increase in inequality and social exclusion [12].

The Nigerian government over the years has initiated some projects and programmes to reduce poverty in the country. These initiatives were unable to achieve their objective of empowering the people due to

some limitations, especially, elitist capture leading to the exclusion of some persons. The first phase of the National Fadama Development Project (NFDP-I) was no exception to this challenge [9]. The Second National Fadama Development Project (NFDP- II) was developed as a poverty reduction project designed to sustainably increase the incomes of the Fadama users through expansion of farm and non-farm activities with high value added output, and to improve the living conditions of the rural poor, contribute to food security as well as increased access to rural infrastructure [13, 6, 4]. The project took a demand-driven approach where by all users of Fadama resources were encouraged to develop a participatory and socially inclusive plan for implementation of their agreed sub-projects [9]. The Community Driven Development (CDD) approach was aimed at avoiding situations of elite capture and conflict (formal and informal) which was a primary obstacle to the success of the first Fadama Development Project [5]. It should be noted that, promoting social integration and inclusion would create a society that is safer, more stable and more just, which is an essential condition for sustainable economic growth and development [12].

The project's social guidelines, incorporated in the project's operating manual, encouraged the inclusion of vulnerable and marginalized groups as a way to ensure that groups traditionally marginalized by gender, age, and class were fully targeted and are beneficiaries of project funded activities [6, 14]. Persons participating in the project were encouraged to form Fadama User Groups (FUGs) which will be under the Fadama Community Association (FCA) at the community level. The project was planned to operate for six years and to fund five components as reported by [10]. These components included; Rural Infrastructure Investment, Pilot Productive Asset Acquisition Support, Advisory Services, Capacity Building, and lastly, Project monitoring and evaluation.

Nevertheless, how involved were the vulnerable and marginalized groups in the entire project implementation? This study therefore was designed to assess the participation of vulnerable and marginalized groups in the National Fadama II facility in Yola North LGA of Adamawa State. Consequently, the study was structured to achieve the following objectives; (i) describe the socio-economic characteristics of vulnerable and marginalized persons in FUGs in the study area (ii) examine the proportion of vulnerable and marginalized groups that participated in the project and the type of activity such groups undertook (iii) assess the benefits derived by the respondents from the entire project (iv) assess the level of participation of the respondents in the project; and lastly (v) identify the constraints that affected the level of participation of the respondents in the project.

MATERIALS AND METHODS

The study was conducted in Yola North LGA of Adamawa State, Nigeria. Yola North was selected for this study because of the relative concentration of vulnerable and marginalized persons compared to all other Local Government Areas that participated in Fadama-*II* project. This can be attributed to the fact that it is the state capital. The study area lies between Latitude 9^{o} 14' North of the Equator and Longitude 12^{o} 38' East of the Greenwich Meridian, having an average elevation of about 192m [1]. The area falls within the Northern Guinea Savannah Zone and has a tropical wet and dry climate. Dry season lasts for a minimum of five months (November-March) while the wet season spans April to October. Mean annual rainfall is about 700mm [1]. Girei LGA bound the area to the North and Yola South to the East, South and West. According to [7], the area has an estimated population of about 198, 247.

Data for the study were obtained from both primary and secondary sources. Primary data were collected using structured questionnaire administered to the respondents. Multi-stage sampling technique was employed in selecting the representative FUGs used for this study. All groups classified as vulnerable and marginalized were purposively selected in the

first stage. These vulnerable and marginalized groups were stratified into two; women/widows groups and other stratum for the youths and the physically challenged. This is the second stage. Ten FUGs were randomly selected from both stratum proportionate to size; seven from women groups and three from youths and the physically challenged. The last stage involved the random selection of respondents proportionate to the size of the FUG. Secondary data were collected from Adamawa state Fadama Office and Yola North Local Fadama desk office.

In the analysis of data generated, descriptive statistics such as frequency distribution, means and percentages were used for the realization of the study objectives.

RESULTS AND DISCUSSIONS

Respondent's Socio-economic Characteristics

The socio-economic characteristics of the respondents is presented in Table 1. The table shows that about 49% of the respondents were between 30 and 39 years of age, while 20.45% were within the age range of 20-29 years. Respondents that were over 50 years of age constituted about 14%. This implies that most of the respondents were relatively young and physically active. Hence, the need to empower such group so as to reduce their vulnerability. This finding agrees with [2] who showed a high level of participation of young people in the project in Orire Local Government Area of Oyo State, Nigeria. The Table revealed that both male (about 32%) and female (about 68%) participated in the project. The dominance of women in this category implies that the project through its Community Driven Development (CDD) approach has encouraged the inclusion of females in the project. The Table further showed that, majority (56.8%) of the respondents were married, 19.3% were widowed, 17.1% were single, while only a few (6.8%) of them were divorced. This implies that, majority of the respondents were married because of the value attached to being married in the study area. The educational distribution of the respondents as measured by years of formal education reveals that about 23% of the respondents had no formal education, 24% attained primary education, while about 28% attained secondary education and 25% with tertiary education. Thus, majority of the respondents are literate and that might have influenced the decision of the respondents to participate in the project. This finding lends credence to those of [2, 14]. The distribution of respondents by primary occupation as also shown on the Table revealed that, 34% of the respondents were primarily into trading, while civil servants, farmers, the retirees, and artisans constituted about 18%, 13%, 7% and 5% of the respondents respectively. Similarly, unemployed represented about 24% of the respondents.

Table 1. Socio-economic Characteristics of the Respondents

Variable	Frequency	Percentage
Age (Years)		
20 – 29	18	20.45
30 – 39	43	48.85
40 – 49	15	17.04
50 – 59	8	9.09
60 and Above	4	4.54
Total	**88**	**100**
Sex		
Male	28	31.81
Female	60	68.19
Total	**88**	**100**
Marital Status		
Single	15	17.10
Married	50	56.80
Widowed	17	19.30
Divorced	6	6.80
Total	**88**	**100**
Primary Occupation		
Farming	11	12.50
Trading	30	34.00
Civil Servant	16	18.20
Retirees	6	6.80
Artisans	4	4.50
Unemployed	21	23.9
Total	**88**	**100**
Educational Attainment		
No formal Education	20	22.73
Primary School	21	23.86
Secondary School	25	28.41
Total	**88**	**100**

Source: Field survey, 2010

The high proportion of unemployed persons in this group has clearly shown the need for more inclusive empowerment of people in the area. This will restore their human dignity and reduce their vulnerability to being marginalised in the society.

Assessment of Participating FUGs

In a bid to analyse the extent of social inclusion of the vulnerable and marginalized groups in the project, the number of FUGs registered and those that were able to benefit from the project in the study area was collected from the local desk office. The records showed that 84 FUGs were registered for the project. However, only 54 FUGs were able to benefit from the project [15]. The various groups classified as vulnerable and marginalized by the project includes; the women, youths, the elderly, widows, persons living with HIV/AIDS and the physically challenged. Figure 1 shows the distribution of vulnerable and marginalised FUGs that participated in the project in the area. The vulnerable and marginalized FUGs constituted only 20 out of the 54 groups that participated in the project (representing about 37% of the total participating FUGs). Women groups were dominant in this category (50%), followed by widows with 25% representation, the youths with about 20% and the physically challenged had just 5% representation. However, it was observed that, the elderly and persons living with HIV/AIDS have not participated as an FUG in the project.

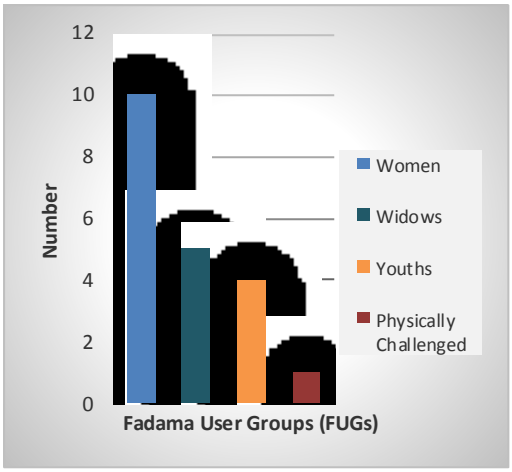

Fig. 1. Distribution of Vulnerable and Marginalized FUGs.
Source: Yola North Local Fadama Desk Office, 2010.

This is probably due to lack of awareness on such initiative or lack of the needed funds that will facilitate their active participation in the project.

Type of FUG Activity

The type of activities undertaken by the various vulnerable and marginalized FUGs is depicted on Figure 2. The distribution shows that majority of the groups (60%) were into non-farm activities. The diverse non-farm activities undertaken by the groups included shoe cobbling/beads making, tailoring, and sales of soft drinks, blacksmithing and processing of grains / oil extraction among others. However, the remaining 40% of the groups were into farm activities like rice production, fish production/processing, poultry farming, and yoghourt making. This shows that the project has encouraged diverse economic activities among its beneficiaries.

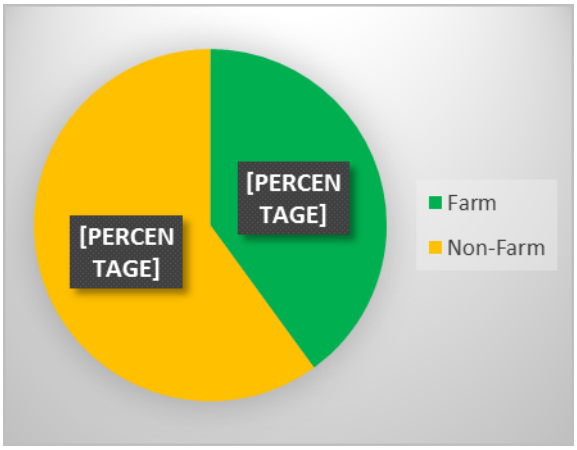

Fig. 2. Distribution of FUG Activities.
Source*:* Field Survey, 2010

Project Components Patronized by the FUGs

The pilot asset acquisition and capacity building components were the most patronized by all the FUGs (100%) in comparison to other components (Table 2).

Table 2. Project Components Patronized by the FUGs

Components	Frequency	Percentage (%)
Input Support	04	40
Capacity Building	10	100
Advisory Services	07	70
Pilot Assets Acquisition	10	100

Source*:* Field survey, 2010

This indicates a high demand for these components by Fadama users. FUGs that undertook farming activities also received input support.

Source of FUGs Counterpart Fund

All FUGs were expected to generate counterpart funds (matching-grant) of certain amount in order to be able to implement their group project. The distribution of the FUGs according to their sources of counterpart fund in the area is presented in Table 3. Majority (60%) of the groups claimed to have sourced the funds from their group members, while 30% received donations from other sources and their members' contribution. However, the Local Council was able to raise the needed matching grant only for about 10% of the FUGs. The implication of this is that, majority of the groups executed projects within the limit of what their members can contribute.

Table 3. Source of FUG Counterpart Fund

Source	Frequency	Percentage (%)
Contribution by members	6	60
Donations/contributions	3	30
Local Government	1	10
Total	10	100

Source*:* Field survey, 2010

Estimated Amount of Money Received from Fadama II for Project Execution by FUGs

As shown on Table 4, all the sampled FUGs were able to access funds from the project. This was predicated on the amount of counterpart-fund generated by individual FUGs. Majority (80%) of the FUGs received less than half a million naira. Only 10% of the FUGs were able to access more than ₦1,000, 000.

Table 4. Financial Support Received by Sampled FUGs

Amount (₦)	Frequency	Percentage (%)
< 100,000	1	10
100,000- 499,999	7	70
500, 000- 1,000,000	1	10
>1,000,000	1	10
Total	10	100

Source*:* Yola North Fadama Desk Office, 2010

This implies that most of these groups have only been able to generate matching grant that can fund projects less than half a million naira.

Assessment of Benefits Derived by Participants from Fadama II Project Activities

The assessment of benefits derived by members from FUG activities in the study area is presented in Table 5. Majority (about 90%) of the respondents claimed that, the project had assisted them to acquire skills and have gained financial benefits. Only about 10% of the respondents claimed not to have benefitted from the project entirely. This corroborates the findings of [4] which reveals that, Fadama II project has a significant impact on the welfare and human capital of project beneficiaries.

Table 5. Type of Benefits Derived by Members from FUG Activities

Benefits	Frequency	Percentage (%)
Financial	53	47.75
Skills	49	44.14
Not benefited	9	8.11
Total	111*	100

Source*:* Field Survey, 2010 *Multiple responses

Rating of Benefit by Respondents from the Project

Members who have benefited from the project were asked to rate their benefits and their responses is presented in Table 6. Majority (about 77%) of respondents felt they benefited less than they had expected. Therefore, they rate their benefit as low. Only 10% of the beneficiaries considered their benefit as high. This shows that benefits were enjoyed more by group leaders and active members than non-active members; which might have led lead to conflict.

Table 6. Type of Benefits Derived by Members from FUG Activities

Perception	Frequency	Percentage (%)
High	8	10.13
Average	10	12.65
Low	61	77.22
Total	79	100

Source*:* Field Survey, 2010

Participation Rating in the Entire Project

Assessment was developed to gather beneficiary perception about group participation, composition, and roles in local

decision-making. Their responses is presented in Table 7. Majority of the respondents (about 67%) considered their participation level as average. Further, about 20% rate their participation level as high, while about 12% view it as low. This implies that majority of the participants have some reservation about how their FUGs/FCAs are being governed. This is the likely cause of conflicts in groups as opined by some of the respondents.

Table 7. Participation Rating of FUG members

Perception	Frequency	Percentage (%)
High	18	20.45
Average	59	67.05
Low	11	12.50
Total	88	100

Source*:* Field Survey, 2010

Factors Limiting FUGs Participation in the Project

The ability of FUGs to participate in Fadama II project in the study area was constrained by some factors. The distribution of the respondents based on these factors is presented in Table 7.

The Table shows that about 40% of the respondents claimed that, inadequate counterpart fund was the main factor that hindered them from participating in the project fully.

This implies that inadequate counterpart fund might have limited the ability of the participants and their groups to execute their desired projects. This raises the need to help them to access affordable credit services. Similarly, about 28% of the respondents complained of internal conflict within FUGs/FCAs.

These beneficiaries might have lost confidence on the leadership of their groups, which has led to conflict and has affected their participation in the project.

In addition, about 26% of the respondents claimed that delay from the project office was a factor that affected them, while only about 6% complained of Low literacy of members in terms what the project entails.

Delay in the disbursement of funds from the project office has caused ineffective execution and abandonment of subprojects.

Table 8. Constraints Faced by FUGs during the Project

Constraints	Frequency	Percentage (%)
Inadequate counterpart fund	73	39.89
Internal conflict within FUGs	51	27.87
Delay from project office	47	25.68
Low Literacy of some members	12	6.56
Total	183*	100

Source*:* Field Survey, 2010 *Multiple responses

CONCLUSIONS

The study concludes that, during the implementation of Fadama II project, most of the participants have benefited. However, the level of participation in the project was constrained by some factors. Based on this, the study recommends that:

(i)Future empowerment initiatives should take into cognizance the income constraints of people in this group by reducing the amount of their matching-grant. Similarly, Local Government Councils and well to do individuals should be encouraged to assist vulnerable and marginalized persons in paying their counterpart funds.

(ii)Similar projects in the future should be encouraged to involve credit service providers who can assist by offering affordable credit to people in this group. This will enable such groups to generate matching grant adequate to fund their intended projects.

(iii)Government and all other development actors should intensify sensitization and mobilization of all economic interest groups especially the vulnerable and marginalized persons in future initiatives. This will steer participation, reduce conflict in FUGs/FCAs and empower more people in this group.

(iv)Timely and sufficient injection of funds will facilitate the achievement of objectives of any empowerment initiative. Therefore, delays emanating from the project offices should be minimized.

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NON-FARM DIVERSIFICATION AMONG RURAL FARMERS IN YOLA SOUTH LOCAL GOVERNMENT AREA OF ADAMAWA STATE, NIGERIA

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Abstract

Diversifying livelihoods has become a common concept in development discourse across the globe in recent decades. The focus of this study was to analyse non-farm diversification in rural Yola South Local Government Area of Adamawa state, Nigeria. Specifically, the research objectives were to; describe the socio-economic characteristics of respondents, identify livelihood activities among the respondents, and also identify the determinants of diversifying into non-farm activities. Primary data were collected using questionnaire from respondents (140) drawn from the study area using multistage sampling technique. Data collected were analysed using descriptive statistics and probit regression model. Findings of the study revealed that, majority of the respondents were male (90%), 88.57% were married and 70% were educated. They are mostly farmers with average farm size of 2.47 hectares. The probit regression analysis showed that, the coefficients of age, household size, distance to market, access to credit and farm size significantly influence the decision of respondents to undertake non-farm activities in the area. The study recommended that, all development actors should ensure; improved access to credit by farmers, the provision of basic infrastructure in the area, and the empowerment of rural residents through intensified entrepreneurships and technical training.

Key words: *diversification, non-farm, farm households, rural, Yola-South*

INTRODUCTION

Rural areas across most developing nations are changing from being exclusively agrarian societies to those undertaking diverse economic activities in the rural non-farm sector. Although agriculture remains the main source of livelihood in such areas; but, there is growing recognition of its inability to guarantee sustainable livelihood opportunities for these rural residents [10,16]. Diversification into the non-farm sector is now a common strategy in rural areas to reduce of livelihood failure, thus, it needs more attention from policy makers [13,18,25]. [23] and [17] gave account of how the sector contributes for about 30−45 percent of rural households' income in developing nations.

Diversification is seen as a process by which rural families construct a diverse portfolio of activities and social support capabilities in their struggle for survival and in order to improve their standard of living[14]. Similarly, non-farm diversification implies widening of income generating activities away from the traditional crop production and livestock rearing [5,19] . According to [14], the causes and consequences of diversification are differentiated by location, assets, income, opportunities and social relations. Considering the risk and uncertainties associated with agricultural activities, diversification contributes to better household welfare by reducing vulnerability through the generation of more financial resources [24]. Diversification in this context is as a result of a distress push. These Push factors has to do with the risk and seasonality common with farm activities; hence, rural farm households diversify their activities outside agriculture as a means of improving their livelihoods [8,15].

Agriculture has remained the main livelihood

source of majority of the residents of Adamawa state [16]. The State has a very high (2.9%) annual population growth rate [26]. This implies that, with ever increasing human population, there will be a very high demand for land. [7] and [22] outlined the effects of increased land fragmentation and rapid soil degradation to include; reduced farm yield, income and the unsustainable use of productive capacity of the land resource base. Equally, climate change has made farmers in the State vulnerable to poverty and food insecurity [2]. According to [20], 74.2% of the residents of the State are below the poverty line of $1.25 per day and majority of them are farmers who reside in rural areas. As a consequence of these, a large percentage of rural households do diversify their livelihoods into non-farm activities to enhance their well-being [16].

Recent studies in Nigeria have shown that rural households are increasingly diversifying their income sources by combining farm and non-farm activities to sustain their livelihoods [4,5,18,19]. Yet, there is paucity of studies on the diverse non-farm activities and factors that promote such diversification by farm households in the area. In recognition of the existing gap in knowledge and practice, this research intends to provide development actors with a modest understanding of the dynamics of non-farm diversification in rural Yola South. Consequently, the study has the following research objectives:

(i)Describe the socio-economic characteristics of the respondents;

(ii)Identify the non-farm activities of the respondents;

(iii)Identify the determinants of non-farm diversification in the area.

MATERIALS AND METHODS

Yola South Local Government Area of Adamawa State, Nigeria, lies between Latitude 9^o 14' North of the Equator and Longitude 12^o 28' East of the Greenwich Meridian [20]. The area is located in the Northern Guinea Savannah Zone having a tropical wet and dry climate. Dry season lasts for a minimum of five months (November-March) while the wet season spans April to October with mean annual rainfall of about 700mm [2].The area has a land mass of 2,310.05km^2 and a population of 196, 197, who are mostly farmers [21]. The dominant ethnic groups in the area are Verre, Batta, Fulani, Hausa, and Laka.

In selecting respondents for the study, multi-stage sampling technique was used. Three wards (Bole/Yolde Pate, Mbamba, and Namtari) were randomly selected in the first stage.

Twelve (12) communities were randomly selected proportionate to the size of the wards in the second stage. Further, a total of 140 household heads were randomly selected from the sampled rural communities.

Descriptive statistics, such as frequency distribution, means and percentages were used to describe the socio-economic characteristics of the respondents; identify the diverse non-farm activities; and identify the constraints to taking up non-farm activities in area.

In estimating the effects of the independent variables on the probability of a farmer to participate in non-farm activities, a binary choice probit model was used.

The dependent variable (dummy) assumes the value 1 for respondents who undertake non-farm activities and 0 for otherwise. The probit model used in this study is specified as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + U \quad \text{(i)}$$

Where;

Y= Non-farm Activities (Yes=1: No= 0)

β_0 = Constant

X_1 = Age of the household head (years)

X_2 = Gender of the household head (Male=1: Female=0).

X_3 = Household size (Number).

X_4 = Educational status of the respondent (Number of years).

X_5 = Distance to the nearest Market (Km)

X_6 = Membership of cooperatives (Yes=1: No= 0)

X_7 =Access to credit (Yes=1: No= 0)

X_8 = Farm size (Ha)

U= Error term

RESULTS AND DISCUSSIONS

Respondent's Socio-economic Characteristics

Respondents' socio-economic characteristics are presented in Table 1. Male respondents constituted the majority (90%) and mostly (88.57%) married due to tradition and social orientation. The average household size in the area was 7 which is comparable to the regional average [20]. Educationally, majority of the respondents had a minimum of primary education (70%). Majority (94%) of the respondents economically active (less than 60 years of age) and were mostly (96%) small-scale farmers cultivating 1-5 hectares of land.

Table 1. Socio-economic Characteristics of the Respondents

Variable	Frequency	Percentage
Age (Years)		
20 – 29	12	8.57
30 – 39	51	36.43
40 – 49	40	28.57
50 – 59	29	20.71
60 and Above	08	5.72
Mean = 41.39 Years		
Sex		
Male	126	90.0
Female	14	10.0
Marital Status		
Married	124	88.57
Widowed/Divorced	16	11.43
Household size		
1 – 5	59	42.14
6 – 10	65	46.43
11 and above	16	11.43
Mean = 7 People		
Primary Occupation		
Farming	113	80.71
Trading	09	6.43
Civil Servant	08	5.72
Artisans	10	7.14
Educational Attainment		
No formal Education	42	30.00
Primary School	41	29.28
Senior Secondary School	40	28.57
Tertiary	17	12.15
Farm Size (Ha)		
< 1	15	10.71
1-5	120	85.71
6-10	05	3.58
Total	**140**	**100**

Source: Field survey, 2014

Patterns of Non-Farm Diversification in Rural Yola South

The broad trend of non-farm activities in the area as shown on Table 2 indicates that, majority of the respondents sampled for the study undertake diverse non-farm economic activities.

Table 2. Distribution of Respondents According to their Non-farm Activities (N=140)

Activity (ies)	Frequency	Participation Rate (%)
Traditional		
Hunting	12	8.57
Sales of Wild fruits	04	2.86
Fishing	14	10.00
Casual Wage Labour	14	10.00
Sales of Thatch	04	2.86
Firewood gathering/sales	12	8.57
Sand Packing	05	3.57
Beer Brewing/sale	02	1.43
Barbing *(wanzam)*	02	1.43
Butchery	05	4.76
Wood Carving	01	0.71
Oil pressing (groundnut)	02	1.43
Traditional herbal practice	03	2.14
Blacksmithing	02	1.43
Pottery	06	4.29
Non-Traditional		
Grinding mill operation	03	2.14
Car driving	02	1.43
Carpentry	03	2.14
Civil Service	09	6.43
Charging/Sale of Recharge cards	02	1.43
Clergy	02	1.43
Patent medicine store operation	01	0.71
Masonry/Bricklaying	03	2.14
Electrician/Mechanic	03	2.14
Motorcycle transport *(Achaba)*	08	5.71
Photography	01	0.71
Sewing	03	2.14
Vulcanising	01	0.71
Retail shop operation *(Kiosk)*	04	2.86

Source: Field survey, 2014

This suggests that diversifying in the non-farm sector is widespread in the study area. However, opportunities for non-farm diversification abound mostly in the traditional/informal sector of the rural economy. Traditional non-farm activities have high participating rates in the area. These activities require minimal training and start-up capital. Similarly, the intensity of performing these activities increases during the dry season when it is practically very difficult to carry out farming activities in the area. Activities that dominate this category include fishing, casual wage labour, firewood

gathering/sales, hunting and pottery among others. This may be attributed to the low level of education in the area as only about 41% of the respondents had attended secondary and tertiary institutions. Furthermore, civil servants, commercial motorcyclists *(Achaba)*, and retail shop operators *(Kiosk* owners*)* dominate the non-traditional non-farm sector in the area. However, this category is replete with activities that are mostly semi-skilled by nature. This can be attributed to the remote nature of the area and the inadequacy of basic social amenities (roads, electricity and markets among others), hence, limiting formal non-farm opportunities in the study area.

Determinants of Participation in Rural Non-Farm Economic Activities

Table 3 below provides the parameter estimates for the probit model. The marginal effects of the independent variables were estimated because of their significance in policy and decision-making. The estimated probit regression model gave the McFadden R-square of 0.600, which implies that, all the explanatory variables included in the model were able to explain about 60.0% of the variability in diversifying into the non-farm sector by the respondents. The variables found to have notable influence on undertaking diverse non-farm activities were age, household size, distance to market, access to credit and farm size.

The result showed that age has a negative and significant (5%) influence on the ability to diversify into non-farm activities. This implies that, the probability of diversifying into non-farm activities decreases with age. The likelihood of participation declines with 0.127, as the respondents get older. Most of the non-farm opportunities in the area are non-skilled activities that require physical strength, so the older people are at a disadvantage. Therefore, young people are more likely to diversify into the non-farm sector to support their livelihoods. This finding is similar to those of [1] in Ghana and [12] in Ethiopia.

The coefficient of household size was positively significant in influencing the decision to undertake non-farm activities. Specifically, the probability to undertake non-farm activities increases with 0.247 for a member increase in household size. This is as expected, since a larger household has surplus labour and can conveniently assign workers to other activities other than farming. This finding lend credence to that of [18] in South-East Nigeria who made a similar submission.

Location plays a vital role in the viability of non-farm activity. Distance to the main market centre was significant and negatively affect participation in non-activities. Conversely, farmers residing at far distant locations from market centres are less likely to participate in non-farm activities. This could be attributed to the fact that households residing in the villages distant from market centres have less access and opportunity to sell output, purchase inputs, and as well pay higher cost of transportation. This finding corroborate that of [6] in North-Central Nigeria.

Reconfirming the findings from previous studies ([18] in South-East Nigeria, [12] in Ethiopia and [9] in Ghana), the results showed that the coefficient for farm size was significant and negatively related to non-farm diversification. The implication is that a hectare increase in farm size will reduce non-farm diversification practice by 0.30. This is true as farm size increase it will in turn generate additional income all things being equal; conversely, a farming household is likely to reduce other non-farm activities [2]. This means that farmers who cultivate more land have the capacity to generate higher income, which might not motivate them to undertake diverse non-farm economic activities.

Credit access plays a key role in the decision to participate in both agricultural and non-farm activities [19]. Increase in access to credit by a given household will increase the level of non-farm diversification. The result of this study showed that, the coefficient for access to credit was significant (5%) and positively influences decisions to undertake non-farm activities. Noteworthy is that, number of years of schooling was not significant in the study area. This may be because of the lack of formal non-farm opportunities in the study area. The result coincides with the findings of [26] who opined

that, education is a key determinant of participation in remunerative non-farm activities.

Table 3. Result of Probit Regression for the Determinants of diversifying into non-farm activities

Variable	Coefficient	Std. Error	Z-Statistic
Age(X_1)	-0.127427	0.020551	-6.200445 *
Gender(X_2)	0.560304	0.664330	0.843412
Household size (X_3)	0.247464	0.079792	3.101352 *
Education level (X_4)	-0.012532	0.029499	-0.424813
Distance to market (X_5)	-0.091218	0.030564	-2.984466 *
Coop. membership (X_6)	-0.092782	0.363432	-0.255295
Access to credit (X_7)	1.181196	0.519420	2.274068 * *
Farm size (X_8)	-0.303915	0.133303	-2.279873 * *
C	6.778168	1.368042	4.954650
R^2	0.600		

Source: Field survey, 2014

CONCLUSIONS

Generally, farmers in the study area have highly diversified livelihoods, given that a majority of the households were found to derive their income from a combination of farm and non-farm activities. Hence, the need to create an enabling environment that will promote remunerative non-farm activities, which will in turn better the lives of rural households in the area. In the light of the findings from the study, it is recommended that:

(i)The government at every tier should strengthen initiatives that seek to increase access to credit for rural farm households. This will enhance the establishment of non-farm businesses and promote agricultural development simultaneously.

(ii)Provision/ improvement of critical economic infrastructure such as roads, electricity, markets and communication facilities will encourage non-farm diversification.

(iii)The government and other stakeholders responsible for the development of rural area in the state should provide entrepreneurships and technical training to rural residents. This can help to improve farmers' capacity to undertake more profitable non-farm economic activities.

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RESEARCH REGARDING THE DETERMINATION OF THE MAIN PHYSICAL PROPERTIES OF THE FĂGET GLEY SOIL, TIMIȘ COUNTY, IN STRAWBERRY CROPS

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Abstract

The objectives of the papers were to characterize the natural framework, to identify and characterize the soil types and subtypes, to determine the physical properties of luvosoil in the Faget area, Timis County, Romania in strawberry crops. The physical properties of the gley soil were determined based on soil samples collected from a natural setting, on two depth levels, namely: 0-10 and 10-20 cm, during two various periods of the year, respectively, early spring, during March and autumn, during October. The research was carried out during two years, namely: 2013 and 2014, managing the following analyses, and the following methods: soil density; apparent density; total porosity and aeration porosity. The soil density registered values ranging from 2.43 g/cm^3, at the 0-10 cm depth and 2.48 g/cm^3, at the 10-20 cm depth. The soil apparent density registered values ranging from 1.16 g/cm^3, at a 0-10 cm depth, in March 2013 and 1.20 g/cm^3, at a 10-20 cm depth, in October. The total soil porosity presented values ranging from 41%, at a 10-20 cm depth, in October 2014 and 45%, at a 0-10 cm depth, in March 2013 and 2014. The soil aeration porosity presented values ranging from 10.90%, at a 10-20 cm depth, in October 2014 and 13.90%, at a 0-10 cm depth, in March 2013.

Key words**:** *culture, density, pedo-genesis processes, physical property, porosity, soil*

INTRODUCTION

The town of Făget is situated on the south-western part of Romania, in the contact area of the Lugojului Plain and Lugojului Hills, on the superior Bega river stream. [12]
Situated in the East of the Timiș county, it lies at a 98 km distance from Timisoara and 33 km form Lugoj, linked by the national road DN68A. The same road towards east links the town with Deva, at a 68 km distance. [1]
The town is also crossed by the Lugoj-Ilia railroad. [11]
The plain occupies around half of the researched area, and represents the lowest morphologic step, with hypsometric values ranging from 75 to 200 m. [6]

MATERIALS AND METHODS

The researched soil is a gley soil situated within the built-up area of the town of Făget, Timiș county, and used as a strawberry plantation. [9] The strawberry plantation was founded in August 2012. The soil samples with this crop were sampled after its founding, respectively after planting the strawberry stools.
The paper aimed at determining the soil's main physical properties, based on soil samples collected from a natural setting, on two depth levels, namely: 0-10 and 10-20 cm, during two various periods of the year, respectively, early spring, during March and autumn, during October.
The research was carried out during two years, namely: 2013 and 2014, managing the following analyses, and the following methods:
SOIL DENSITY ***(cm^3)*** – with the help of the pycnometer, using distilled water; [5]
APPARENT DENSITY ***(cm^3)*** [7]
The density was calculated with the following formula:

$$DA = \frac{M_1 - M_2}{V}$$

where: DA –apparent density (in g/cm^3);

M_1 – mass of the soil filled cylinder with a metallic cap (g);

M_2 – mass of the empty cylinder with a metallic cap (g);

V – cylinder volume (cm^3).

TOTAL POROSITY PT (%) was calculated with the help of the following formula:

$$PT = \left(1 - \frac{DA}{D}\right) x100$$

AERATION POROSITY PA (%).[7] In order to calculate it, we used the values of hydrophysical and physical indices:

PA = PT - CC x DA

CC – water field capacity.

RESULTS AND DISCUSSIONS

In order to calculate the **soil density**, the soil samples were collected at two depth levels (0-10 cm; 10-20 cm), during the first year (2013), as well as the second one (2014), the data regarding soil density being presented in table and Fig. 1.

Table 1. Soil density determination (g/cm^3), on luvisol soil

Crop	Month	Depth (cm)	Year	
			2013	2014
Strawberries	March	0-10	2.44	2.43
		10-20	2.46	2.45
	October	0-10	2.45	2.46
		10-20	2.47	2.48

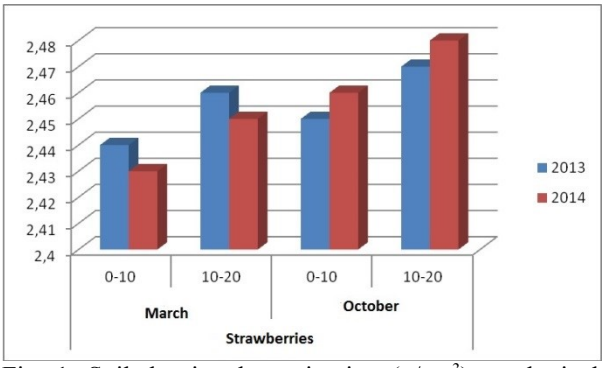

Fig. 1. Soil density determination (g/cm^3), on luvisol soil

From the above presented data, one can observe the fact that, on luvisol soil, the soil density registered values ranging from 2.43 g/cm^3, at the 0-10 cm depth and 2.48 g/cm^3, at the 10-20 cm depth.

In table and figure 2 the **apparent density** values are presented.

Table 2. Determining the soil apparent density (g/cm^3), in luvisol soil

Crop	Month	Depth (cm)	Year	
			2013	2014
Strawberries	March	0-10	1.16	1.17
		10-20	1.19	1.19
	October	0-10	1.17	1.18
		10-20	1.20	1.20

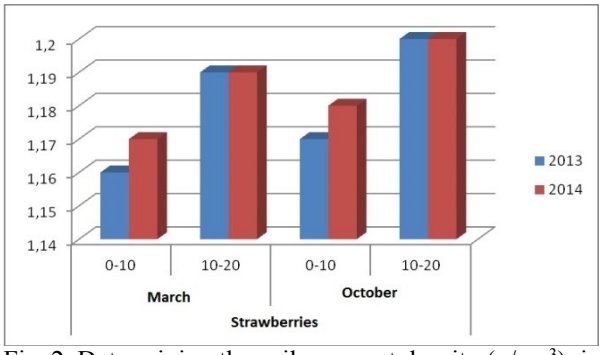

Fig. 2. Determining the soil apparent density (g/cm^3), in luvisol soil

From the above presented data, one can observe the fact that, on luvisol soil, the soil apparent density registered values ranging from 1.16 g/cm^3, at a 0-10 cm depth, in March 2013 and 1.20 g/cm^3, at a 10-20 cm depth, in October.

Between the apparent density and the porosity there is a correlation that can be used when categorising soils into porosity classes. **Soil porosity** is a very important characteristic, since plants and microorganisms can find better life conditions only between certain aeration and capillary porosity, the data regarding its values being presented in table and figure 3.

Table 3. Determining the total soil porosity (%), in Luvic soil

Crop	Month	Depth (cm)	Year	
			2013	2014
Strawberries	March	0-10	45	45
		10-20	44	44
	October	0-10	43	43
		10-20	42	41

In luvic soil, the total soil porosity presented values ranging from 41%, at a 10-20 cm depth, in October 2014 and 45%, at a 0-10 cm

depth, in March 2013 and 2014.

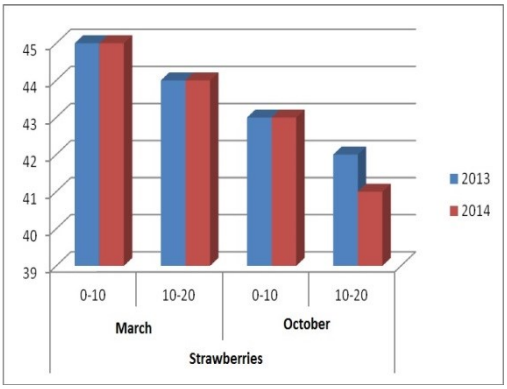

Fig. 3. Determining the total soil porosity (%), in Luvic soil

The aeration porosity as well as the total porosity is very important for fruit tree plantation, and thus for obtaining fruit productions.

Organic fertilizers are the ones leading to the most significant soil aeration porosity values, as one can observe in table and graph 4.

Table 4. Determining aeration porosity (%), in luvic soil

Crop	Month	Depth (cm)	Year	
			2013	2014
Strawberries	March	0-10	13.90	13.30
		10-20	12.60	12.00
	October	0-10	12.70	11.40
		10-20	12.10	10.90

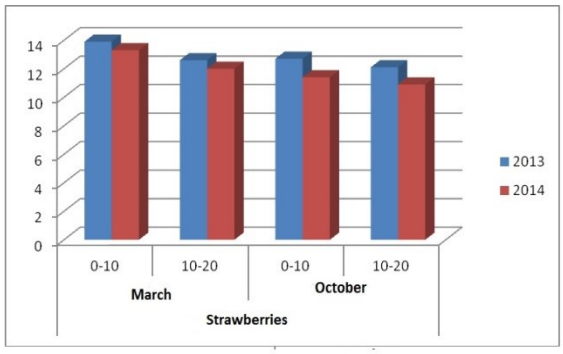

Fig. 4. Determining aeration porosity (%), in luvic soil

In luvic soil, the soil aeration porosity presented values ranging from 10.90%, at a 10-20 cm depth, in October 2014 and 13.90%, at a 0-10 cm depth, in March 2013.

CONCLUSIONS

Regarding the geographic setting, the town of Făget is situated in the south-western part of Romania, in the contact area of the Lugojului Plain with the Lugojului Hills, on the superior Bega river stream.

Regarding the pluviometric regime, for the entire year, the number of rainy days varies in the plain area between 120 and 130. The study of the multiannual pluviometric regime fluctuations revealed a net interval differentiation. Thus, during the years considered to be rainy, the pluvial water excess is due to a restricted number of months (3 – 4) when the water quantities exceed 80 mm. The rest of the months usually present values close to the multiannual averages, some being even droughty.

From the presented data, one can draw the following general conclusions:

The soil density registered values ranging from 2.43 g/cm^3, at a 0-10 cm depth and 2.48 g/cm3, 10-20 cm depth.

The apparent soil density registered values between 1.16 g/cm^3, at a 0-10 cm depth, in March 2013 and 1.20 g/cm3, at a 10-20 cm depth, in October.

The total soil porosity registered values between 41%, at a 10-20 cm depth, in October 2014 and 45%, at a 0-10 cm depth, in March 2013 and 2014.

The soil aeration porosity registered values ranging from 10.90%, at a 10-20 cm depth, in October 2014 and 13.90%, at a 0-10 cm depth, in March 2013.

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STUDIES REGARDING THE PRODUCTION CAPACITY OF SOILS OUTSIDE THE BUILT-IN AREA OF THE POJEJENA COMMUNE, CARAȘ-SEVERIN COUNTY. CASE STUDY

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Abstract

The objectives of the paper were: to characterize the natural framework, to identify, study and describe the types and subtypes of soils, to establish the expenses needed for wheat and maize crops and to estimate the production capacity of the agricultural land, compared to the yields obtained, as well as the economic efficiency of the studied farm. The studied material was represented by the land belonging to the Pojejena administrative-territorial unit, Caraș-Severin County, respectively the soils identified in the national perimeter. They were studied in relation to the environmental factors conditioning their existence. The paper presents the fertility of the agricultural land in the studied area, the necessary costs for wheat and corn cropping per hectare, in relation to these soils' production capacity, reflected by the obtained productions and the farm's economic efficiency. In the studied farm, the luvisol soil covers a surface of 24 ha. The widest surface is cultivated with corn, namely 19 ha, and the rest of 5 ha with wheat, whereas the eutricambosoil covers 18 ha, of which 12 ha are cultivated with wheat and 6 ha with corn. For the founding and maintaining of the two crops, corn and wheat, we have made up a cost chart, necessary for one hectare of each crop. The average for the corn crop over the two studied years, 2014 and 2015 respectively, was of 5150 kg/ha. With regards to the production average, without taking the soil type into account, it was of 3050 kg/ha. Although, from the two studied soil types eutricambosoils yielded higher productions, their fertility can still be increased by complex fertilizations and the introduction of adequate crop rotations.

Key words**:** *economic efficiency, pedogenesis processes, potentially productive, production capacity, soil*

INTRODUCTION

The Pojejena commune is situated in the south-western part of a Romania, at the border with the Serbian Republic, on the left Danube shore, 12 km upstream from Moldova - Nouă. [9]

The commune lies at the foot of the Locvei Mountains, the maximum altitude being registered on the Piatra Alba peak, 525m, gradually descending to the Danube, made up of calcareous sedimentary areas. [3] The commune relief's make-up is 50% mountain, 40% hill and 10% plain. The Pojejena commune is included in the Iron Gates Natural Park. [8]

The Pojejena commune climate is moderate continental, with sub-Mediterranean influences, characterized by mild winters due to Mediterranean Sea warm air mass influences. Precipitations are characteristic to the Mediterranean type, with maximum temperatures usually in May and minimum ones in October. The annual precipitation average ranges from 800 to 1000 mm. [10]

From a hydrographical point of view, the hydrologic network of the Pojejena commune is represented by the Danube river to the south, the Radimna rivulet to the west 1 km from the commune limit, the Pojejena rivulet 50-100 m to the south-east, both flowing onto the Danube. [7]

MATERIALS AND METHODS

The studied material is constituted by the land belonging to the Pojejena administrative-territorial unit, Caraș-Severin county, respectively the soils identified in the national perimeter. They are studied in

relation to the environmental factors conditioning their existence. [6]
The paper observed the fertility of the agricultural land in the studied area, necessary costs for the founding of a wheat and corn hectare, in relation with these soils' production capacity, reflected by the obtained productions and the farm's economic efficiency. [5]
In order to learn the physical, hydric and chemical properties of the soils in the studied perimeter, we used data obtained from OSPA Caraș-Severin, as well as those from the Pojejena Mayor hall. [4]
The total studied surface is of 42 ha. The soil types identified in the field based on OSPA Caraș-Severin and the Pojejena Mayor Hall studies are: [2]
Luvisol soil, with a 24 ha surface;
Eutricambosol soil, with an 18 ha surface.

RESULTS AND DISCUSSIONS

In the Pojejena commune, the agricultural land occupies 46.91% of the total surface, amounting to 5,284 ha. From the usage point of view, the land is divided as follows: agricultural use (pasture and hay land) 72.63 %, tillable land 26.36%, and vineyards 0.4%. The surfaces occupied by pastures and hay land are the most important ones, since they insure the growth of the live stocks..
Forests occupy 43.97 % of the total commune surface, representing an important regenerative resource, whose potential is not yet fully capitalized.
Necessary costs for founding and maintaining crops. In the studied farm, the luvisol soil covers a surface of 24 ha. The widest surface is cultivated with corn, namely 19 ha, and the rest of 5 ha with wheat, whereas the eutricambosol soil covers 18 ha, of which 12 ha are cultivated with wheat and 6 ha with corn. Thus, the total family type farm surface is of 42 hectares, used as follows:
- Corn cultivated surface - 25 hectares;
- Wheat cultivated surface - 17 hectares.

For the founding and maintaining of the two crops, corn and wheat, we have made up a cost chart, necessary for one hectare of each crop, as one can infer from the data presented in tables 1. and 2.

Table 1. Costs necessary for the founding and maintaining of a CORN crop,
The following materials are necessary:

Ct. no.	Material	M. U.	Quantity	Price	Total cost (RON)
Soil preparation and seeding					
1	Diesel oil	L	79	5	395
2	Complex fertilizers	Kg	100	2.4	240
3	Seed	Kg	25	23	575
Crop maintenance and harvesting					
1	Ammonium nitrate	Kg	350	1.84	644
2	Herbicides and phytosanitary treatment	-	-	120	120
3	Harvested	-	-	250	250
			TOTAL		**2.224**

From Table 1, one can observe the fact that costs necessary for founding and maintaining one hectare of corn amount to RON 2,224.
From this sum we deduce the UE subvention sum of Euro 180, that is: 180 X 4.25 = RON 765.
Thus, in the end, our costs amount to: 2,224 – 765 = RON **1,459/ha.**
1,459 x 25 ha surface = RON 36,475

Table 2. The needed materials and related Costs for the founding and maintaining of a WHEAT crop

Ct. no.	Material	M. U.	Quantity	Price	Total cost (RON)
Soil preparation and seeding					
1	Diesel oil	L	79	5	395
2	Complex fertilizers	Kg	100	2.4	240
3	Seed	Kg	250	1.5	375
Crop maintenance and harvesting					
1	Ammonium nitrate	Kg	300	1.84	552
2	Herbicides and phytosanitary treatment	-	-	100	100
3	Harvested	-	-	250	250
			TOTAL		1.912

From table 2., one can observe the fact that costs necessary for founding and maintaining one hectare of wheat amount to RON 1,912.
From this sum we deduce the UE subvention sum of Euro 180, that is: 180 X 4.25 = RON 765.
Thus, in the end, our costs amount to: 1.912 – 765 = RON **1,147 RON/ha.**
1,147 X 17 ha surface = RON 19,499
Corn and wheat productions, obtained from the two studied soil types, respectively luvisol and eutricambosol soil, differed, as one may observe in tables 3. and 4. and figures 1. and 2.

Table 3. Corn production (kg/ha) obtained on luvisol and eutricambosol soils

Soil type	Year/Production obtained (kg/ha)		Average
	2014	2015	
Luvisol	4,500	5,300	4,900
Eutricambosol	5,100	5,700	5,400
Obtained production average			**5,150**

With the corn crop, the productions obtained on luvisol soil, varied form 4,500 kg/ha in 2014 to 5,300 kg/ha, in 2015, with an average of 4,900 kg/ha.

With eutricambosol soils, the corn productions were higher, namely 5,100 kg/ha in 2014, respectively 5,700 kg/ha, in 2015, with an average of 5,400 kg/ha over the two years.

The average for the corn crop over the two studied years, 2014 and 2015 respectively, was of 5,150 kg/ha.

Table 4. Wheat production (kg/ha) obtained on luvisol and eutricambosol soils

Soil type	Year/Production obtained (kg/ha)		Average
	2014	2015	
Luvisol	2,900	2,700	2,800
Eutricambosol	3,500	3,100	3,300
Obtained production average			**3,050**

Regarding the wheat crops on luvisol soils, they varied between 2,900 kg/ha, in 2014, to 2,700 kg/ha, in 2015, with an average of 2,800 kg/ha over the two years.

On eutricambosol, same as for the corn crop, productions were higher, namely 3,500 kg/ha, in 2014, respectively 3,100 kg/ha, in 2014, with an average of 3,300 kg/ha over the two years. With regards to the production average, without taking the soil type into account, it was of 3,050 kg/ha.

Although the same fertilizers and treatments were applied to both crops, in 2013, as well as 2014, the obtained productions varied a great deal. This fact is due especially to climate conditions in 2014, because the precipitations during the vegetation period were a lot more numerous, thus helping to obtain higher productions, as compared to those obtained in 2013.

CONCLUSIONS

Agriculture, with its important branches: land cultivation and animal breeding, alongside with fishing, tourism and commerce are the main economic activities undertaken by the commune inhabitants. The area's soil and climate conditions facilitate vegetal crops, the total cereal cultivated commune surface being of 5,286 ha.

With the corn crop, productions obtained on luvisol soil, ranged from 4,500 kg/ha in 2013 and 5,300 kg/ha in 2014, with an average of 4,900 kg/ha. In the case of the eutricambosol soil, corn productions were higher, namely 5,100 kg/ha in 2013, 5,700 kg/ha in 2014 respectively, with an average of 5,400 kg/ha over the two years.

The corn crop production average over the two studied years, 2013 and 2014 respectively, was of 5,150 kg/ha.

Regarding the wheat crop, on luvisol soil, it ranged from 2,900 kg/ha in 2013 to 2,700 kg/ha in 2014, with an average of 2,800 kg/ha over the two years.

On eutricambosol soil, just as in the corn crop's case, higher productions were obtained, namely de 3,500 kg/ha, in 2013, respectively 3,100 kg/ha, in 2014, with an average of 3,300 kg/ha over the two years. Regarding the production average, without taking the studied soil type or year into account, it amounted to 3,050 kg/ha.

Although fertilizers and treatments were equally applied to the two crops, during 2013, as well as during 2014, the obtained productions greatly varied. This was especially due to climatic conditions in 2014, when there were more numerous precipitations, thus helping obtain higher productions, as compared to those obtained in 2013.

Although, from the two studied soil types eutricambosol soils yielded higher productions, their fertility can still be increased by complex fertilizations and the introduction of adequate crop rotations.

Likewise, in order to increase the fertility of these soils, adequate agritechnical works are necessary, which should facilitate water penetration into the soil, and, in some cases, even hydro ameliorative works (drainage).

Since luvisol soils are acid soils, poor in fertilizing elements, here measures of calcareous amendment and complex nitrogen, phosphor and kalium fertilization must be

applied.

Periodically, once in 3-4 years, there is a need either for organic fertilization or for a clover crop rotation.

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THE ROLE OF FINANCING AGRICULTURE IN NATIONAL ECONOMY DEVELOPMENT

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Abstract

Besides the transition to market economy as a specific form of transformations for post socialistic countries, including the Republic of Moldova; besides the necessity to form a form model which would ensure energetic, alimentary and other kinds of vital securities needed by the country's population, it is also necessary to create the country's social/economic structure able to counteract all the existing and recent phenomena caused by the crisis affecting nowadays the world civilization, development of transmission mechanism of processes associated with the development of agriculture for the economic growth, in order to identity perspective strategies for agriculture in the Republic of Moldova; the development of funding policy in the context of strategies of development of enterprises; analysis of the funding policy effects on the capacity of agricultural enterprises in the Republic of Moldova; development and elaboration of a financial policy of agricultural value chain for agricultural enterprises in the Republic of Moldova; argumentation of the necessity and opportunity for the innovation promotion in the financial policy of agricultural enterprises in the Republic of Moldova.

Key words**:** *agricultural enterprises, common agricultural policy, development strategy, funding policy, subvention*

INTRODUCTION

The presented material addresses a multifaceted problem with multiple and diverse interdependencies between economic development strategies of agricultural entities and funding policies to ensure and encourage the implementation of these strategies when the role and place of the Moldovan agriculture in the formation of macroeconomic indicators are still very important, although it was reduced by 50% during the period 2000 - 2014. The importance of agriculture for the national economy is determined by at least the following argument: agriculture currently has a share of 27.5% in the total number of the employed people and 27.65% of GDP.
Meanwhile, in 2013 40% of the agricultural economic entities suffered losses. The reasons that explain this negative phenomenon are complex and numerous. The lack and failure to promote rational development strategies and some proper funding are among the most important and essential ones.
If development strategies are created and implemented in the proper way, agricultural economic entities can benefit from their application. The most significant advantage is the perspective of agricultural enterprises to increase their income. Besides financial benefits, companies can enjoy other distinct assets [1]. Agricultural entities will have to solve two distinct problems in the context of development strategies: (i) the identification of the necessary development direction from various strategic alternatives, which can be hardly ever assessed; (ii) the concentration of efforts, including financial ones, in the selected direction.
Thus, the funding policy is of special significance, ensuring smooth implementation of development strategies. Both financial theory and practice show that the funding policy should be connected with both strategic project and organizational structure of the economic unit at the same time. It must be designed so that it doesn't compromise the value of the organizational capital, i.e. it does not produce discontinuities as to the contracts with customers, suppliers, the staff, the state

or local communities [11].
Based on the decisive role of agricultural economic entities in both economic and social destiny of every country, the financial dimension treatment of their activity is of the greatest interest and importance. Funds, promoted by the funding policy, ensure the required amount of resources necessary for the current use in economic entities as well as for their development in the long term.

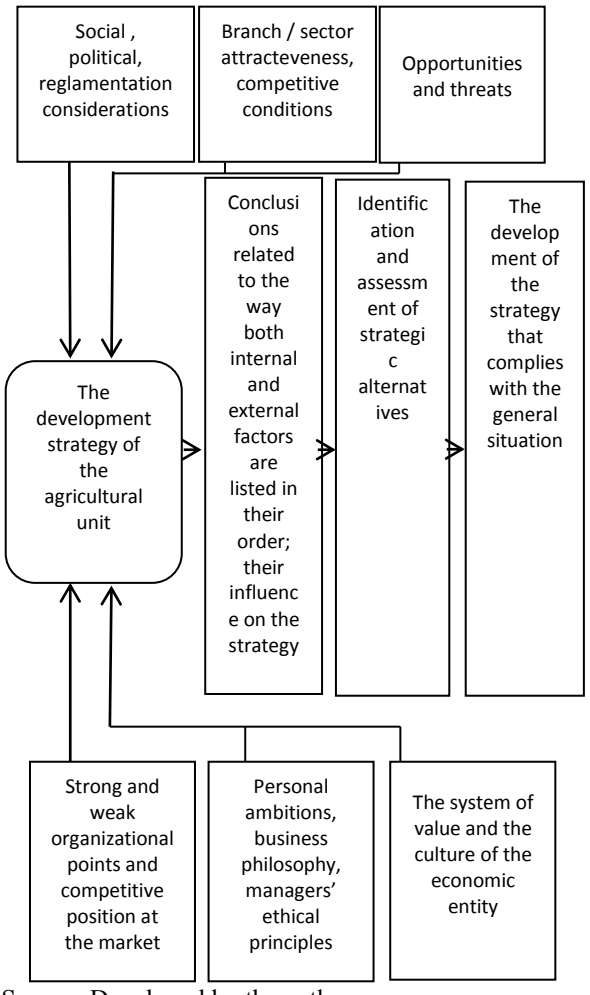
MATERIALS AND METHODS

Investigations involve addressing a very complex problem with multiple and diverse interdependencies between economic development strategies of agricultural entities and their funding policy. From the scientific point of view, the research was conducted in the context of a complex and systematic approach to contemporary economic concepts [10]. The generalized experience of the developed countries and the ones with the low income per capita in agricultural entities funding and their development strategies is paid special attention in the paper. Taking into consideration the complexity of the presented material, there was applied an expanded arsenal of the scientific method based on the principles of dialectical determinism. Therefore, using scientific abstraction, we have considered the fact that the driving force of the development is internal contradictions of both phenomena and processes. We feel that both induction and deduction are not independent, isolated from each other research methods, but they are interrelated, being the parts that are necessary to study the economic reality. We considered it right to analyze every phenomenon and process and to complement our analysis with the synthesis.

RESULTS AND DISCUSSIONS

The analysis of the most important scientific contributions in identifying the role of agriculture in sustainable development of the national economy made it possible to group them into the following subject issues:
-agriculture, economic growth and poverty reduction;
-agriculture and urbanization trend;
-green revolution, acceptance and acquisition of technologies;
-research & development in agriculture and adequate technologies;
-extension services (consultations) as a means to boost the acceptance and acquisition of new technologies;
-environmental challenges and the sustainability of agricultural systems;
-barriers to accept and acquire technologies in the agricultural sector;
-the size of the household and land tenure [7].

Fig. 1. Determinants of any development strategy of economic agricultural entities



Source: Developed by the authors.

The development of the strategy is influenced by many factors. Figure 1 is a simple model of primary factors that influence the strategy and of the way the strategy ultimately appears. The interaction of these factors is always specific to every economy branch or

sector. The development of the strategy is influenced by some aspects of the political situation [2]. Thus, the attitude of central and local legislative bodies and judicial organs to the business influences the following government actions: taxation of the economic agents, establishing tax reliefs and trade taxes, requirements to the process of hiring and promotion of national minority representatives, the legislation on consumer protection, security and environmental standards, price and wage control, etc. The factor of political stability is of great importance for the companies that operate or have outlets in other countries. Specific interest groups and lobbyists are another element of the political situation which can influence the strategy. We claim that agricultural entities, as far as they develop and implement their development strategies, should take into consideration the policies and legislation that regulate the agricultural sector activity, which is composed of the following key documents:

The National Strategy for the Sustainable Development of the Agribusiness Complex of the Republic of Moldova (2008-2015) is intended to be a document of strategic coordination at the national level of the main political, economic and social actions for the development of the agribusiness sector, combining the assessment of the adaptation level of the local food sector with the conditions and mechanisms of the market economy, main directions and instruments of the agricultural sector modernization, the role of the state as to the agri-food sector development at the post-privatization stage, the expected economic effects as well as the detailed information about the risks of its implementation.

The Sustainable Development Strategy of the agribusiness complex addresses the following policies: - the subsidy policy / supporting farmers, – the land market development and farm consolidation policy, - the trade policy, - the investment policy, - the innovation policy and the development of the agricultural science, - the policy of socio-economic development of rural areas, - the regulator, - the development of institutional abilities [8].

The Concept of the Subsidy System for Farmers for 2008-2015 has its objectives:

-to model a single subsidiary system for farmers, vital for the priorities stated in the agricultural policy documents, close to the needs of different groups of farmers in rural areas;

-to establish the sectors and main directions of agriculture, funded by the state, which allocates resources from the fund aimed to subsidize farmers and is annually approved by the State Budget Law;

-to rationally allocate financial resources from the fund aimed to subsidize farmers;

-to determine the basic criteria required to establish eligibility criteria for the beneficiaries from the agricultural sector regarding the state financial support;

-to create an institutional system to manage financial resources necessary to subsidize farmers, to monitor their distribution and to assess quantitatively and qualitatively the influence of the state's support measures [6].

The Land Consolidation Program. The consolidation of agricultural land includes resolving a wide range of issues – from the rational land use to the revival of rural communities. They will achieve this goal (the revival of rural communities) through land consolidation in accordance with the land consolidation program, encouraging land markets, reducing transaction costs, using mortgage, etc.

The Law on the organization and functioning of agricultural food markets nr. 257 of July 27, 2006, establishes the legal framework for the organization of agricultural food markets by the individuals and businesses that produce, store, process and/or sell these products at the national level or within the production area, on internal and/or external markets, and the functioning of these markets. By law, the activity of agricultural food markets is regulated by the Ministry of Agriculture and Food Industry (MAFI) and the Council on the product chain. The MAFI develops a market strategy and agricultural policies as well as ensures the implementation of the legal framework and specific regulations, collaborating with the Council partnership organizations.

The close relationship between the financial development and the economic growth is well grounded in the literature and in practice [4]. In recent years, debates have expanded to include the notion of financial "exclusion" which is a barrier to the economic development and points to the need to develop inclusive financial systems. Recent empirical evidence that has used the databases on households shows that the access to basic financial services such as savings, payments and credits can be a significant contribution to improve poor people's lives. The access to funds is often the main obstacle to the growth of economic agricultural entities, and individual farms, small and medium-sized enterprises in particular.

In our opinion, access to funds is the individuals' possibility, as well as the chance of households and firms to benefit from financial products and services. The access to funds shows who benefits from the offered products and services and at what price. The limited access to financial services reduces the welfare and slows down the growth of any economic entity. Moreover, this may increase the risk of financial instability because the poor try to develop their own means of informal access [3].

The access to funds for agricultural entities is more limited than it should be because of informational frictions, distorted incentives, and disproportionately high transaction costs. Some of these can be mitigated by means of political actions, and some may be worsened by the side effects of incorrect policies. The access issue is viewed differently depending on the user's or supplier's opinion. The implementation of financial products and services that meet participants' needs of both demand and supply may be the way to improve access to funding.

The access to funds involves the following three dimensions (Fig. 2): funding recipients, financial products and services and funding providers.

Funding recipients. The access has many dimensions: services should be available when they are required, the products must be adapted to specific needs; prices for these services must be affordable, and, the most important, it must be meaningful for finance providers, transforming into their profit, and, therefore, being available on a continuous basis.

Products. The lack of access to funding means exclusion from products and services that help individuals, households and firms face risk, accumulate savings, manage cash flows, etc.

Providers. However, recent experience shows that funding providers can overcome these obstacles and reach small, isolated or disadvantaged customers by promoting innovative design and customer-driven products developed in order to minimize unit costs. There is a range of financial service and product providers all over the world, helping to fulfill these tasks. The types of providers range from banks and large international insurance companies (by means of national, regional and local savings banks, as well as national and regional credit unions or cooperatives), specialized microfinance companies, money transfer agencies and – for some services.

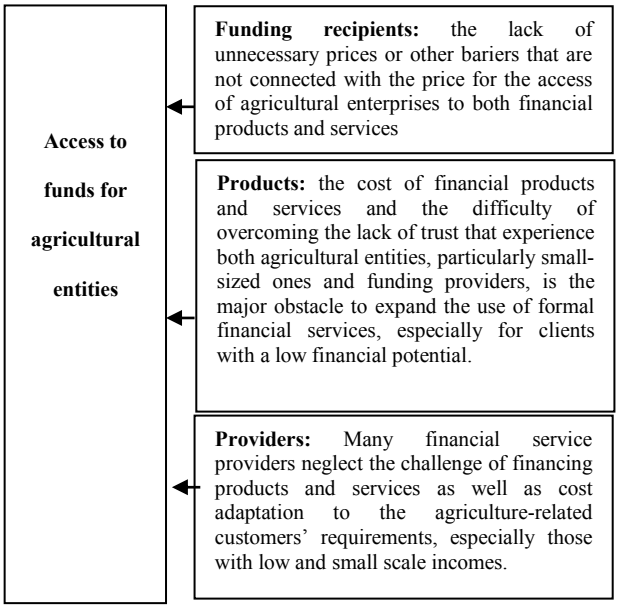


Fig. 2. Access determinants to finance agricultural entities and related critical isssues
Source: Developed by the autors

Taking into consideration the lack of an integrated methodology for assessment and monitoring of funding access for agricultural entities at the level of specialized authorities in the Republic of Moldova, we propose the following system of indicators that should be

used to periodically study the way it evolves [5].

To obtain a functional system we have stated the following criteria which should be met by developed indicators:

Usefulness: The indicators should be a proper instrument to measure whether agricultural economic entities access easily or hard the funding and to help policy makers to formulate or adjust their policies and programs in order to expand the access of agricultural enterprises to funds.

Availability: The data for the development of indicators should be available not to impose new burdens on government authorities and businesses.

Feasibility: If the information for the development of indicators is not publicly available, it should be feasible to make it available at the lowest price or to get it when practicing routine data collection or surveys.

Timeliness: The information should be collected in a timely manner, so that the evolution of access conditions for agricultural enterprises can be monitored. Annual data are and can be available more easily, though taking into consideration specific seasonal agricultural activities. We believe that they should be supplemented with quarterly data, where possible, in order to better capture variability of financing indicators and describe the turning points.

Comparability: The indicators should be relatively uniform in all the regions of the country in terms of the population surveyed, content, methods and frequency of data collection or timeliness [9].

Having applied these criteria, we obtained the following system of indicators that may be useful in assessing and monitoring the access of agricultural entities to funding:

The indicators that measure access of agricultural economic entities to funding:

-the institutions that provide funding to agricultural economic entities (categories of institutions, the name of the institution);

-financial products and services offered to agricultural entities by funding institutions: the name, the volume, the cost, access conditions, the average time to obtain access to the product / service required;

-loans provided to agricultural economic entities / the total of the loans provided to the enterprise sector;

-short-term loans granted to agricultural economic entities / the total of the loans provided to agricultural economic entities;

-loans granted to agricultural economic entities according to their categories (micro, small, medium, large-sized enterprises; depending on the organizational and legal form) / the total of the loans provided to agricultural economic entities;

-government guarantees granted to the agricultural entities which borrow money;

-government loans granted to agricultural economic entities;

-authorized loans / the loans requested by agricultural economic entities;

-the loans used by agricultural economic entities / authorized loans;

-bad loans granted to agricultural economic entities / the total of the loans provided to agricultural economic entities;

-interest rates on loans to agricultural economic entities;

-the difference between the interest rates to other sectors and the interest rates on loans to the agricultural sector;

-the percentage of agricultural economic entities which were required collaterally for the loan;

-arrears at the level of agricultural economic entities;

-bankruptcies at the level of agricultural economic entities;

-the access of agricultural economic entities to subsidies.

At the same time, the expanded access of agricultural entities to funding should be a major concern of the Ministry of Agriculture and Food Industry of the Republic of Moldova addressed by promoting some specific policies.

CONCLUSIONS

According to the authors, the following thematic groups have the most important scientific contributions in identifying the role of agriculture in the sustainable development

of national economies: agriculture, economic growth and poverty reduction; agriculture and urbanization; green revolution, acceptance and implementation of technologies; research & development in agriculture and adequate technologies; extension services (consultations) as a means to boost the acceptance and implementation of new technologies; environmental challenges and the issue of agricultural systems sustainability; barriers to acceptance and implementation of technologies in agriculture; the size of the household and land tenure.

Funding structures are always mixed (debts and equity), regardless the form of organization, with a predominance of debts and highlight the role of specialized financial creditors (bankers, bond holders, etc.) to provide a monitoring role which benefits all agency contractors.

The decision to finance is a private transaction in which the degree of the asset specificity plays a central role.

The development strategy based on intangible assets in highly volatile activities will require equity financing with a strict control of shareholders.

According to the authors, the funding policy must be connected with the strategic project and organizational structure at the same time.

The funding policy should be designed so as not to compromise the value of organizational capital; it does not produce discontinuities as to the contracts with customers, suppliers, the staff, the state or local communities.

The strategy of an agricultural economic entity implies all the objectives that the agricultural entity management proposes to achieve, the actions to be taken and the way resources are allocated to ensure its future competitiveness and development.

The strategies can be classified by their extension within agricultural enterprises into corporate, business and functional strategies.

The development of the strategy is influenced by many factors, and namely: political, social, regulatory and civil considerations; the attractiveness of the sector and competitive conditions; specific opportunities and threats; strong and weak points of the agricultural enterprise, its competitive potential; personal ambitions, business philosophies and managers' ethical beliefs; the influence of values and corporate culture on the strategy.

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MIGRATORY SPECIES OF BUTTERFLIES IN THE SURROUNDINGS OF SIBIU (ROMANIA)

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Abstract

Butterfly migration is an entomological scientific community debated topic since the last century. Today we know more information about invasions of butterflies in different parts of the world some of them being attributed to climate change. The research started in 1999 and until now, the collections of Lepidoptera studied and also with collections around Sibiu enabled me to accomplish a list about the migratory butterfly species around Sibiu.

***Key words*:** *butterflies*, *climatic changes, migration, Romania, Sibiu*

INTRODUCTION

One of the earliest reports of butterfly migration, is dating from 1100, reported as a flight of a swarm of butterflies in Saxony up to Bavaria. Cristofor Columbus reminds from his expeditions, about the appearance of an intense swarm of butterflies that darkened the sky. In 1745, a growing population of the cabbage butterfly created to the locals in Harra Germany, the impression of a snowstorm in the middle of winter. Today is known a lot of information about the butterflies invasions in most European countries.

Butterfly migration can be defined as a directed movement for a longer period of time, that is not dynamic, under normal conditions, which is obviously influenced by external factors. Most theories that try to explain the causes of butterflies migration start from the unfavorable environmental conditions. The lack of food or inadequate one [1,2,44], overpopulation, the approach of drought or cold periods, which triggers the migration in most cases.

From the effectuated research it seems that the admiral butterfly looks like *Vanessa atalanta* and the thistle one, they come to our country in search of a more cool and humid climate, their descendants returning to south in autumn, avoiding the cold winters in Romania. But not to all species, triggering the migration flight can be correlated with the alternaternation of the environmental conditions[15].

Flying speed is characteristic to all species, being strongly influenced by environmental factors, especially by wind and precipitations. Diurnal butterflies can not fly but with the speed of 15-20 km / h, and in favorable wind conditions, the same species can travel even with 150 km / h. Top speed records the crepuscular butterflies of Sphingidae family from which *Acherobtia atropos* (the skull butterfly) and *Daphis neri* (oleander moth), by its own force reaching 50 km/h, and by using the wind also 100 km/h.

Research on butterfly migration, revealed that major losses in agriculture and forestry may be due to the massive migration of harmful species, from a geographic area to another. Knowing the specifics of biology and flight, for potentially or actually harmful migratory species to agriculture or forestry would allow effective warning forecast, reducing annually damages. Studies on flight dynamics, speed, orientation could have considerable theoretical and practical implications[4].

It is important to understand the difference between dispersal and migration. The term dispersal is used to describe random and aimless movement away from the site where a butterfly emerges. Dispersing butterflies are

easily diverted from their course by minor changes in wind direction or obstacles in their path. They will for example fly around the edge of a block of forest rather than fly through it or over it. When they encounter hostile habitats such as arable farmland, lakes, rivers, roads or buildings they steer left or right to try to find a route around them[47].

Butterflies have strict requirements in terms of minimum/maximum temperature tolerance. The habitats they occupy are determined by where their larval food plants grow, and by the availability of adult food sources and roosting sites. They are unable to survive and breed unless these and numerous other vital conditions are precisely met. Suitable habitats are often highly localised so consequently many species have an extremely patchy distribution[5,8,11, 28].

Nothing in nature is constant. Habitats are continually changing [13,14,38,39]. Woodlands become overgrown and shade out herbaceous plants on which the caterpillars of many butterflies depend.

Butterflies commute altitudinally too, moving from peaks to valleys and back again, to areas where the temperature is most suitable. Sometimes these journeys take them to mountain passes. Over the millennia these become established routes by which species migrate seasonally from one valley to another[16,45].

MATERIALS AND METHODS

Due to the studies and the collection carried around Sibiu (Dumbrava Sibiu, Sibiel[25,31,43]), the analysis of museum collections with collections made since 1879 in different areas of the city but also personal collections started in 1999 and till 2015 of the Lepidoptera populations revealed that there are two types of migratory species of butterflies.

Prospective migratory forms include species that recognize beforehand the unfavorable periods of life, and it is an internal factor that causes the migration. The migration takes place at the time when, the environment living conditions afford the maintaining of the species. In this category we have migratory species as eumigrants which are seasonal migrators of the first rank, that leave every year at certain times their developmental areas in search of seasonal breeding areas. The descendants of these species of butterflies migrate in the opposite direction, returning to the areas where theire parents migrated. Also in the collection area we met the paramigrants, that are seasonal migratory populations of rank 2. These Lepidoptera populations leave annually at some moments the area around Sibiu, seeking for areas where they can withstand the winter as adults after the latency period and changing life conditions. These species are returning in the study area for breeding.

Migratory consecutive forms, which include migratory species to whom the phenomenon of migration is triggered by improper survival factors (temperature, food, moisture, length of days or nights). In this type of forms we have species of immigrants that migrate targeted within the areal, these populations are not returning to the original territories, but remain in the new ones and here produce their descendants. Specimens exceeding the optimal area of the species, reaching atypical spaces disappear. Species that practice the dismigration are expansionist species or population with fluctuating density ,which in cases of high densities, are expanding their areal. The character of migration is triggered irregular, random and the migration is not redirected.

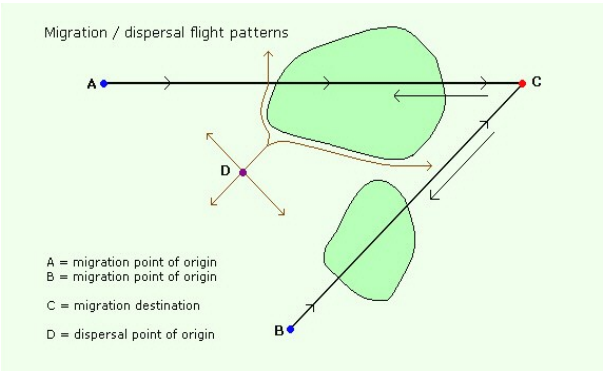

Fig.1. The diagram above illustrates the differences between dispersal and migrational flight patterns. The blocks of green represent 'hostile' habitats, e.g. a dispersing grassland butterfly would consider a forest to be hostile so would avoid flying into it or over it.
Source:http://www.learnaboutbutterflies.com/Migration.htm

Seasonal migration is an entirely different phenomenon from commuting or random dispersal. It tends to occur spontaneously and involves the mass movement of hundreds, thousands or even millions of butterflies (Fig.1.).

Other species such as Clouded Yellows, Whites and Swallowtails are nomadic, and migrate down to the lowlands in late summer to breed. In lowlands, but the habitat there becomes too hot and dry in summer, so they then return to the the early spring their progeny produce a further brood in the mountainsides where there is cooler air and an abundance of flowers for nectaring[45,46].

RESULTS AND DISCUSSIONS

Of Macrolepidoptere migratory species that we have met over the years around Sibiu (Table 1) either from own collections [3,7,17-24,26,27,29,30,32-37,40-43], museum collections or from published data we have achieved a provisional classification [6,9,10,12,37], according to data from particular literature.

Table 1. The classification of the migratory butterflies species in the surroundings of Sibiu

GROUP	FAMILY	SPECIES
I **Imigrants**	NYMPHALIDAE	***Vanesa atalanta* Linnaeus, 1758** 2♀♀, 11,17.VII.2001, 3♀♀, 11.VII.2003, 21.VIII.2003, 16.IX.2003, 24♂♂, 18.VII.2001; 22.VII.2004; 16.VIII.2009; 23.VIII.2011; 10♂♂, 26.VIII.2001; 17.IX.2003; 3ex. 22.IX.2004; 4ex. 23.IX.2009; 1.X.2010; 8.X.2011, 5♀♀,10.V.2011; 27.VI.2011, 2ex.15.VII; 15.VIII.1951 EW[10]; 1ex., 20.VIII.1920 DC; 1♂, 23.IX. 2011 CM[37]
		***Vanesa cardui* Linnaeus, 1758** 3♀♀, 17,18,23.V.2001, 2♀♀, 13.15VIII.2007, 5♂♂, 18.V; 9.VI.; 26.VIII; 2 ex. 8.X; 13.X. 2011; 2♀♀,9.IV; 18.V. 2011;16.VIII.1916 DC[9]; 30.VII.1907 VW; 1.IX.1952 EW[10]
	SPHINGIDAE	***Acherontia atropos* Linnaeus, 1758** 2♂♂, 10.VIII.1938 EW [10]
	NOCTUIDAE	***Agrotis ipsilon* Hufnagel, 1766** 2 specs., 18.VIII.1904 VW[12]
II **Paramigrants**	ARCTIIDAE	***Euplagia quadripunctaria* Poda, 1761** 1 spec., 2.VIII.1888 DC [9] , 2specs.,11.VIII.1904 VW[11] , 15.VIII.1903 VW[12], 6 specs.,16.V.1939 EW, 10.VI.1945 EW; 13.VI.1938 EW, 27,28.VII.1953 EW; 17.VIII.1953 EW[10] [10]
	PIERIDAE	***Aporia crataegi* Linnaeus, 1758** 3♀♀, 17,22,29.V.2001, ,9 ♂♂, 8 ex. 31.V; 9.VI. CM 2011; 12.VI.1904 VW; 13.VI.1907 VW [12,37]
		***Pieris brassicae* Linnaeus, 1758** 1ex., 21.V.1904 VW; 68♀♀, 3ex. 2.VII; 4.VII; 2 ex.11.VII; 5ex. 18.VII; 1.VIII.1903 VW; 6ex. 2.VIII; 6.VIII; 5ex. 11.VIII; 3ex. 18.VIII; 3ex. 26.VIII; 17.IX; 11ex. 22.IX; 24ex. 23.IX; 1.X; 2 ex. 7.X. 2011 CM[10,37]
		***Pieris napi* Linnaeus, 1758** IV.1920 (non collections day) VW; 10.IV.1921 VW; 1♀, 25.VIII.2001, 2♂♂, 2.VII.2003; 26.VIII. 2011; 9♀♀, 3ex. 26.VIII.2001; 22.IX.2001; 2ex. 23.IX.2003; 7.X.2003; 21.VIII.2011, 8.X.2011; CM[12,37]
		***Pieris rapae* Linnaeus, 1758** 1ex., IV:1920 (non collections day) VW; 4♀♀, 12,15,17,29.IV.2001, 2♀♀, 17.V.2003, 45♂♂, 3.IV.2003; 1.V.2003; 31.V.2003; 9.VI.2004.; 7 ex. 26.VI.2005; 2.VII.2005; 6.VII.2005; 4ex.11.VII.2006; 12.VII.2001; 15.VII.2006; 4ex. 2.VIII.2009; 2ex. 6.VIII.2009; 3ex. 11.VIII.2011; 3ex. 18.VIII.2011; ex. 26.VIII.2011; 3ex. 22.IX.2011; 6ex. 23.IX. 2011;CM; 1ex.11.V.1955 VW; 21.V.1904 VW; 41♀♀, 8.V.2001; 2ex. 9.VI.2001; 7ex. 26.VI.2003; 3ex. 2.VII.2001; 11.VII.2003; 3ex. 12.VII.2004; 2.VIII.2004; 5ex. 11.VIII.2011; 9ex. 18.VIII.2011; 2ex. 26.VIII; 5ex. 22.IX.2011; 7.X; 8.X. 2011 CM [37]
III **Emigrants**		***Colias hyale* Linnaeus, 1758** 1ex.; 12.V.1904 VW; 7♀♀, 8,11,22,27,29,30,31.VII.2001, 5♂♂, 11.VII.2001; 22.VII.2003; 18.VIII.2001; 23.VIII.2011; 9.X. 2011 CM; 1ex.,15.VIII.1903 VW; 4♀♀, 2 ex. 15.VII.2001; 23.IX.2011; 7.X. 2011 CM
		***Inachis io* Linnaeus, 1758** 1ex.,23.VI.1953 EW[10]; 1ex., 12.VII.1918 DC; 1♂, 21.VI.2001, 2♂♂, 7.VII.2003; 1♂, 18.VII.2005, 1♀, 13.VII.2001, 1♀, 17.VII.2003, 1♀, 12.VIII.2008, 1♀, 22.VIII. 2011 CM EW [10]
	NYMPHALIDAE	***Aglais urticae* Linnaeus, 1758** 1spec.; 12.III.1922 VW[12] ; 1spec., 4.VI.1941 EW[10]
		***Issoris lathoria* Linnaeus, 1758** 1 spec., IV.1920 (non collections day) VW, 2 specs., 3.VIII.1903 VW, 15.VIII.1903 VW [12], 1 spec., 25.VIII.1938 EW [10,37]
	LYCAENIDAE	***Lycaena phlaeas* Linnaeus, 1785** 2specs.; 21.V.1904 VW; 14.VII.1903,1904 VW[11] ; 4♂♂, 24.VII.1952 EW; 2♂♂, 1♀,25.VII.1938 EW; 26.VII.1953EW [10,37]
	GEOMETRIDAE	*Cyclophora punctaria* Linnaeus, 1758 1 spec. 27.IV.1904 VW [12]
	PAPILIONIDAE	***Papilio machaon* Linnaeus,1758** 2 ex.; 17.V.1902 VW; 1♂17.V.1939 EW; 9.VII.1904 VW; 1♂25.VII.1939 EW; 1♀,12.VII.2001, 1♂1.X.2007 CM [10,12,37]
	NYMPHALIDAE	***Nymphalis xanthomelas* Esper, 1781** 1spec.,9.VII.1904VW[12];1spec., 9.VI.1947 EW[10]
IV **Dismigrants**		***Hipparchia semele* Linnaeus, 1758** 1 spec. 29.VII.1958 HH [37]
	SPHINGIDAE	***Hyloicus pinastri* Linnaeus, 1758** 15.VIII.1938 EW [10]
	NOCTUIDAE	***Catocala sponsa* Linnaeus, 1767** 3specs.; 23.VII.1907 VW; 26.VII.1904 VW;2specs.; 8,11.VIII.1904 VW [12,37]
		***Catocala elocata* Esper, 1787** 1spec.; 16.VIII.1904 VW [12,37]

CONCLUSIONS

After centralizing the data obtained during the years of study on the populations of Lepidoptera collected around Sibiu can conclude that there are these migratory species grouped into four classes: *Immigrants*, species of *Nymphalidae* families (2 species), *Sphingidae* (1 species) and *Noctuidae* (1 species), *Paramigrants*, a species of the family *Arctiidae*, *Emmigrants* who is the group best represented by 4 families: *Pieridae* (5 species) *Nymphalidae* (3 species), *Lycaenidae* (1 species) and *Geometridae* (1 species). In the *Dismigrants* group we have the following families: *Papilionidae* (1 species), *Nymphalidae* (2 species), *Sphingidae* (1 species) and *Noctuidae* (2 species).

From the undertaken research can be drawn that the species of lepidopteran family *Nymphalidae* leave annually at some point the study area of the enclosure of Sibiu, seeking actively areas where they can withstand as adults the winter time after the latent period and after changing life conditions. The distribution of a species within its range is also greatly affected by human intervention - urban expansion has the greatest impact, but governmental policy on farming, forestry and road planning also has a very profound effect on the distribution and abundance of butterflies. According to some authors, species such as *Apatura iris* which occur at low density in woodland habitats can't easily locate the opposite sex, so they have evolved 'hill-topping' - a strategy whereby both sexes fly to the highest point in the vicinity, typically a tall oak tree on a ridge, where courtship and copulation take place. After mating the females disperse to lay their eggs on sallow bushes which typically grow alongside ditches on lower ground. The males also disperse to low lying areas where they feed by imbibing mineralised moisture from the paths or patches of mud. Next morning they commute back to the 'master' oak tree to mate with other females[16] .

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BEHAVIOUR AND DYNAMICS OF *Mamestra brassicae* SPECIES (LEPIDOPTERA: NOCTUIDAE) IN AN AGRICULTURAL ECOSYSTEM IN THE TOWN SIBIEL, SIBIU COUNTY IN REGIM OF THE YEARS 2014-2015

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Abstract

The constitution of the local geographical populations, print also a behaviour (flight, locomotion, reproduction) characteristic for each zone of the area. The biology, ecology and behavior of populations study is allowing to establish the specific features of the populations associated with the possibility of control and fighting. Regarding ecological studies of populations based on data captured in conditions of the years 2014-2015 in the village of Sibiel, district Sibiu, significant results were obtained with both light traps and pheromone traps. This paper is a summary of data on the dynamics and abundance of Mamestra brassicae populations in a vegetable garden in the town Sibiel of district Sibiu in terms of the years 2014-2015.

***Key words*:** *agricultural ecosystem, Mamestra brassicae, pheromonal traps, Romania, Sibiel City*

INTRODUCTION

Mamestra brassicae L. (cabbage owl) (Fig.1.) is a very important species in economic terms, flagged as an polyphagous pest to a large number of plants, but with preference for brassicas. The species is detected in both agricultural crops and natural ecosystems (forests) up to altitudes of 2000 m [8,9].
Characterized by a relatively constant-small populations and by a specific behavior, put a number of issues regarding environmental studies, monitoring programs and management, control and combat. The ability of species to occupy a stretched area, builds on the success in adaptation possibilities, at least in part, they are associated with genetic variability of local populations [11].
On the other hand, *Mamestra brassicae* is a native species, with sedentary behavior with a reduced flight capacity and therefore without too great capacity of leaving the confines of a certain particular climatic zone [10]. Ecological research (population abundance, dynamic distribution model, ecosystem division) were also made for *Mamestra brassicae* populations in our country by [816].Our research has been undertaken and refers to behavior in response to light stimulation and sexual attractant.
This paper is a summary of data on the dynamics and abundance of *Mamestra brassicae* populations in a vegetable garden in the town Sibiel of district Sibiu in terms of the years 2014-2015.

Fig. 1. *Mamestra brassicae* L. (cabbage owl), adult and larva (foto.orig.)

MATERIALS AND METHODS

Research with pheromone traps were made in 2014 and 2015 in a vegetable garden in the town Sibiel. The lots that represented the agro-ecosystem were cultivated annually with vegetables and the natural ecosystems in the immediate vicinity of the garden cost of hardwood Suparatel located adjacent agricultural cultures.

Sexual attractant traps (pheromone traps), which was arranged in rows of cabbage perpendicular to the dominant wind direction at a distance of 30-50 m and 1 m height from the ground.

The trap was checked every 2-3 days, when the observations of the current record number of individuals were made, the cleaning or changing the adhesive lanes [1,2,3,4]

Light trap was installed in the middle of the culture of vegetables and a light bulb in the habitat grasses near the vegetable garden.

Population dynamics was registered based on the values of capture using averages/trap/day, or number of individuals/trap/day observed during both flights. Based on estimated values of capturing its coefficient of variation (CV) to characterize the level of pest abundance, including data obtained with pheromone traps, by the model interpretation of the light trap.

On the basis of the average catch among both types of traps, has characterized the *Mamestra brassicae* populations from different batches, using hibernate index (HI) and coefficient generation (CG). The capturing data from the light trap were used to characterize the emerging model.

To analyze the trends in the population evolution in the area studied and for highlighting the relationships between capturing with two types of traps was used the regression equation ($y = a + bx$) and the correlation coefficient (r).

RESULTS AND DISCUSSIONS

The dynamics and abundance of *Mamestra brassicae* populations through research with pheromone traps.

Some of the data obtained during the years 2014-2015 are shown in curves obtained by the total number of males captured highlights a constant low level of populations throughout the range. On the other hand a relatively high level in 2015 alternated with a low level in 2014, without a clear periodicity. In all years, the first generation (flight I G1) the population level was small. The curves trend show an overlap of one period and the distinction between the two generations is distinct. A slightly modified behavior was recorded in 2015, a flight dynamics curve with several peaks. For the generation (G2), the flight occurred most frequently at the beginning of August. Also at this generation, when the flight spanned the entire month of August and even early September, it appeared a second maximum in 2015. We associate this aspect with the influence of ecological factors and with the behavior of species in the area and we do not associate it the existence of a third generation.

Mamestra brassicae flight dynamics characterize in reality the particularities and adaptive values of local geographical populations, dependent on a number of internal and external factors. In this fact, the flight dynamics study of *Mamestra brassicae* populations is similar to the population of Transylvania [30].

Variability in flight dynamics based on capturing with the pheromone traps, were not only temporal but also spatial. The phenomenon was found among very close [16,31].

Population dynamics and abundance of *Mamestra brassicae* through comparative analysis of the data obtained from trap light. In Figure 3 the results obtained in years 2014 and 2015 are presented as a model.

Research with pheromone traps are shown compared to the two types of ecosystems. In the forest area near the vegetable field the level of populations was higher and relatively constant. On the other hand, in the G1 the level was significantly higher compared to the situation of the vegetables field (where also the variability in space and time was accentuated) and approached to that of the G2. In terms of form flight curves, these were more extensive in forest where the male flight was initiated before the culture ones, more disctinct in G1 and sometimes also in G2.

Dynamic data obtained do not reveal a repeating pattern with distinct differences, which in fact made more difficult the possibility of highlighting correlations between adult flight (capture) in different ecosystems and frequency of larval attack, ovipozitor and damages.

Data captured at the light trap did not reveal yet notable differences on flight dynamics of

Mamestra brassicae populations. Flight times overlapped, pheromone beeing more obvious when the population level was higher, especially in G2.

Although light traps captured significantly only females, could not establish a clear relationship between the population of males and females, in the vegetable garden the behavioral patterns of species involving research over longer periods of time and between different local populations.

From practical point of view (using sex pheromone in population control) it is of interest to the beginning of the flight. Although characterized as a protogin species for our population this phenomenon has not been clear (probably also because we are referring to just an area). Moreover, comparing the data of the flight dynamics of pheromone traps of cabbage crop to those from the nearby forest Subparatel (Sibiel), males flight was sooner initiated in the natural ecosystem and flight period was extended even compared to that of adults in the trap light. In addition the phenomenon was not clear even if the data from the trap light was compared to those in pheromone traps.

From comparative research of *Mamestra brassicae* populations in France, made with two types of traps, showed a similar period of activity for adults (). Pheromone traps were remarkable efficiency in generation (G1) for the first flight while light traps were more efficient in the second flight (G2).

Variability dynamics as a normal population characteristic manifested itself in both time and space associated with the type of trap, but the curves trend was broadly similar.

Regression equation (y = 0.9 + 0,056x) showed a similar trend. Obviously due to the marked variability the correlation coefficient was small. The results show the existence of a stable population in the area, with significance for monitoring and management programs [5,6,7]. Precisely this aspect of research is needed lengthend, if not, the metods used for short periods research may not be relevant.

The tendency for evolution of the *Mamestra brassicae* population for such a period, less presented (2014-2015) is shown. This time the data of pheromone traps, the regression shows a slightly decreasing trend in both well studied agroecosystem and also in the neighboring natural ecosystem [13-16, 17-22]. However in terms of comparing the direct data capture from two types of traps, placed one in agro cabbage culture and the other in the neighboring forest ecosystem Subparatel (Sibiel), even for short dynamics model was similar [28,29].

Mamestra brassicae populations characterization with respect to growth and abundance based on fields from the two types of traps, also revealed a number of interesting issues. Processing of data from pheromone traps by using the coefficient generation (CG), hibernation index (IH) and the coefficient of variation (CV) was an effective way of assessing changes in abundance from one generation to another and from one year to another.

Even if these parameters were used for data processing from light trap, we first introduced the results of pheromone traps, relying on the fact that the rate of the sexes is around 1 and given the behavior response of the two sexes to the light stimulation.

Mamestra brassicae is one of the species of Noctuidae responders in the field of variants sexual pheromone, similar studies were done in the same locality Sibiel in an apple orchard, where it was studied the behavior of response to pheromone traps of the species *Cydia pomenella* (worm apples) [12,23, 24]. The processing of catching traps data, with the help from the above indices, revealed that extrapolating methods from processing the data in pheromone traps is more advantageous in some situations and correct.

The generation coefficient is the ratio of the average number of G2 and G1 adults in the same year and the hibernate index is the ratio between the average number of adults captured in the first generation of a year and the average G2 of the next year.

The coefficient of variation was used also for this action in editing the data from the light trap.

After analyzing the data obtained in the two years of study and interpretation CG values, finds the largest population of *Mamestra brassicae* in generation G2. The fluctuations

were sometimes significant, but there was a clear correlation between the populations of the two generations of the same year. Also no values IH could reveal any clear correlation between the population of G2 (2014) and G1 population (2015).

CONCLUSIONS

Mamestra brassicae species behavioral model in the field was imagined and based on the results obtained for the capturing observations. On the other hand, behavioral observations have revealed no damage or attack to the natural ecosystem, and using light traps and pheromone traps revealed a reduced number of females.

In cabbage cultivated agroecosystems [26,27] there is a population represented by both sexes and in the habitat of its features is running phases of the general behavior, including reproduction (associated with stimuli from the host plant), the female remains in the area, for the ovipozitor behavior and males may behave indifferently.

On emerging, beeing typical the protogin, the females perform a behavioral activity (feeding, flight) to sexual maturation, situations in which they accept also biotops and neighboring ecosystems and in our case the Subparatel Forest (Sibiel), ensuring the optimum conditions to these species. In this situation a part of the population, each year, arrives in natural ecosystems where it takes place the behavior of call, followed by a response behavior of males (those in the bordering area of the agroecosystem studied but also from the culture of cabbage, which will follow the same route for their sexual maturity) and pairing.

After pairing the males can stay here or can accompany females (or a part of them) on the reverse route, area of host plant where ovipozitor behavior occurs.

The behavior described characterize every ecosystem, but we consider that there are not two distinct populations but a permanent interaction (a local migration) between the two ecosystems that determine and adjust the population in the area. Low level of populations didn't allow us to succeed in this study, by using the captured adults.

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PASSIVE IRRIGATION SYSTEM FOR GREEN ROOFS

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Abstract

This paper present an innovative system for green roof irrigation. This is based on natural flow of water through plants witch mean capillarity. The system work in two directions: collecting the rain water in suspended tanks on the top of the building, under growing substrate and then transporting the water through capillary conductor, watering the substrate. This solution can be applied on large scale for all constructions witch wont to convert their roofs to green roofs.

***Key words*:** *capillary, green roof, irrigation*

INTRODUCTION

Given the current problems facing humanity: changing the temperature of the planet, the emergence of fluctuating weather events, desertification of large areas of land, finding technical solutions to meet the climate change it has lately become a priority.

In Romania in recent years they have found major climate changes manifested by extreme weather events: summer, prolonged drought, flooding caused by heavy rains, and winter is characterized by abundant short snowfall and followed by long periods in which rainfall missing.

The study presented in this paper is an original technical solution that emulated the current trend of green rooftops adapted to the new conditions imposed by climate change.

Even if green rooftops are not new, the fact that modern society is trying to implement on a large scale to existing buildings are also an indication that this technique is a standard in terms of adaptation to climate change. The best example is the impact in minimizing heat island effect in urban areas.

Although, valuing the green roofs was limited long time in Romania by local conservatism in construction but in recent years climate change is forcing the adoption of such solutions. However the benefits related to limiting the heat island effect and private companies have appeared to us that by this method provides an alternative to air conditioners.

The proposed solution comes to help those who want to have green roof thermal protector of his own construction.

A not insignificant factor is the action it has urban ecosystems around it. Expanding Green rooftops can successfully counterbalance the negative effect that has on urban biodiversity. The figure below shows the three types of substrate types characteristic of cultivated plants types.

Fig. 1. Different substrate depths (6, 12, and 20 cm) used to create various vegetation forms as a basis for the colonization of diverse fauna on the roof [1].

A green roof is a roof that has media and vegetation planted above a roofing system. The different components and wide variety of benefits is dependent on the type and complexity of the green roof system. There are two types of green roofs; intensive and

extensive. Living roofs have a wide variety of environmental and financial benefits [5].

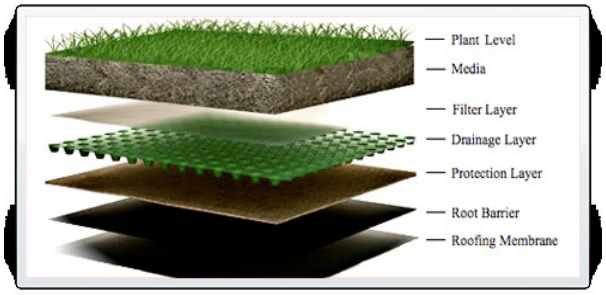

Fig. 2. Layers of a green roof
Source:
http://godfreyroofing.com/commercial/education/roofing-articles/introduction-to-green-roofing/

Complete Built-Up System — In a built-up system all of the elements of the green roof system are built in order to support vegetation and growth. These systems provide flexibility in substrate depth and vegetation requirements.

Root Barrier: The root barrier acts as a protection obstruction, which prevents the roofing system from being damaged by roots.

Protection Layer: The protection layer is a puncture resistant membrane that prevents the root barrier from being damaged when the green roof is installed. Certain protection layers also can absorb water and nutrients.

Drainage Layer: The primary function of the drainage layer is to allow excess water to run off, and is often constructed with lightweight materials.

Filter Layer: The filter layer segregates the plant and media from the drainage layer. The filter layer prevents the drainage layer from becoming clogged as well as retains important organic materials in the media that are needed for plant growth.

Growth Media: The growing media is the substrate that sustains growth in the green roof. It is a mixture of inorganic (crushed clay, expanded slate) and soil with organic and mineral additives (humus, sand, lava, peat). The media must provide nutrient, water, and air supply to the vegetation as well as resist frost, wind, and maintain a specific pH-value. The composition of growing media can vary in order to help reach a specific goal, such as water retention, fire retardant, or insulation value[4,5]

Plant level: The plant level contains different varieties of vegetation that are dependent upon the specific green roof project and location [2,3,5].

MATERIALS AND METHODS

Passive irrigation system comprises: a supply tank of the roof, drainage tubes, capillary conductors and water tank at the base of the building.

Greened roof supply tank is located on top of the building, below the topsoil and replace virtually standard draining system. It has a parallelepipedic shape and has a length equal to the length of the roof. Container volume calculation is based on irrigation needs: roof or roof surfaces or hedges and underlying building. Also the area where the building is located has a great importance in average and maximum amounts of precipitation.

In the figure below (fig. 3.) is presented cross section of the top rain water tank for passive irrigation.

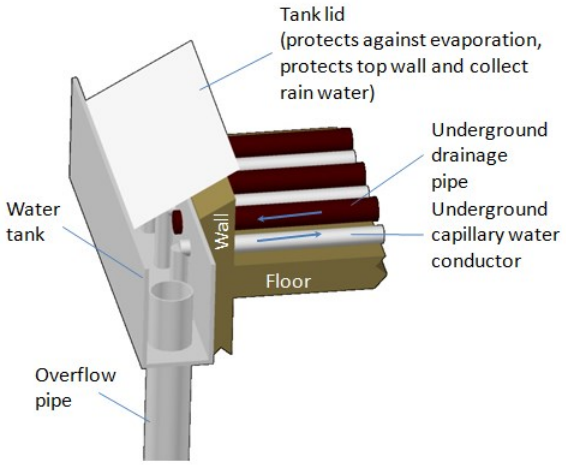

Fig. 3. Cross section of the top rain water tank for passive irrigation (original)

Given that the tank reaches the maximum loading capacity at one tooth heads is equipped with an overflow, a pipe located upright which has opening superior to the maximum water level in the reservoir and the bottom is connected to a reservoir at the base of the building .

Inside the upper reservoir open mouths water outlet of drainage tubes. Also, there are sandwiched capillary water conductors that

connect the interior of the tank base and the farthest point calculated water transport in soil.

Drainage tubes are plastic, they are perforated to allow the passage of water from the soil into the tube and transverse cross the soil volume of green surface from the building.

Capillary water conductors have in their composition of high density fabrics and are coated with a waterproof plastic sheath. According to the needs wetting, calculate distances where the insulation is removed. In those places the water will return to the soil.

Tank cap has an inclination of 30 °. From the edge of the outer wall of the tank is punctured to drain rainwater accumulated on it in the tank inner edge covering the top of the wall protecting.

The reservoir at the base of the building accumulate excess rain water from the upper tank. It will irrigate adjacent spaces of the building.

RESULTS AND DISCUSSIONS

The irrigation system presented is calculated depending on the needs of the irrigation of cultivated plant species, their density, soil thickness, soil composition and total area of irrigation.

The water cycle involves two stages: collecting water in rain and water supplies in drought conditions.

In rain water evenly distributed over the entire surface of the roof traverses the ground layer and accumulates at its base. Existing drainage pipes makes the water to penetrate through their holes and move to the side tanks where it accumulates. Also, a collecting area above the tank is not negligible. Due inclination covers, water flows outward and falls through a series of slots in the tank.

If the rainfall exceeds the capacity of the collection system, the water level reaching critical level, horizontal pipe whose opening is at this level will evacuate the excess to a reservoir at the base of the building.

After the termination of rain because the drainage system is rapidly reduce moisture in the soil to plant the needed parameters.

Plants certainly continue to draw water from the soil and will initiate the drought system regime.

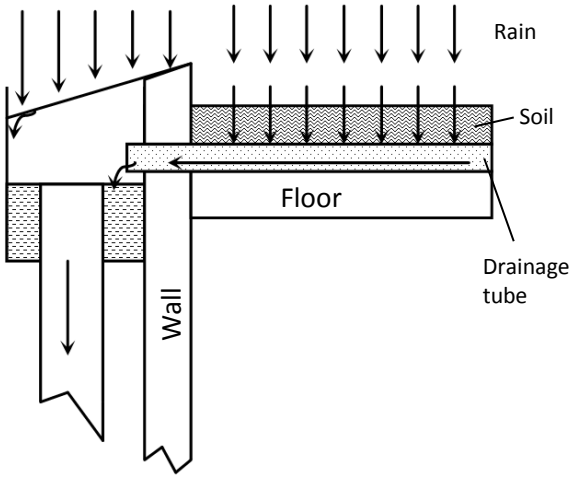

Fig. 3. Water flow on rain conditions (original)

In drought conditions, the conductors penetrating the capillary to the bottom of the tank will carry water through effect of capillarization distributing it evenly over the entire surface of the roof. At equal distances, water insulation surrounding the wires is interrupted, a place where the soil has contact with the core conductor. Distances between conductors are also calculated according cultivated plant species, their density, soil thickness, soil composition and total area of irrigation. Distances between areas where insulation is opened and distances between watering conductive matrix form.

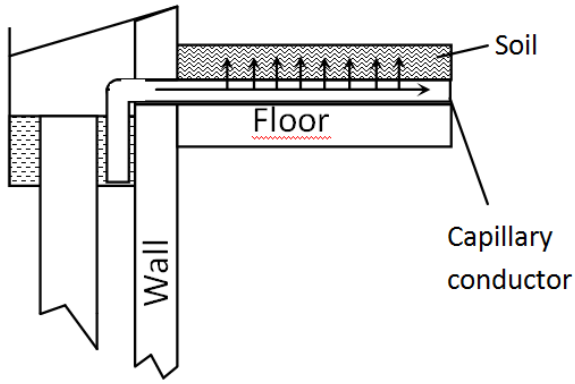

Fig. 3. Water flow on drought conditions (original)

Plants use capillary action to bring water up the roots and stems to the rest of the plant. The molecules of the water (the liquid) are attracted to the molecules of the inside of the stem (the solid). This attraction is used to help

force the water up from the ground and disperse throughout the plant [6]. The same process is involved in capillary conductor where capillaries are created by the internal structure of dense textiles.

A big advantage of positioning the tank near the green roof is to eliminate energy consumption for pumping water vertically from the base of the building.

The base of the tank offers the possibility of shading windows under it, reducing the room temperature inside the building in summer.

From an economic perspective, equipping a building with such a system brings higher costs of production and assembly than in a classic green roof. While return on investment is substantial due to lower water consumption for irrigation and also electricity consumption due to air-conditioning systems during the summer. In winter, both the layer of earth conductors and textile capillary substantially improve heat transfer coefficient also leading to saving of thermal energy.

CONCLUSIONS

The proposed concept can be applied in any green rooftop, small or large surfaces.

Unlike sprinkler systems when some of the water dissipated in the form of droplets is coached by air currents, where the proposed system remains in ground plants needed water.

Water flow is natural under gravity or capillarization effect.

Positioning the supply tank to the roof level can fuel successful green wall under it.

Even if the proposed solution requires a higher initial investment, due to tanks and capillary conductors, amortization, in current climate conditions specific to Romania is fast.

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DEGREE OF CHARGE WITH NUTRIENTS OF WASTE WATER FROM A MEAT INDUSTRIALIZATION UNIT. CASE STUDY

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Abstract

The purpose of this paper is to track the amount of nutrients that reach the waste water coming from a unit of the meat industrialization. Waste water resulting from such a unit, insufficiently treated, affect negatively the quality of the ground water in the area, or the emissary it reached. The intended indicators in this study were those which pollute emissaries in particular: chemical consume of oxygen, biochemical consume of oxygen, ammonia nitrogen, total phosphorus. From the evolution of the analyzed indicators, there are low values, similar to those provided by legislation in force for ammonia nitrogen and hardly biodegradable organic compounds, recording small exceeding for the biochemical consume of oxygen. Powerful agent of eutrophication, total phosphorus has quite high exceeding. In conclusion, the impact of the discharge of waste water on the environment from such a unit, exists, although it is quite low.

Key words: *emissary, nutrients, quality indicator, waste water*

INTRODUCTION

The unpolluted water is vital for the human survival and for the integrity of the natural ecosystems, so it is imperative that water resources are managed wisely [3].
By using, water changes its initial physical, chemical and microbiological characteristics transforming into waste water, due to pollution or contamination.
The high consumption of water for different specific uses leads to high values of waste water flows, often concentrated on a relatively small area, due to discharges of untreated waste water into the environment [4].
Thus, without adequate treatment technology and implemented, the quantities of contaminating substances and pollutants reach the environment and degrade irreparably the water of natural receptor.
Waste water treatment can be more or less complex, depending on the physico-chemical and microbiological characteristics of water and the quality requirements for discharge into receiving rivers.
The risk of nutrient pollution of groundwater is high around the units in the food industry due to their high solubility in water in the soil. The effective pollution of soil and groundwater can be reached when the harmful substances that reach the soil exceed the quantitatively the soil capacity to degrade these substances [2].
Wastewater (effluents), reach the receiver (in this case Borcea Branch) and they flow into emissary (the Danube), to which transmit pollutants [5]. The pollution degree receptor is highest during periods of drought, precisely in the periods that need to be irrigated and can act phytotoxically on irrigated crops [11].

MATERIALS AND METHODS

In this paper I tried to identify the current situation of the waste water which reach Borcea Branch and then the Danube and their treatment mobility. The quality of Danube river water is strongly influences by the quality of the waste water before being evacuated into the receptor. This water comes both from the town sewerage and from the economic activity [7].
A major source of pollution in the area of Borcea branch and the Danube River is the

waste water derived from the factory of meat processing and meat products in Calarasi municipality.

The Agency of Environment Protection Agency Calarasi carries monthly surveys for the wastewater evacuated from the companies, with significant impact on surface water quality. It performs analyzes for wastewater discharged into the emissary [1].

The pollutant loading of waste water from the food industry consists of: nutrients, organic substances, materials in suspension, detergents and extractable.

The Council Directive 91/271/EEC of 21st May 1991 on urban waste water treatment, as amended by Commission Directive 98/15/EC of 27th February 1998 is the legal basis of EU legislation in the field of waste water. This directive has been fully transposed into the Romanian legislation by the Government Decision no. 188/2002 approving the rules on conditions for discharge of waste water into the aquatic environment, as amended by the Government Decision no. 352/2005 [1].

The central objective of the directive is to protect the environment from the adverse effects of discharges of urban waste water and waste water from certain industrial sectors (mainly food industry processing and manufacture) [10].

Waste water from the food industry consist of water transport and washing of raw materials, technological water, condensate or cooling water from washing and disinfecting of manufacturing rooms, of machinery and packaging, water from the sanitary facilities. This waste water is characterized by a high fluctuation of physico-chemical and microbiological characteristics, due to the variety of source and their composition.

From the meat processing units, the waste water derived from slaughtering animals, cleaning the digestive tract, processing of meat, fat and skins. They show a very high content of organic materials, large amounts of nitrogen and phosphorous and a temperature of 30-40ºC in general.

The wastewater cleaning derived from the process of this factory operates on the principle of biological treatment with activated sludge.

The principle of the method for the biological treatment with active sludge is that microorganisms are intimately mixed with waste water containing organic material in the presence of oxygen, followed by flocculation microorganisms forming activated sludge, which is an active microbial mass. The active sludge constitutes the basic structural unit of biological treatment process, it contains all the species in their common work can metabolize organic matter until CO_2 and H_2O. The active sludge can be defined by depositing floaters when interrupting the aeration [10].

In order to determine the amount of nutrients in this water, five samples of waste water were collected, both from entrance and from exit of the treatment plant and more indicators were analyzed that indicate the degree of nutrients discharge of this water: chemical consume of oxygen, biochemical consume of oxygen, ammonia nitrogen, total phosphorus.

Table 1. Situation of parameters depending on the sampling period

Crt. No.	Waste water sampling date	Quantity of treated waste water (mc)	Number of slaughtered animals	Quantity of processed meat (Kg)
1.	25.01.2016	108	16	1,280
2.	26.01.2016	98	14	1,120
3.	27.01.2016	201	29	2,320
4.	28.01.2016	84	12	960
5.	29.01.2016	49	7	560

RESULTS AND DISCUSSIONS

In the period 25-29th January 2016 waste water samples were collected both from entry and from exit of the treatment station. In this period, a total amount of 540 m^3 waste water was treated, and the number of slaughtered animals was of 78 (amount of processed meat - 6,240 kg).

Following the analyses, it was found out that:
-An increase on the entry into the treatment plant of the analyzed indicators: chemical consume of oxygen (COD-Cr), biochemical consume of oxygen (BOD_5), ammonium nitrogen (NH_4^+), total phosphorus - probably due to the contribution of organic matter from soluble fat following washings and nutrients in the blood.

-Concentration of the analyzed indicators out of the treatment plant: chemical consume of oxygen (COD), biochemical consume of oxygen (BOD_5), ammonium nitrogen (NH_4^+), total phosphorus, is greatly reduced compared to the initial values.

-The only exceeding, according to NTPA - 001/2002, Norm approved by GD 188/2002 amended by GD no. 352/2005, is that of total phosphorus indicator, that in concentrations higher than 34 mg/dmc in waste water before treatment cannot be brought below the permitted maximum of 1 mg/dmc when water discharges into the environment. Waste water treatment in physico-chemical level and biological level is effective for the organic phosphorus, such inorganic phosphorus in treated water remains soluble.

Table 2. Average concentration of the indicators analysed in the period 25-29th January 2016

Crt No	Indicators/ Measure unit	Values of entry into station	C.M.A. *	Values of exit out of station
1.	Chemical consume of oxygen (COD-Cr) (mg O_2/dmc)	3,518.51	125	33.66
2.	Biochemical consume of oxygen (BOD_5) (mg O_2/dmc)	1,484.95	25	14.58
3.	Ammonia nitrogen (NH_4^+) (mg/dmc)	41.32	2.0	0.15
4.	Total phosphorus (mg/dmc)	34.74	1.0	1.1

* C.M.A – maximum concentration admitted imposed according to NTPA 001-2002

The efficacy resulted of introducing modern methods of wastewater treatment resulted from the production of this factory, representing companies in the county in the last three years are shown in Table 3. The analyzes were made in the laboratory of the Agency of Environment Protection Calarasi. [1]

Table 3. Quality indicators of waste water evacuated in the emissary in the period 2013-2015

Indicators	Measure unit	CMA*	2013	2014	2015
COD-Cr	mgO_2/dmc	125	79.85	51.5	70.25
BOD_5	mgO_2/dmc	25	30.76	27	26.15
[NH_4^+]-Ammonia nitrogen	mgN/dmc	2	0.17	0.28	0.37
Total phosphorus	mgP/dmc	1	3.38	3.63	3.05

* C.M.A – maximum concentration admitted imposed according to NTPA 001-2002

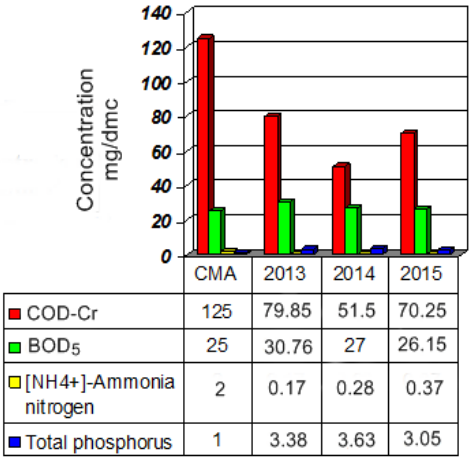

Fig. 1. Quality indicators of waste water discharged in the environment in the period 2013-2015

As we can see from the data presented in Table 3 and Figure 1, nor hardly biodegradable organic compounds or ammonia nitrogen do not cause problems when discharged into the emissary. But there are problems in the case of total phosphorus, which show quite large excess (about three times the maximum admitted limit). Exceeding is reported in the case of biochemical consume of oxygen, maximum 23%.

The results of measurements and analyzes made by the expertise of the Agency for Environment Protection Calarasi revealed the efficiency of the purification and treatment system of waste water discharged into Jirlău river, then Borcea branch, reducing this way the content of organic material discharged into the environment and at the same time reducing the amount of nutrients (eutrophication agents) - total phosphorus and ammonium ion.

Operating to the parameters presented, with the organic load and eutrophication parameters according to legal norms, the environment impact is reduced, thereby preventing the pollution of surface waters, soil and groundwater [6].

CONCLUSIONS

Regarding the case study made in the factory of meat processing, representative unit in Calarasi town and an important contribution of pollutants that reach the Borcea Branch and

then into the Danube, we see an exceeding of the concentration of pollutants: total phosphorus (an important agent of eutrophication) and to a smaller extent organic material.

Most indicators analyzed, at the exit out of the treatment plant were within the maximum limit - the maximum admitted concentration, thus demonstrating the effectiveness of the treatment method used.

The biological treatment is the most effective, most economical and the cleanest method of removal of organic substances in the waste water. The biological processes, aerobic or anaerobic, are the most complex processes in the modern science, involving both biological parameters and physical and chemical ones.

The biological treatment with active sludge is a treatment technology that must be recommended for the waste water treatment derived from food industry, due to the efficiency of this treatment that has less expensive technology, cleaner and at the same time - organic.

We can conclude that if indeed quite large efforts are made in the recent years not to reach any pollution by nutrients due to nitrogen and phosphorus in the terminal basin of the Danube, there are still problems with a much lower rate compared to the previous years [8].

We must not forget the waste water derived from the waste water treatment plant in the city, as well as large amounts of nitrates derived from the agricultural sector, which have a substantial contribution to the pollution of the groundwater, and finally reach the Danube [9].

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THE QUALITY OF DRINKING WATER FROM NADĂŞ VILLAGE – CLUJ COUNTY

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Abstract

The aim of the present study was to determinate the groundwater quality from 17 wells, 3 natural springs and 3 samples from a local distribution network. The samples were taken from Nadas village, located in Crisul Repede village, Cluj County. The area has a topography that consists in a valley surrounded by hills (500 - 700 meters high). The main objective was to investigate physico-chemical parameters: pH, TDS, ORP, salinity and heavy metals (Cu, Cd, Cr, Pb, Fe, Zn and Ni). Laboratory analyzes revealed that the waters sampled from well 7 exceeded the permissible limit imposed by US-EPA for TDS value (500 mg/L), wells 4 exceeded the salinity value imposed by US-EPA (0.2 ‰), one well had a pH close to permissible limit (9.5), ORP had negative values (between -6.9 and -143.5 mV), while the heavy metal content varied significantly, depending on the water sources and heavy metal type. Copper and cadmium were not detected in the analyzed water samples, but chromium had values between 1.36 – 40.21 µg/L, zinc between 11.19 –437.6 µg/L, iron increased levels in the wells samples from 10.77 µg/L to 99.90 µg/L, lead was identified in four wells (4.93 - 51.1 µg/L) and nickel ranged between 4.94 - 39.61 µg/L. Were registered significant differences between the water samples collected from wells, natural springs and water samples from the local distribution network.

Key words**:** *drinking water quality, groundwater, heavy metals, physico-chemical parameters, wells*

INTRODUCTION

Groundwater is an essential component of the water cycle representing more than 97% of the available fresh water on Earth.
It is particularly important due to the fact that it has an important role because is the largest in water supply and has the highest natural wealth represented by groundwater, which is important because of their superior quality compared to other types of freshwater in nature [4].
Knowing the quality of the water is extremely important for human health.
Nadăş village (46°51 '22.27 ", 23°9'5.53") is located in Cluj County and it is crossed by the Nadăş River [12].
It is placed in a valley surrounded by hills with heights between 500-700 meters.
Cluj-Napoca (53.5 km), Huedin (12 km) and Zalău (73.5 km) are neighboring towns [7].

MATERIALS AND METHODS

A total of 23 groundwater samples were collected in March 2014, from 17 wells, 3 natural springs and 3 samples from local distribution network. The study area with sampling points distribution is shown in Fig.1.

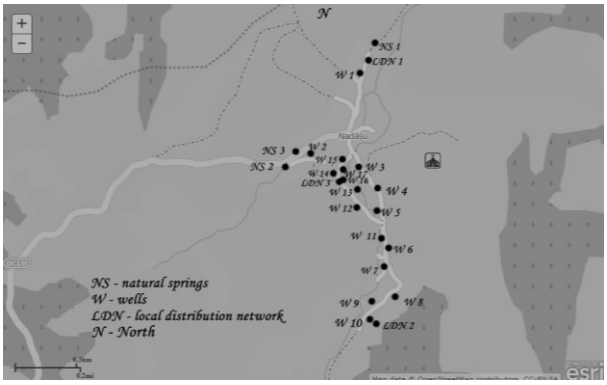

Fig. 1. Study area (Nadăş village) with sampling points
Source: Modified after www.turactiv.ro

The physico-chemical parameters (pH, total dissolved solids-TDS, electrical conductivity-

EC, oxidation reduction potential-ORP, salinity) were analyzed *in situ* using a portable multiparameter 320i WTW, while the chemical parameters were determined in laboratory.
The investigated heavy metals (Cu, Cd, Cr, Pb, Fe, Zn and Ni) were analyzed by atomic spectrometry absorption (AAS ZEEnit 700 Analitik Jena).

RESULTS AND DISCUSSIONS

The analysed water proved to be slightly acidic to neutral, having the pH between 6.67 and 9.15. Most of the analysed samples (56.5%) had the pH under 7, while 39% samples had the pH between 7 and 7.5 and only one sampled had a pH over 7.5 (9.15), as it can be seen in Fig. 2.

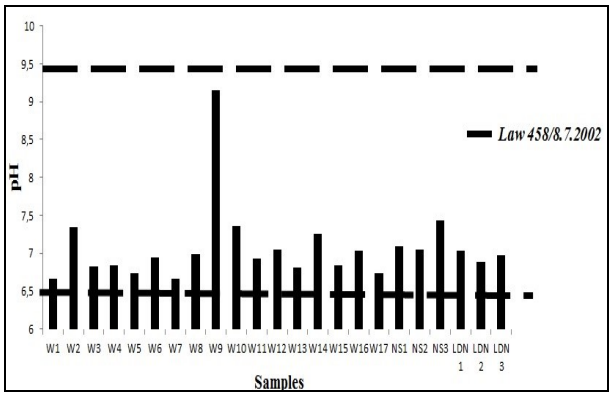

Fig. 2. pH values depending on the sampling points
Source: Own calculation.

Total dissolved solids reflect the presence of dissolved inorganic and organic substances in the water sample. A total of 17% from samples (W1; W4; W5 and W6 - Fig. 1.) exceeded the maximum permitted limit according to US-EPA (500 mg/L) [13]. The lowest TDS value was registered in well W9 (32 mg/L), while 78% of the analysed samples had a relatively low TDS level, between 262 mg/L - 496 mg/L (Fig. 3.).
Electrical conductivity is the property of water to allow the passage of electric current and according to Law 458/08.07.2002 the MPL (maximum permissible limit) is 2500 µS/cm [5].

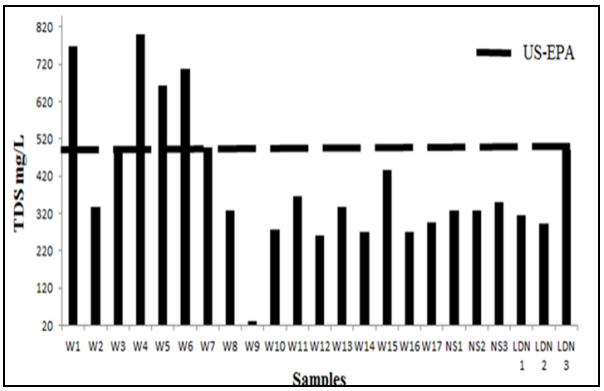

Fig. 3. TDS values depending on the sampling points
Source: Own calculation.

The lowest (49.9 µS/cm) value was observed in sample W9, while the highest level was 1251 µS/cm (W4) and the others samples had values between 409-1203 µS/cm (Fig.4). The analysed waters proved to have a low EC value, all the waters had the EC values below the MPL according to national legislation.

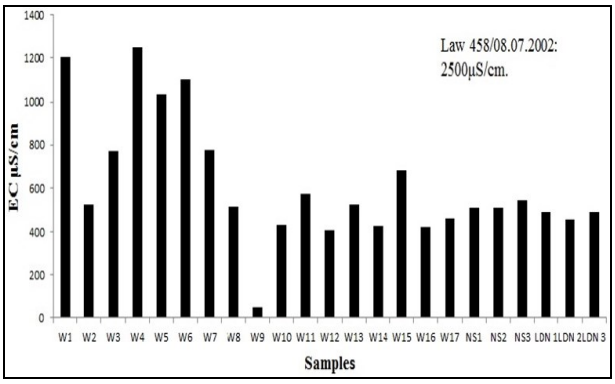

Fig. 4. EC values depending on the sampling points
Source: Own calculation.

The oxidation reduction potential (ORP) was other investigated parameters. A high negative ORP indicates that the water is a more powerful antioxidant, while a positive ORP indicates oxidizing water. By analysing the water samples it was found that ORP had negative values (between - 6.9 mV and - 143.5 mV), as it is presented in Fig. 5.
With the exception of 17% of collected samples (W1, W4, W5, W6) which had a salinity level higher than the MPL value (0.2 ‰, US-EPA), the other samples had a low salinity (0.1‰), while for 70% samples the salinity was lower than 0.1‰ (Fig. 6).

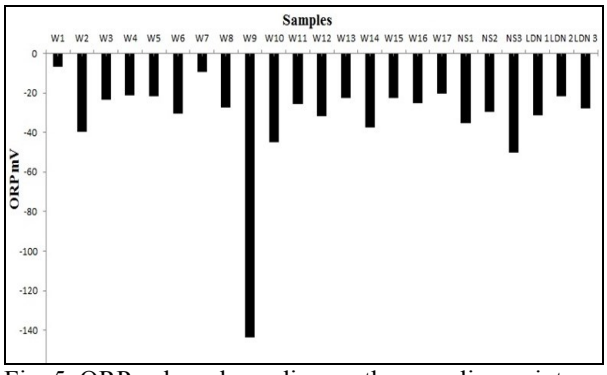

Fig. 5. ORP values depending on the sampling points
Source: Own calculation.

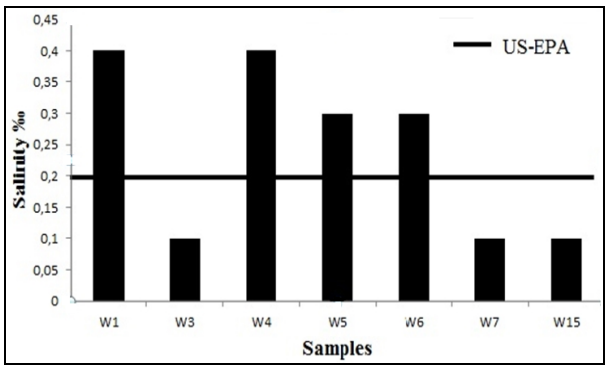

Fig. 6. Salinity values depending on the sampling points
Source: Own calculation.

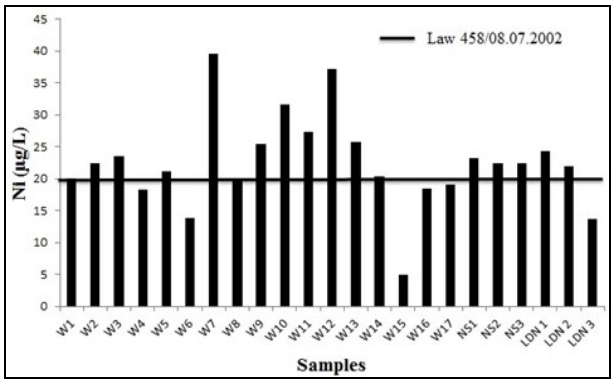

Fig. 7. Nickel concentrations depending on the sampling points
Source: Own calculation.

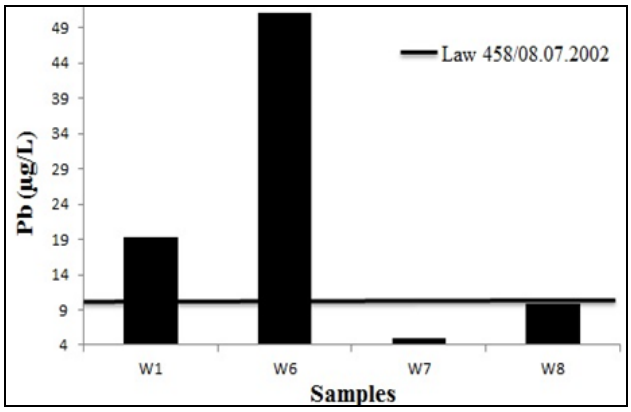

Fig. 8. Lead concentrations depending on the sampling points
Source: Own calculation.

It is known that some of heavy metals (Ni, Cd, Cr, Pb, As, etc.) are toxic and their presence in drinking water can cause serious health and environmental problems [2]. Heavy metals can be accumulated in liver, bones and kidneys, or other organs [11].

In the analysed water samples the heavy metal content varied significantly, depending on heavy metal type and water sources. Copper and cadmium were not detected, while the other heavy metals were detected in the majority of the samples: 96% (Cr), 87% (Zn), 17% (Pb), 100% (Fe), 100% (Ni).

The heavy metals concentrations ranged between 1.36 - 40.21 µg/L (chromium), 11.19 µg/L - 437.6 µg/L (zinc), 4.93 µg/L - 51.1 µg/L (lead), 10.77 µg/L - 99.90 µg/L (iron), 4.94 µg/L - 39.61 µg/L (nickel). As it can be seen in Fig. 7. and Fig. 8., lead and nickel exceeded the MPL in 50 % (Pb), respectively in 69.56 % (Ni) of the analysed samples. Lead is one of the metals which are highly toxic and can cause serious health effects [1,10].

Nickel can appear in groundwater due to the dissolution from rocks which contains nickel [3].

The spread of heavy metals is becoming increasingly important because they accumulate fast in the environment (water, soil, air) and from there in the human body, which can suffer severe pathological changes because the effects of these metals [8].

Lead is a frequent heavy metal and may cause chronic poisoning: sickness, by attacking the motor nerve endings, the kidneys and cancer. Children up to 6 years age and pregnant women are most sensitive to the adverse health effects of lead [14].

Nickel is a metal that is revealed frequently in drinking water, generally at concentrations less than 10 µg/L. Exposure to Ni by the intake from drinking water induces toxicity, lung cancer and allergies [9].

Cadmium is slightly soluble in water (1 mg/L) and its toxicity in water is influenced by water hardness. Exposure to cadmium cause acute and chronic effects: headache, fever, lung diseases, has a strong bioaccumulation and affects kidney and bones in the human body.

Chromium is an essential element for life in quantities between 0.05 - 0.2 mg/day for humans, but a higher concentration can cause toxic effects. Chromium VI is carcinogenic and at a low level may cause dermatitis [6].

CONCLUSIONS

The laboratory analysis showed the water sample from one of the wells had a pH (9.15) close to the permissible limit according to Law 458/2002 (6.5-9.5).

17.4% of the wells exceed the permissible limit for TDS imposed by US EPA (500 mg/L) and other 17.4% samples were near the acceptable limit (W3 – 496 mg/L, W7 – 496 mg/L, W15-437 mg/L, LDN3 – 492 mg/L).

Electrical conductivity was low for all the analysed samples, being lower than the MPL (2500 µS/cm) set by Law 458/2002. EC ranged between 49.9 µS/cm (W9) and 1251 µS/cm (W4). The analysed water had a negative ORP (between - 6.9 mV and -143.5 mV).

Copper and cadmium were not detected, but chromium concentrations ranged between 1.36 µg/L - 40.21 µg/L, zinc concentrations were between 11.19 µg/L - 437.6 µg/L, lead concentrations were identified only in four wells and its concentrations were between 4.93 - 51.1 µg/L, iron concentrations ranged between 10.77 µg/L and 99.90 µg/L while nickel had values between 4.94 µg/L - 39.61 µg/L.

People have been announced regarding their wells water composition. Those sources of drinking water should be monitored, also there are waters filters which can be used and for cleaning the water.

The present studies indicated that some of the investigated water sources (exceeded lead- W7, W12 and nikel-W1, W2, W3, W5, W7, W9, W10, W11, W12, W13, W14 ; salinity level higher than the MPL - W1, W4, W5, W6; total dissolved solids- W1; W4; W5 and W6 and one sample had a pH close to the acceptable limit-W9) may pose some health problems for the people who use the water as drinking water.

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STUDY ON THE INFLUENCE OF IMPORT AND EXPORT OF FRUIT IN ROMANIA ON ECONOMIC INDICATORS

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Abstract

The aim of this paper is to highlight the importance of trade in fruits in Romania, what share does it have in the European and global trade, to show what is its contribution to the development of national economy and how does it affect the GDP of agriculture in Romania. Trade represents a form of human activity hat achieved along time the strongest connection between peoples, contributed to the development of economies and societies. The analysis methods used in order to highlight the changes occurred on the fruit market in Romania are as follows: the grouping method, the degree for covering the import by exports, correlation method. Analysing the correlation in Romania between fruit production, the value of agriculture GDP, and fruit import, a significant correlation is noticed, and the increase of fruit production has a positive impact on GDP and helps diminishing the imports. For the situation to be improved, fruit production increase is advisable, by increasing productivity as a result of using more efficient technologies, setting up associations of producers, building storage facilities.

Key words**:** *correlation method***,** *fruit, GDP, Romania*

INTRODUCTION

Trade represents a form of human activity hat achieved along time the strongest connection between peoples, contributed to the development of economies and societies as a whole. [5] [17] trade represents an efficient branch of an economy, that contributes to the development of society, especially in this period, given that it is based on a strong competition.

It is well know that economic growth strongly stimulates imports of fruits, whereas inflation reduces them. [13]

The Romanian exterior trade and not only faces a series of issues among which the most important are: the increase of economy opening degree, adaptation to the new trends at world and European level, the increase of competition on the international markets, including on the European ones. [1]

In Romania, trade in fruits may represent an important part of the trade in agricultural products considering the geographical position, favourable climate conditions, fruit growing tradition, as well as the existence of some producing varieties created in the research stations that would determine better living conditions for the Romanian farmers.

In Romania, the state of the fruit-growing sector is, currently, not quite good, considering the area occupied by orchards that was of 230,795 ha in 1990, being diminished to 140,048 ha [14] in 2011 and the high level of imports, that were of USD Thousand 14,000 in 1990, being increased to USD Thousand 45,460 in 2011. [8] [10] [15]

Romania's accession to the European Union has resulted in the emergence of the Single Market, removing the import and export barriers, and the downward trend of fruit production since 1989 has adversely affected the fruit market. [9]

The Romanian fruit market features a wide variety of fruits, and a great seasonality, leading to a different demand according to the season. It also features a high level of fruit perishability and self-consumption. The high level of self-consumption is due to the lack of storage facilities owned by the manufacturers and the high number of population living in the rural area, with a weight of 45 % in 2011. [4]

Another negative factor is the existence of

small farms, with high input consumption and outdated technologies, and the lack of a marketing strategy. [19]

The fruit quantity obtained at the national level is not enough and does not always meet the quality requirements, so that the buyers are caused to prefer imported fruits, leading to the diminishing of Romanian farmers' income and, implicitly, adversely affecting the national economy.[7]

The aim of this paper is to highlight the importance of trade in fruits in Romania, what share does it have in the European and global trade, to show what is its contribution to the development of national economy and how does it affect the GDP of agriculture in Romania.

MATERIALS AND METHODS

The analysis methods used in order to highlight the changes occurred on the fruit market in Romania are as follows: the grouping method, the degree for covering the import by exports, correlation method.

The grouping method presupposes the grouping of the products after certain characteristics, based on it one can perform the analysis of import and export, but one can also establish the weight of certain products in the import and in the export.[2]

Grouping represents a classification and its purpose is to highlight the main characteristics, in the case of fruits, they were grouped into stone fruits and seedy fruits. Fruit classification was made according to the structure, thus, pome fruits are fleshy, having seeds enclosed in compartments with parchment-like walls (apples, pears) and stone fruits are characterized by the juicy pulp and tough stone enclosing the seed (apricots, plums, peaches, nectarines, cherries).

The degree for covering the import by exports is calculated as a ratio between the value index of export and the value index of import.

$$Ga=\frac{E}{M}\times 100 \text{ [2]}$$

Ga= the degree for covering the import by exports;

E= export value;

M= import value;

The correlation method shows the level of association between the variables, expresses the association degree between variables. It is a general term used in order to define the interdependence or relation between the variables notices in statistic populations. In restrained sense it is a measure of the degree of statistic relation between the quantitative variables, under the name of „correlation coefficient". [11]

The correlation coefficient is a composite indicator measuring the intensity of relations between the variables.

Frequently, the simple linear correlation does not correspond to the type of dependency between the two variables and therefore, other types of regression functions are used.

In this paper, to better highlight the connection between the variables, a second-order polynomial regression function was used, type $Y= a+bx+cx^2$, where:

a= level of dependent variable (Y) when the independent variable x is constant

b = level of dependent variable (Y) when the independent variable x increases or decreases by an unit

c = level of dependent variable (Y) when the independent variable x has connections with other factors from the outside environment

The determination coefficient (r^2) expresses what share of Y variation is owed to X factor.[3]

The correlation ratio may have values between 0 and 1. When the value is close to 1, the connection between the variables is stronger and it is less intense when closing to 0. The minus sign indicates the reverse connection, while the plus sign indicates the direct connection. [6]

Data taken from Food and Agriculture Organization of the United Nations website and the Statistical Yearbooks of Romania for 1990 and the period 2002-2013.

RESULTS AND DISCUSSIONS

Due to climate conditions and low performance management, the tree fruit production has registered significant fluctuations that are strengthened by the high degree of perishability of many species,

varieties and fruits. In this context, the challenge is to find and substantiate measures in order to ensure the continuity of production flow to the market, to avoid the excesses of price fluctuations that, finally, affect the manufacturers' income and generate confusion, uncertainty among the consumers.[16]

Area planted with fruit trees and the fruit production obtained are important indicators justifying fruit imports.

In Romania, in 1990, area cultivated with fruit trees was of 230,795 ha, in 2002, it has decreased to 207,809 ha, and in 2014 to 147,435 ha. Area cultivated with fruit trees has diminished in 2013 compared to 1990 with 36.12 % and with 29 % compared to 2002. (Table 1)

The underlying cause of decreasing the area cultivated with fruit trees was the transition to the market economy starting with 1990 that allowed the restitution of land to the owners. Because the owners did not have the financial resources and mechanical means necessary for the management of the orchards they have received following the restitutions, they were compelled to grub up a large part of these areas.

The dynamics of areas cultivated with fruit trees compared to 1990 and 2002 is the following: the areas cultivated with orchards in the period 2002-2013 compared to those cultivated in 1990 are decreasing continuously, from 90 % in 2002 to 64.9 % in 2013. (Table 1)

Table 1. Area cultivated with orchards and its dynamics in Romania

Period	Surface (ha)	Fixed base indices 1990 (%)	Fixed base indices 2002(%)
1990	230,795	100.00	-
2002	207,809	90.04	100.00
2003	203,687	88.25	98.02
2004	194,456	84.25	93.57
2005	199,968	86.64	96.23
2006	157,345	68.18	75.72
2007	156,002	67.59	75.07
2008	149,267	64.68	71.83
2009	145,292	62.95	69.92
2010	144,844	62.76	69.70
2011	140,048	60.68	67.39
2012	142,242	61.63	68.44
2013	147,435	63.88	70.94

Source: Statistical Yearbook of Romania, 1996, 2007, 2012;2015; own calculations

Compared to 2002, the areas cultivated with orchards in the analyzed period are also continuously decreasing. If in 2003, the area cultivated with orchards represented 98 % of that of 2002, in 2013 it represented only 70.9 % (Table 1).

As regards fruit production in Romania, it can be said that it is fluctuating, but continuingly increasing (Table 2). In Romania, fruit production in 1990 was of 1,453,007 ton, diminished in 2002 to 952,000 ton, and in 2013 it increased to 1,299,972 ton. During the analyzed period, the highest fruit production was obtained in 2003, being of 2088506 ton.

Table 2. Fruit production in Romania (ton)

Period	Apples	Pears	Plums	Peaches and nectarines	Cherries	Apricots	Annual total
1990	683,152	73,800	449,500	52,900	67,700	48,000	1,453,007
2002	491,500	68,100	220,638	13,000	66,300	18,300	952,000
2003	811,100	103,758	909,648	18,000	98,500	42,591	2,088,506
2004	1,097,837	45,931	475,767	19,629	50,988	20,648	1,744,400
2005	637,979	88,890	622,357	29,797	117,859	52,410	1,647,000
2006	590,413	62,425	598,753	17,408	104,791	38,754	1,486,400
2007	475,370	62,852	372,631	16,980	65,163	27,567	1,085,800
2008	459,016	52,576	475,290	16,432	67,664	32,125	1,179,200
2009	517,491	66,111	533,691	17,132	67,874	32,499	1,323,000
2010	552,860	60,375	624,884	11,241	70,290	23,804	1,419,600
2011	620,362	66,913	573,596	22,494	81,842	33,745	1,479,900
2012	462,935	54,274	424,068	17,428	70,542	29,089	1,128,594
2013	513,580	66,849	512,459	19,130	80,477	28,310	1,299,972

Source: Statistical Yearbook of Romania, 1996, 2007, 2012; www.fao.org

This situation appears due to the fact that the quantity and quality of the fruits is directly dependent upon the climate conditions (drought, hail), diseases, pests, production technologies applied. Other negative issues of the fruit growing sector are: the reduction if the area cultivated with orchards, crumbling; the lack of high performance technologies for cultivation and processing; low production on the hectare; the lack of storage areas; fruit growing areas n decline and abandoned.

As regards structure, in Romania, fruit production is shared by apples, as 45%, plums, as 40 % and other fruits, 15 % (Table 3)

Table 3. The structure of fruit production in Romania

Period	Apples	Pears	Plums	Peaches and nectarines	Cherries	Apricots
1990	50	5	33	4	5	3
2002	52	7	23	1	7	2
2003	39	5	44	1	5	2
2004	63	3	27	1	3	1
2005	39	5	38	2	7	3
2006	40	4	40	1	7	3
2007	44	6	34	2	6	3
2008	39	4	40	1	6	3
2009	39	5	40	1	5	2
2010	39	4	44	1	5	2
2011	42	5	39	2	6	2
2012	41	5	38	2	6	3
2013	40	5	39	1	6	2

Source: Own calculations

Within the total fruit production, the share of apples ranges from 39 % to 63 % and the share of plums ranges from 23 % to 44 %. (Table 3)

As regards the dynamics of fruit production, the production obtained in 2013, compared to 2002, has increased with 5.74 % and decreased with 10.5 % compared to that obtained in 1990 (Table 4). It can also be noted that apple production has registered a downward trend compared to 1990, except 2004, when an increase of 60.7 % was registered. In exchange, for the same period compared to 1990, plum production has an ascending trend, except 2002 when a decrease of 50.9 % took place and in 2007 the decrease was of 17.1 %.

Table 4 Dynamics of fruit production

	Fixed base indices 1990 (%)							Fixed base indices 2002 (%)					
	Apples	Pears	Plums	Peaches and nectarines	Cherries	Apricots	Total	Apples	Pears	Plums	Peaches and nectarines	Cherries	Apricots
1990	100	100	100	100	100	100	100						
2002	71.9	92.3	49.1	24.6	97.9	38.1	65.5	100	100	100	100	100	100
2003	118	140	202.4	34.0	145.5	88.7	143.7	165.0	152.4	412.3	138.5	148.6	219.4
2004	160	62.2	105.8	37.1	75.3	43.0	120.1	223.4	67.4	215.6	151.0	76.9	183.2
2005	93.4	120	138.5	56.3	174.1	109.2	113.4	129.8	130.5	282.1	229.2	177.8	173.0
2006	86.4	84.6	133.2	32.9	154.8	80.7	102.3	120.1	91.7	271.4	133.9	158.1	156.1
2007	69.6	85.2	82.9	32.1	96.3	57.4	74.7	96.7	92.3	168.9	130.6	98.3	114.1
2008	67.2	71.2	105.7	31.1	99.9	66.9	81.2	93.4	77.2	215.4	126.4	102.1	123.9
2009	75.8	89.6	118.7	32.4	100.3	67.7	91.1	105.3	97.1	241.9	131.8	102.4	139.0
2010	80.9	81.8	139.0	21.2	103.8	49.6	97.7	112.5	88.7	283.2	86.5	106.0	149.1
2011	90.8	90.7	127.6	42.5	120.9	70.3	101.9	126.2	98.3	260.0	173.0	123.4	155.5
2012	67.8	73.5	94.3	32.9	104.2	60.6	77.7	94.2	79.7	192.2	134.1	106.4	159.0
2013	75.2	90.6	114.0	36.2	118.9	59.0	89.5	104.5	98.2	232.3	147.2	121.4	154.7

Source: Own calculations

Compared to 2002, apple production has an ascending trend, except 2007 and 2008, when it has decreased with 3.3 % and 6.6 % respectively. And in case of plum production, an ascending trend can also be noticed in this period.

Although there are large plantations of fruit trees, as regards the quantity, structure and regularity of market supply, the domestic production is not enough [18] and that's why Romania imports fruits.

In Romania, fruit import is represented by: apples, pears, grapes, plums, apricots, bananas, kiwi etc.

Table 5. Import, export of fruits and their dynamics in Romania

Period	Import (thousands $)	Export (thousands $)	Fixed base indices for import (%)		Fixed base indices for export (%)	
			1990	2002	1990	2002
1990	14,000	24,000	100	-	100	-
2002	6,889	1,165	49.2	100.0	4.9	100.0
2003	6,649	4,214	47.5	96.5	17.6	361.7
2004	9,461	3,364	67.6	137.3	14.0	288.8
2005	25,797	5,119	184.3	374.5	21.3	439.4
2006	29,381	4,800	209.9	426.5	20.0	412.0
2007	66,480	12,937	474.9	965.0	53.9	1,110.5
2008	69,658	10,126	497.6	1,011.1	42.2	869.2
2009	34,889	12,466	249.2	506.4	51.9	1,070.0
2010	33,403	19,542	238.6	484.9	81.4	1,677.4
2011	45,460	25,398	324.7	659.9	105.8	2,180.1
2012	56,043	24,619	400.3	813.5	100.2	2,113.2
2013	60,336	27,117	431.0	875.8	113.0	2,327.6

Source: Statistical Yearbook of Romania, 1996: www.fao.org; own calculations

Analyzing the evolution of fruit imports in Romania, according to Table 5, it is determined that in the period 2002-2004 compared to 1990, there was a decrease of imports, a positive fact for Romanian economy. But in the period 2005-2013 compared to 1990, there was an increase of imports. In the period of 2003-2013 compared to 2002, the fruit import had an ascending trend, the highest increase being registered in 2008, of 911%.

Fruit import in Romania is due to the high demand for fruits of the domestic market, considering that the domestic production does not cover the necessary. Fruits imported to Romania include fruits that grow in our country and fruits that do not grow here, but are demanded by the market.

Consequently the increase of the fruit production determines the drop of the import value, given the orientation trend of the consumer to locally produced fruits, considered to be more ecological, with better taste, that may be purchased at a better price. But there are also consumers who prefer the imported fruits because they have a better quality, especially as regards the look. There was also a time when the local producers were not able to sell their products in supermarkets allowing the consumers who bought from those stores to buy imported fruits. Another cause of the high level of imports would be the influence of climate conditions on fruit production, resulting in a decrease of them, both quantitative and qualitative. The lack of an organization of local manufacturers in professional associations, the low productivity determined by a weakly developed irrigation system, the insufficient investments in the sector determine the decline of internal production, favoring imports in this manner.

You may find below an analysis of fruit imports in Romania as regards the value, considering the two groups in which fruits are divided: stone fruits and pome fruits.

Analyzing the evolution of fruit import in value terms in Romania according to fig. 1 it can be noticed that in the period 2002-2013 the value of the import of seedy fruits was higher than the value of import of stone fruits.

Furthermore, it is noticed that the trend of seedy fruits was an oscillating one, thus in

2007 compared to 2006 an increase of s 93.7% was registered, and in 2009 compared to 2008 a drop of 45.9% was registered.

Consequently the year when the import reaches the highest value is 2008 by USD thousands 69,658. In the case of stone fruits the increase from 2007 compared to 2006 was 195.4% , and the drop from 2009 compared to 2008 was 55.6%, furthermore it can be noticed that even though in the 2010-2013 an ascending trend was registered, the maximum value of import was in 2008, reaching USD Thousands 28, 749.

The fruit import in Romania in the period 2002-2013 was in average USD Thousands 22,860.8 in the case of seedy fruits and USD Thousands 12,407.3 in the case of stone fruits. And the average of fruit import in Romania in the analyzed period was USD Thousands 35,268.1.

The share of fruit import in Romania of the global and European Union import is shown in table 6.

It can be noticed that the share of Romanian fruit imports of the global import ranges from 0.09 % in 2003 to 0.56 % in 2007. In 2008, the share was of 0.51 %, in 2009 and 2010 it has decreased, and in 2011 was of 0.3 %.

As regards the share of fruit imports in Romania of the European Union import, it is noticed, as in case of the global share, that in 2007, the highest value was registered, of 0.99 %. If in 2002, the share of Romanian imports of the European Union imports was of 0.19 %, in 2013, it has increased to 0.72%.

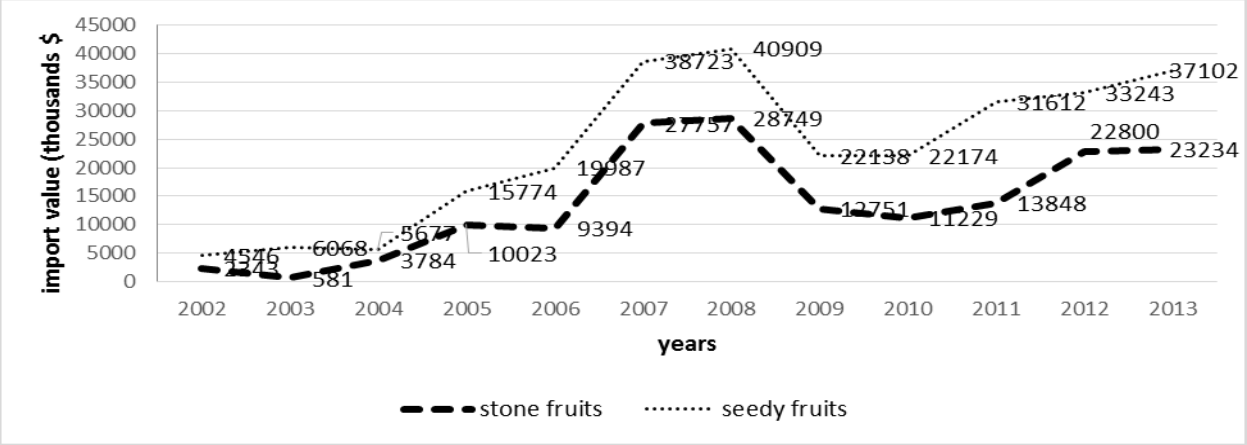

Fig.1 The evolution of world fruit import in value terms in Romania

Table 6. Share of fruit import in Romania of the global and European Union import

Specification	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
The share of Romanian fruit imports of the global import	0.11	0.09	0.11	0.30	0.29	0.56	0.51	0.29	0.24	0.30	0.29	0.35
The share of Romanian fruit imports of the UE import	0.19	0.14	0.18	0.51	0.51	0.99	0.91	0.58	0.55	0.70	0.67	0.72

Source: Own calculations

The highest share of the fruit import was registered in Romania in 2007 and was mainly a result of the very low fruit production of that year.

As regards the export, according to Table no. 5, it can be noticed that, compared to 1990, in the period 2002-2013 there was a downward trend that adversely affected the Romanian economy. Compared to 2002, in the period 2002-2013 the fruit export has registered an ascending trend that positively affected the economy.

Fruit export of Romania is also analyzed by the two fruit groups, stone and pome fruits.

Analyzing the evolution of fruit export in value terms in Romania according to fig. 2 it can be noticed that in the period 2002-2013

the value of the export of stone fruits and seedy fruits varied a lot.

Thus in the case of stone fruits an increase of 156.5% is noticed in 2003 compared to 2002, followed by a drop of 16.8% in 2005 against 2004, in 2006 compared to 2005 an increase of 27.6% is registered, followed by a drop of 43.1% in 2007 against 2006 and an increase of 103% in 2008 against 2007. In fact 2008 is the year when the value of export of stone fruits is the highest, given the fact that a new drop follows, and then an ascending trend, without reaching the maximum value from 2008.

With regard to the export of seedy fruits it can be noticed that the value is very low, but in 2007 compared to 2006 an increase of 2,918% takes place, but in 2008 compared to 2007 a drop of 79.9% is registered, followed by a new spectacular increase in 2011 compared to 2010, of 505%.

The fruit export from Romania in the period 2002-2013 was in average USD Thousands 3,882.1 in the case of seedy fruits and of USD Thousands 4,489.3 in the case of stone fruits. And the average of fruit export in Romania in the analyzed period was USD Thousands 13,451.3.

The fruit export from Romania represented 23.2% from the total fruit trade of Romania. The degree for covering fruit export from the fruit import at the level of Romania was 30.2%.

The share of fruit export in Romania of the global and European Union export is shown in Table 7.

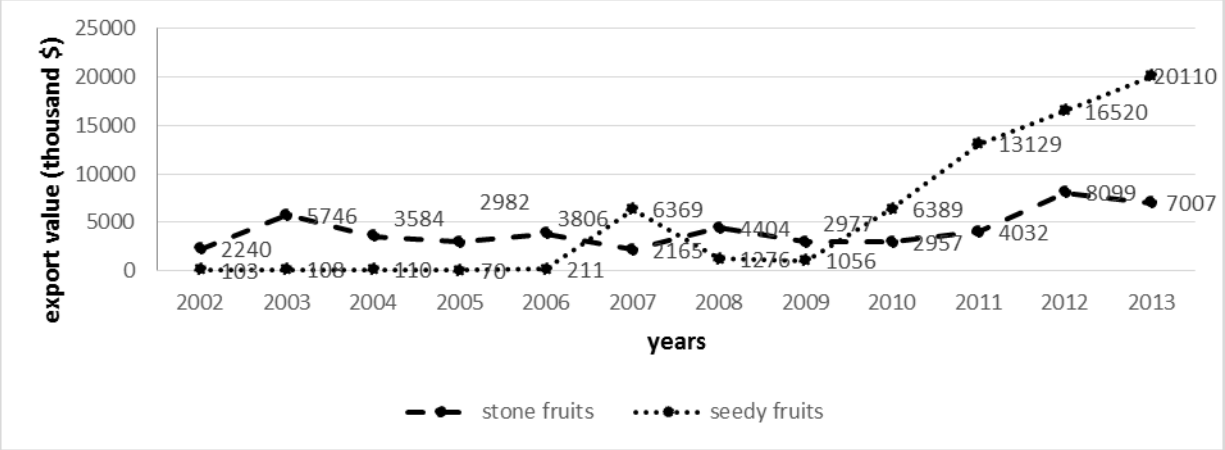

Fig.2 The evolution of world fruit export in value terms in Romania

Table 7. Share of fruit export in Romania of the global and European Union export

Specification	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
The share of Romanian export of the global export	0.02	0.06	0.04	0.06	0.05	0.12	0.08	0.11	0.15	0.18	0.16	0.19
The share of Romanian export of the EU Export	0.04	0.10	0.08	0.12	0.09	0.22	0.14	0.22	0.31	0.38	0.38	0.40

Source: Own calculations

In the analyzed period, the share of Romanian export of the global export has increased, from 0.02 % in 2002, to 0.19 % in 2013

As regards the share of Romanian export of the European Union export, an ascending trend was registered, the increase being from 0.04 % in 2002 to 0.4 % in 2013.

For the economy of a country to be in a favorable situation, the export value has to be higher than the import value. In order to have this situation in Romania, the import/export coverage ratio was calculated, and the results are presented in table 8.

Table 8. Import/export coverage ratio and its dynamics

Specification	1990	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
The degree for covering the import by exports	171.4	16.9	63.4	35.6	19.8	16.3	19.5	14.5	35.7	58.5	55.9	43.9	44.9
Fixed base indices 1990 (%)	100.0	9.9	37.0	20.8	11.6	9.5	11.4	8.5	20.8	34.1	32.6	25.6	26.2
Fixed base indices 2002 (%)	-	100.0	375.1	210.7	117.2	96.4	115.4	85.8	211.2	346.2	330.8	259.8	265.8

Source: Own calculations

If in 1990, the import/export coverage ratio was of 171 % because the value of exports was higher than the value of imports, from 2002 to 2011 the import/export ratio has been very low, from 63.4 % in 2003 to 14.5 % in 2008. Since 2009, the import/export coverage ratio has started to increase, in 2009 being of 35.7, in 2010 of 58.5 % and in 2011 of 55.9%. A very low import/export coverage ratio is very unfavorable because this indicator shows the balance of trade.

In 2011, at the international level, the fruit consumption was of 74.1 kg and in European Union was of 100.1 kg, according to the data of Food and Agriculture Organization of the United Nations. Consumption and its dynamics for Romania are shown in Table 9.

Table 9 Fruit consumption in Romania and its dynamics

Period	Consumption (kg)	Fixed base indices 1990 (%)	Fixed base indices 2002 (%)
1990	59.5	100.0	-
2002	45.4	76.3	100.0
2003	59.6	100.2	131.3
2004	77.4	130.1	170.5
2005	75.9	127.6	167.2
2006	83.2	139.8	183.3
2007	67.8	113.9	149.3
2008	66.7	112.1	146.9
2009	62.3	104.7	137.2
2010	63.3	106.4	139.4
2011	70.5	118.5	155.3
2012	71.1	119.5	156.6
2013	73.7	123.9	162.3

Source: Statistical Yearbook of Romania, 1996, 2007,2012; www.fao.org; own calculations

The fruit consumption in Romania has an ascending trend, but its increase is not significant. In Romania, fruit consumption/person ranges from 45.4 kg in 2002 to 83.2 kg in 2006. However, fruit consumption is still below the quantities recommended by nutritionists for all the benefits it has for human health, being an important source of vitamins, minerals, microelements and helping the prevention of obesity, by decreasing the food energy intake.

Ultimately, trade has to positively affect the economy of a country. Trying to find ways in which the Romanian trade may have a positive impact on the economy, we used the following factors in our analysis: total fruit production, fruit import, fruit export, GDP for agriculture.

We used data regarding Romanian total fruit production for the period 2002-2011, fruit import for 2002-2013, Romanian fruit export for 2002-2013 and Romanian GDP resulted from agricultural activities for the period 2002-2013.

Each of these factors is in a deterministic relation with the others, and each one of them may be influenced by other factors.

We have determined the simple correlation between the total fruit production and agriculture GDP, between the total fruit

production and fruit import and between the total fruit production and fruit export.
In order to emphasize the correlation between the total fruit production and agriculture GDP, we used a polynomial regression function, using Correl. The polynomial regression function based on which the correlation ratio and determination was calculated is of the type $Y= a+bx+cx^2$
Simple correlation ratios and determinations are shown in Tabel 10.

Table 10. Simple correlation ratios for the correlation of the analyzed factors with the total fruit production and their significance

Factorul	ryx	r^2	Semnificativ după r
Agriculture GDP	0.7376	0.5442	*
Fruit import	0.8313	0.6911	*
Fruit export	0.3687	0.1363	-

Source: Own calculations

Analyzing the correlation between agriculture GDP and total fruit production, there is a direct correlation, meaning that the two variables vary in the same direction, therefore, the increase of total fruit production causes the increase of agriculture GDP. The correlation between the total fruit production and agriculture GDP is a significant, medium level correlation. The correlation ratio determined based on a polynomial regression function was ryx = 0.7376, and determination r^2 = 0.5442 (table 10). Ignoring the influence of other factors, determination r^2 = 0.5442 indicates that GDP variation was influenced (54 %) by the variation of total fruit production (Fig.3)

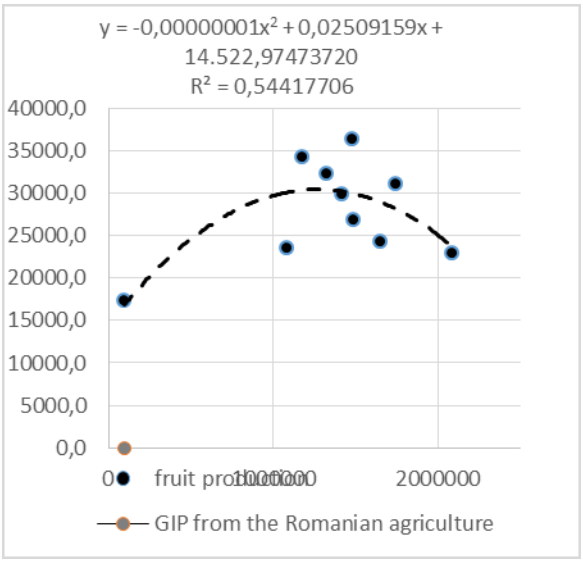

Fig. 3 The correlation between the fruit production and GIP from the Romanian agriculture

During the analyzed ten years, a higher variability coefficient was registered, the minimum production being of 952,000 ton in 2002, and the maximum production was of 2,088,506 ton in 2003.
Another analyzed correlation was the correlation between the fruit import and the total fruit production. According to table 10, the registered correlation ratio was ryx = 0.8313 and determination r^2 = 0.6911. The registered correlation ratio indicates a very strong correlation between fruit import and total fruit production and determination r^2 = 0.6911 indicates that the import variation due to the total fruit production is of 69.1% (Fig.4).
Therefore, a special attention has to be given to fruit production that has to be higher in order to meet the domestic fruit demand and to diminish the fruit import.

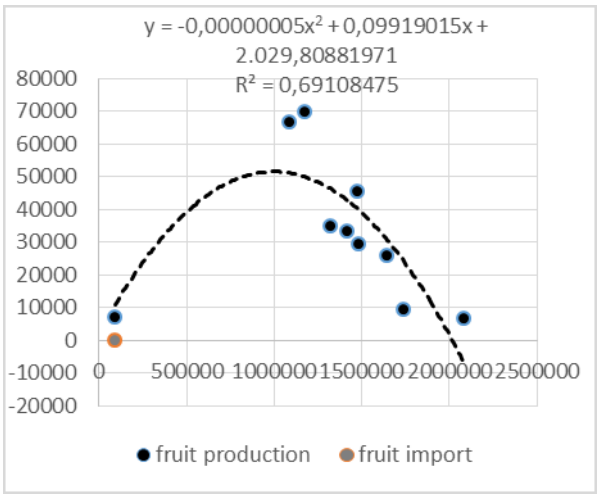

Fig. 4 The correlation between the fruit import and the total fruit production.

The correlation between fruit export and total fruit production was also determined. The correlation ratio resulted from calculation was

of ryx=0.3687, and the determination coefficient was r^2 = 0.1363 (Table 10). The analysis indicated that there is a weak, insignificant correlation between the two factors (Fig.5), meaning that the fruit export is not affected by the increase or decrease of total fruit production.

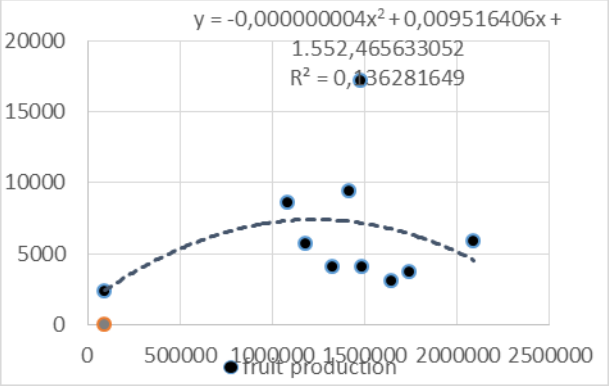

Fig. 5 The correlation between fruit export and total fruit production

Fruit export is affected by other factors, for example, foreign market demand and quality of exported fruits. As regards Romania, quality is important in connection to the quantity of exported fruits.

CONCLUSIONS

Although in Romania, the area cultivated with fruit trees had an ascending trend, the fruit production had an ascending but fluctuating trend, considering that it is directly dependent on the climate conditions and technologies used.

In Romania, as part of the total fruit production, the highest share is of apple and plum production, considering that apples are less perishable compared to other fruit categories and plums are used to produce jam, compote and "ţuica", a traditional alcoholic beverage in our country.

The fruit import in Romania in the period 2002-2013 was in average USD Thousands 32,806,7 and the fruit export was in average USD Thousands 9,913.1 what caused degree for covering fruit export from the fruit import at the level of Romania was 30.2%.

Consequently the increase of the fruit production determines the drop of the import value, given the orientation trend of the consumer to locally produced fruits, considered to be more ecological, with better taste, that may be purchased at a better price.

The lack of an organization of local manufacturers in professional associations, the low productivity determined by a weakly developed irrigation system, the insufficient investments in the sector determine the decline of internal production, favouring imports in this manner.

Analysing the correlation in Romania between fruit production, the value of agriculture GDP, and fruit import, a significant correlation is noticed, and the increase of fruit production has a positive impact on GDP and helps diminishing the imports.

For the situation to be improved, fruit production increase is advisable, by increasing productivity as a result of using more efficient technologies, setting up associations of producers, building storage facilities, investing in processing fruits that cannot be exported and cannot be sold to the buyers due to various reasons (bad quality).

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EFFECTIVENESS OF ELECTRONIC WALLET SYSTEM OF GROWTH ENHANCEMENT SUPPORT SCHEME DISTRIBUTION AMONG ARABLE CROP FARMERS IN IMO STATE, SOUTH EASTERN NIGERIA

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Abstract

The study analyzed effectiveness of e – wallet system of Growth Enhancement Scheme (GESS) distribution among arable crop farmers' in Imo State, South East Nigeria. Simple random sampling technique was used to select one hundred and twenty (120) registered Growth Enhancement Support Scheme (GESS) farmers. Data for the study were collected through a structured questionnaire and analyzed with descriptive statistics and inferential statistics (Probit regression and Z–test analysis). The result revealed that a high proportion (60%) of the respondents were males, with mean ages of 49.8 years, 35.50% acquired secondary education, mean farming experience of 16.50 years, mean farm size and household size of 1.1 hectares and 9.5 persons respectively. Result showed that farmers perceived the scheme was effective ($\bar{x}$ = 2.0) by enhancing timeliness of notification ($\bar{x}$ =2.8), increases responsiveness of staff to disburse inputs ($\bar{x}$ =2.5), effective in notifying clients through SMS and ensures quality to cost effectiveness of inputs, increases responsiveness of GESS staff to certify farmer's notification of inputs and helps in the management of clients and inputs at the redemption centre with mean ratings of 2.1. The result of Probit regression showed that coefficients for availability, quality and cooperation were significant and influenced effectiveness of e – wallet system at 1% and 5% levels of probability respectively in the study area. Location of the redemption centres, bureaucratic bottlenecks, network problems and inadequate farm inputs were challenges encountered by farmers in the scheme. The study therefore recommends formation of cooperatives, easy access to redemption centres and improved telecommunication network to enhance input delivery and effectiveness of the system

Key words**:** *distribution, effectiveness, e-wallet, farmers*

INTRODUCTION

The services of agro-input dealers are critical to farmers' access to affordable quantities of appropriate farm inputs in their local environments. Between 2003 and 2005, the increase in number of agro-input dealers ranged from 2% (for seed treatment chemicals) to 22% (mineral fertilizers) with a mean of 16% across agro-inputs. The difference in the magnitude of percent increase between 2003 and 2005 in the number of agro-input dealers selling different inputs reflects the demand for different agro input in the farming systems of Nigeria. Compared to other developing regions of the world, the low use of farm inputs by smallholder farmers in Nigeria is responsible for the gap between potential farmers' yields and actual crop yields at farm level [9]. However, Nigeria's aggregate agricultural output remains extremely low relative to other developing regions of the world. This has been blamed on low crop yields and much lower use of external inputs than the rest of the world. Distribution of agro inputs such as fertilizer, seeds and agro chemicals are faced with fraudulent practices ranging from adulteration to diversion of products. Much money has been expended by relevant agencies at the state and federal levels on procurement of inputs to targeted farmers but has not yielded positive result [4]. The Federal Government took it as a responsibility to procure these inputs neglecting active participation of beneficiary farmers and private sectors such as agro inputs dealers and this has led to inconsistent subsidy regimes and thus grossly affecting distribution of these inputs. It is quit unfortunate that small scale

farmers that are responsible for the food production in the country has to compete with non farmers before they could have access to fertilizers and other farm inputs. In spite of the continued application of subsidy, total farm inputs such as fertilizer use are far below the potential and economic demand, [14, 24].

The need for a holistic transformation of the Nigerian State has necessitated a strategy that gives cognizance to Growth Enhancement Support Scheme (GESS). The criteria for farmer's participation include: farmers being above 18 years old; have participated in a survey authorized by the government to capture farmers personal detailed information; must own a cell phone with a registered SIM card and have at least sixty naira credit in the cell phone [11]. The fulfillment of these conditions guarantees the issuance of an e-wallet voucher to the farmer whereby an accredited farmer will receive agro inputs allocation through an e - wallet that hosts unique voucher members sent to his or her phone and goes to an accredited agro dealer to redeem his input. An e-wallet has thus been defined as an efficient and transparent electronic device system that makes use of vouchers for the purchase and distribution of agricultural inputs [1]. The e - wallet system is designed for smallholder farmers, who appear the most hit and vulnerable by the impropriety in the fertilizer and other input sector of the Agriculture Ministry. Prior to the introduction of e- wallet, the agricultural sector was shrouded with a lot of irregularities delay in supply of inputs getting to farers and late or no supply of fertilizers and at exorbitant prices [7]. The voucher is used to redeem fertilizers, seeds and other agricultural inputs from agro-dealers at half the cost. The introduction of e-wallet scheme in the distribution of agricultural inputs had eliminated diversion by 95 per cent in the states covered and had improved farmers' access to agricultural inputs such as fertiliser, seeds and herbicides [6]. At the same time, the projects focused on building the professionalism of rural agro-dealers and strengthening a country's private sector fertilizer supply and distribution channels [17]. [19] noted that agricultural input vouchers are increasingly being employed across developing countries to address problems of low agricultural productivity and food security by increasing the timely access to inputs[21]. However, the technicality of an innovation affects its effectiveness. A` well intended programme such as GESS will not meet its goals if the beneficiaries cannot cope with its operations to make it very efficient and effective. It is very unfortunate that despite the intervention by the government on effective farm input delivery, the effectiveness of the system is far below the economic and potential demand for the farmers which is dependent on timely distribution, affordability, availability, quality, cooperation and value addition of farm inputs. In view of this alternative system, it is not certain whether there has been any improvement in agro input distribution and delivery through voucher-based approach in the study area. Based on the stated facts, this study was undertaken to analyze effectiveness of e-wallet system of Growth Enhancement Scheme on arable crop farmers' production in Imo state, south eastern Nigeria.

The specific objectives of the study were to:

(i)describe socio-economic characteristics of the beneficiary crop farmers**;**

(ii)ascertain farmers perception on the effectiveness of e – wallet practices of the scheme**;**

(iii)identify the challenges faced by farmers on the scheme.

Hypothesis

Ho_1: Factors such as timely distribution, availability, affordability, quality, cooperation and value addition do not determine effectiveness of the e-wallet system among arable crop farmers in the study area.

MATERIALS AND METHODS

The study was conducted in Imo State which is located in the south-east Geo-political zone of Nigeria with its capital at Owerri. It is bounded south River State, to the east Anambra State, to the south-west Akwa Ibom State, to the west by Abia and Ebonyi State and to the north Benue State. It lies between the co-ordinates of latitudes 5º29'06" and

5^{0}48'05"N and longitudes 7^{O}02'06" and 7^{O}03'05"E of the equator.. It has equatorial climate which experiences rain and dry seasons yearly. The mean annual rainfall is between 2,000 mm and 3,500 mm. The Relative Humidity ranges from 80-90% with daily annual maximum and minimum temperature of between 31^{0}Cand 21^{0}C. Simple random sampling technique was adopted the selection of arable crop farmers. A list of farmers under the Growth Enhancement Support Scheme (GESS) in the state were obtained from Imo State Ministry of Agriculture, which is the ministry mandated to oversee and supervise the implementation of the scheme. From the list, simple random sampling technique was used to select one hundred and twenty (120) arable crop farmers randomly across the state that registered in the programme. Data from the study were analyzed using descriptive statistics such as frequency counts, percentages and mean score and Probit regression analysis. Specifically, objectives i, ii and iii, were achieved using descriptive statistics while the hypothesis was tested using Probit regression analysis. Objective ii: that ascertained farmers perception on the effectiveness of e – wallet system was captured using a 3 – point Likert type scale of very effective = 3, effective = 2 and not effective = 1. In realizing the midpoint decision rule, the Likert rating were summed up thus; 3+2+1 and was divided by 3 to give a mean score of 2.0. Any mean equal to or above 2.0 implied effective and otherwise not effective.

Model Specification

Probit regression model is explicitly stated thus;

$Y_i^* = B^1 x_i + E$

$Y_i^* = 0$ if $Y_i^* = 0$

$Y_i = 1$ if $Y_i^* = 0$

Where:

Yi* = an underlying latent variable that indexes effectiveness of the scheme

Yi = dummy variable indexing effectiveness of the scheme (effective =1, not effective= 0)

B^1 = a vector of estimated parameter

E = the error term

Xi = individual farmers variables considered in the study include;

X_1 = timely distribution (yes = 1, no = 0)

X_2 = availability (yes = 1, no = 0)

X_3 = affordability (yes = 1, no = 0)

X_4 = quality (unadulterated) (yes = 1, no = 0)

X_5 = cooperation (yes = 1, no = 0)

X_6 = value addition (yes = 1, no = 0)

Ei = error term

RESULTS AND DISCUSSIONS

The distribution of respondents according to socio-economic characteristics is shown in Table 1. The result shows that the mean age of the farmers was 49.8 years, 60.0% of the arable crop farmers were males while 64.17% were married. This implies that males were in their productive ages. This result is in line with the study of [8] which states that the population within the age group of 16 – 55 years constitutes the active workforce in Nigeria. The result indicates that 37.50% of the respondents attended secondary school and mean farming experience of 16.5 years. Level of literacy could have significant influence on their sourcing and access of agro inputs from the scheme. These findings agreed with [13] as they opined that education increases level of skill and foster access to information on improved agricultural practices. Number of years of scheme has shown to encourage farmers to make decisions on sourcing of farm inputs and appropriate technologies to employ in their farms [20]. The result also indicates that the respondents had mean household size of 9.5 persons with mean farm size of 1.1hectares. This indicates that the household size of respondents was relatively large implying that they would provide farm labour [23]. This establishes the fact that, Nigeria farmers are small scaled and such intervention as the e-wallet is necessary, as it can help improve the status of the farmers, guaranteeing timely access to fertilizer, seeds and other essential agricultural inputs. [2, 4] reported that small scale farmers cultivate between 0.8 and 1.3 hectares of land.

Table 1. Socio- economic Characteristics of Famers in Imo State, Nigeria (n = 120)

Variables	Indices
Females	60(%)
Age	49.8(years)
Married	64.17 (%)
Secondary Education	37.50 (%)
Farming Experience	16.5 (years)
Household Size	10 persons
Farm size	1.1(hectares)

Source: Field Survey, 2015

Farmers' Perception on Effectiveness of E-Wallet System Growth Enhancement Scheme

The results in Table 2 show the effectiveness of the farmer's perception on the e-wallet practices of Growth Enhancement Support Scheme (GESS) in the study area.

Table 2. Distribution of Respondents according Perception on Effectiveness E–Wallet System of the Scheme

Perception Statements	Very effective	Effective	Not effective	Total	Mean	Remarks
Notification through SMS	16(13.33)	104(86.67)	0(0.0)	256	2.1	Effective
Timeliness of Notification	92(76.67)	27(22.50)	1(0.83)	331	2.8	Effective
Responsiveness to GESS Staff to certify farmers notification	18(15.0)	92(76.67)	10(8.33)	248	2.1	Effective
Responsiveness to GESS Staff to disburse the inputs	80(66.67)	18(15.0)	22(18.33)	298	2.5	Effective
Adequacy of inputs in relation to farmers demand	7(5.83)	56(46.67)	57(47.50)	190	1.6	Not effective
Insurance of quality to cost effectiveness of the inputs	20(16.67)	97(80.83)	3(2.5)	257	2.1	Effective
Facilitating use of improved seeds	14(11.67)	27(22.50)	79(65.83)	175	1.5	Not effective
Facilitating use of inorganic fertilizer	8(6.67)	40(33.33)	72(60.0)	176	1.5	Not effective
Management of clients and inputs at redemption centres	19(15.83)	92(76.67)	9(7.5)	250	2.1	Effective
Grand Mean					18.9	Effective
Pooled Mean					2.0	

Source: *Field Survey, 2015*
2.0 and above is Effective, less than 2.0 = Not Effective

The result revealed that majority (76.67%) of the farmers claimed that the e – wallet system enhances timeliness of notification ($\bar{x}$=2.8), while 66.67% assert that the scheme increases responsiveness of it staff to disburse inputs ($\bar{x}$=2.5). Furthermore, majority 86.67% and 80.83% assert that the scheme is effective in notifying clients through SMS and ensures quality to cost effectiveness of inputs while 76.67% affirmed that the scheme increases responsiveness of GESS staff to certify farmer's notification of inputs and helps in the management of clients and inputs at the redemption centre with mean ratings of 2.1. The pooled mean perception score ($\bar{x}$=2.0) indicate that the farmers had perceived effectiveness of e – wallet system, since the mean score was equal to 2.0. This result is in line with the findings of [12] which assert that the use of mobile phones (e-wallet) enables farmers to access information from various sources such as research institutes, inputs dealers, government agencies, agricultural extension officers, veterinary doctors' traders and even consumers of their products. This finding also supports the studies conducted by [15] who indicated that mobile phone (e-wallet system) is not only adopted for social reasons, but is viewed by the farmer as a tool that will allow for more efficient and informed action to enhance greater productivity.

Determinants of E- Wallet System among Farmers in Imo State, Nigeria

The result in Table 3 shows the determinants of the effectiveness of e- wallet system in the study area. The chi-square value of 8.73 was highly significant at 1% level probability indicating the goodness of fit of the Probit regression line. The coefficient for availability was positively signed and highly significant at 1% level. This implies that any increase in availability of inputs will lead to a corresponding increase in probability of effectiveness of e–wallet system in the study area. The Agricultural Transformation Agenda (ATA) introduced in 2011 seeks to tackle the ineffectiveness in the distribution of key inputs making them more available and affordable [22]. The coefficient for quality was also positively signed and significant at 5% level, implying that any increase in quality will lead to a corresponding increase in probability of effectiveness of e – wallet system in the study area. This result corroborates with findings of [16], as they found farmers in rural areas of Northern Nigeria affirmed that inputs received from Growth Enhancement Support Scheme through e-wallet system were of high quality. The coefficient for cooperation was positively

signed and significant at 5% level of probability, indicating that any increase in membership of cooperative will lead to increase in the probability of effectiveness of e – wallet system. This implies that e-wallet system encourages and facilitates farmers to form groups and engage in training activities of the scheme. Membership of cooperatives in enhancing the distribution of inputs is very crucial because of the credibility among members within the group. This result is in consonance with findings of [10], which reported that cooperative participation plays important role in the utilization of agricultural technologies.

Table 3. Probit Regression Estimates of Determinants of the Effectiveness of E – Wallet System in the Study Area

Variables	Coefficient	Standard Error	T – Value
Constant (b_o)	1.3023	0.3996	2.83**
Timely distribution (X_1)	0.2888	0.3187	0.91
Availability (X_2)	0.4030	0.1631	3.02***
Affordability (X_3)	0.2586	0.2806	0.92
Quality (X_4)	0.6997	0.2507	2.79**
Cooperation (X_5)	0.5258	0.2864	2.84**
Value Addition (X_6)	0.0091	0.2562	0.04
Chi^2	8.73***		
Pseudo R^2	0.0763		
Log Likelihood	-52.805623		

Source: *STATA 4A Result*

Challenges Encountered by Farmers on E – Wallet System under Growth Enhancement Support Scheme

The result in Table 4 indicates that majority (74.17%) and 68.33% of the farmers claimed that location of the redemption centres hampered and bureaucratic bottlenecks respectively were major challenges encountered in the scheme. [5] found that distance to input redemption centres affect farmers' access to these inputs, especially fertilizer. Bureaucratic bottle necks (68.33%), limited access and inadequate supply were stated among the constraints to effective distribution and procurement of farm inputs especially fertilizer in Nigeria [18]. Also, most (66.67%) and 62.50% assert network problems and late arrival of farm inputs respectively posed a problem. The network problems encountered by the farmers might result from the restricted source of information being utilized by them – the interpersonal communication. Poor telephony network is a major challenge of most of the telephone subscribers in Nigeria. The coverage of some of the networks are restricted to particular areas hence most farms might have limited network coverage. Insufficient fertilizer challenges actually occur as a result of failure on the part of agro dealers to order and supply fertilizer from the manufacturing company. This is contrary to the view of [18] that the promotion of a dual fertilizer market (subsidized and free-market) has prevented the required response from the private sector in taking over the role played by the public sector.

Table 4. Distribution of respondents' responses based on the Challenges of E-wallet System under Growth Enhancement Support Scheme

Challenges	Frequency	Percentage*
Bureaucratic bottlenecks attached in receiving farm inputs	82	68.33
Inadequacy of farm inputs	14	11.67
Selective availability of farm inputs	21	17.50
Distance to redemption centre	89	74.17
Network problems	80	66.67
Untimely supply of inputs	10	8.33
Late delivery of inputs	75	62.50
Insufficient fertilizer	12	10.00
Insufficient seed supply	6	5.00
Quality of farm input supplied	4	3.33

Source: *Field Survey, 2015*
*Multiple Responses Recorded

CONCLUSIONS

The study has shown that the respondents had positive perception on the effectiveness of electronic wallet system of Growth Enhancement Scheme (GESS) in the study area. The study also revealed that effectiveness of e – wallet system is influenced by practices such as availability, quality and cooperation. Location of the redemption centres, bureaucratic bottlenecks, network problems and inadequate farm inputs were major challenges facing the scheme. The study recommends;

-Cooperative formation among farmers to enhance access to farm inputs.

-Redemption centres of this scheme should be closer to farmers for easy access to inputs and procurement.

-Good telecommunication network coverage should be improved upon in order to ensure effective communication between the scheme and its beneficiaries. This will help the

farmers get information at the right time, since farming is time bound.

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PRODUCTIVITY DIFFERENTIALS ALONG GENDER LINES OF COCOA FARMERS IN ABIA STATE, NIGERIA

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Abstract

This study examined productivity differentials along gender lines of cocoa farmers in Abia state, Nigeria in 2015. Multi-stage random sampling technique was used to elicit data from 120 cocoa farmers, whom consist of 60 males and 60 females. Data were collected using a well structured questionnaire and interview schedule administered on the respondent. Data were analyzed using profitability analysis and semi-log regression function. For the male farmers, the coefficients for education, farm size, fertilizer, input and planting materials were positively related to productivity and significant at 5% level of probability while capital inputs was significant at 1%. For the female farmers, the coefficient for age was negatively related to productivity and significant at 1%, while education, farm size, capital input and fertilizer inputs were positive; both were significant at 1.0% and labour was significant at 5% level of probability. From the profitability analysis, the female cocoa farmers were more profitable with the profit of N1412432 than their male counterparts with the profit of N1373643. The results call for policies aimed at land re-forms by making more lands and easy accessibility to credit available to women who are more efficient for increased productivity and profitability.

Key words**:** *cocoa, gender, productivity, profitability*

INTRODUCTION

The issue of gender analysis has been a subject of raging global debate over the years. Essentially, it focuses on the relations between men's and women's realities resulting from both sex (biological differences) and gender (social differences). The word gender means more than sex. Aina [1] viewed the issue of gender as a process by which individuals are born into biological categories of female and male. This could become the social categories of women and men through the acquisition of locally defined attributes of femininity and masculinity. Most developing countries like Nigeria are still hinged on cultures which limit women's participation in agriculture and access to land, loans, improved seedlings, etc. According to Ajani [2] women are responsible for over half of the world's food production and they provide 60-80% of agricultural labour. More so, they are the main producers of the world's staple crops. This shows how important women are in developing countries' agriculture.

Cocoa is one of the major foreign exchange earners for some African countries, such as, Nigeria, Cote d'Ivoire, Ghana, and Cameroon. About 70% of the world supply of cocoa originates from Africa. Reports from the cocoa association of Nigeria [4] showed that, Cote d'Ivoire is the world's leading cocoa producing countries with 1,650,000 tonnes, followed by Ghana with 800,000 tonnes. Indonesia in third with 520,000 tonnes and Nigeria occupying the fourth position with 280,000 tonnes. Cocoa farming presents one of the best investment opportunities in agribusiness. The cocoa plant is a small, evergreen tree that grows exclusively in the deep tropical regions of the world. A cocoa tree usually matures and begins to bear fruit (pods) when it is about four or five years old. On the average, a single cocoa tree produces between 20 and 30 pods at a time. Each pod contains about 20 to 50 seeds, known as cocoa beans. These beans are the goldmine of the cocoa plant because they are processed into cocoa liquor, cocoa butter, cocoa powder and

chocolate.

Under male dominated social structures and political systems, women do not derive equal access to land, technology, education and resources. This has also made the measurement of gender disparities in agricultural productivity to be complicated. According to Dayo [5], agricultural productivity estimates for Nigeria showed a decline in productivity growth from 1960s to the 1980s. Nigeria has witnessed strong growth in the past few years, averaging 8.8% real annual GDP growth from 2000 to 2007[5]. Because of the domestic roles of women and lack of freedom to participate in farm activities in some communities, there is the tendency to undervalue labour productivity in Nigeria [5].

Lack of separate data on actual gender responsibility and productivity in agricultural production is a big challenge to meaningful agricultural and development planning in most developing countries. The records in agricultural extension usually work with the whole farm families since every member of the family is engaged in one way or the other in food production activities without necessarily comparing the contributions of each member. There is therefore need to identify the areas of gender involvement and the role of each member of the farm family in order to plan holistic agricultural programme that will address the problem of gender differential in agricultural productivity. Hence, the need to articulate this study became imperative.

Therefore, this study is aimed at analyzing productivity differentials along Gender lines among cocoa Farmers in Abia State. Specific objectives include examine the cost and return of male and female cocoa farmers in the study area and factors influencing the productivity of male and female cocoa farmers.

MATERIALS AND METHODS

This work was carried out in Abia State, Nigeria. Abia state was created in 1991 having been carved out from the old Imo State. The citizens are predominantly Igbos. Abia state is located in the south eastern region of Nigeria. The state is approximately within latitudes 4° 41' and 6°14' north of the equator and longitudes 7°, 10' and 8'° east of the Greenwich meridian. It has seventeen Local Government Areas that are divided along three agricultural zones namely Ohafia, Umuahia, and Aba [1, 6].

Primary data was used for the study. Multi-stage sampling technique was used in the selection of the respondents. In the first stage, five local government areas were randomly selected. In the second stage, one autonomous community was randomly selected from the five local government areas. In the third stage, two villages were randomly selected from each of the communities giving a total of 10 villages. In the third stage, 12 cocoa farmers (6 males and 6 females) were purposively selected from each community given a total of 120 cocoa farmers in detailed study.

Data analysis

The cost and returns was analyzed using profitability analysis

$$\pi = TR - TC$$

Where

π =Profit

TR = Total revenue

TC = Total Cost

TR = PQ

P = price per unit of output

Q = Quantity of output

TC = TVC + TFC

Where

TVC = Total Variable Cost

TFC = Total Fixed Cost

Factors influencing productivity was analyzed using the log-linear model derived from semi-log functional form was the econometric model specified for explaining productivity following Ukoha [8] and Okoye et al., [7]in cocoa production.

$Y = (X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8)$ ……3.1

where:

Y – Productivity of male and female cocoa farmers (output/labour use in man-day)

X_1 – Farmers level of education

X_2 – Age in years

X_3 – Household size

X_4 – Farm size in hectares

X_5 – Capital input in Naira
X_6 – Planting materials in bundles
X_7 – Fertilizer input in kg
X_8 – labour in mandays

RESULTS AND DISCUSSIONS

The total fixed cost of the male farmers was N 470,627 and the total fixed cost of the female farmers was N 468,398, the total variable cost of the farmers were N 3,473,010 and N 3,431,360 for male and female cocoa farmers respectively which gave rise to the total cost of the both group of farmers as N 3,943,637 for the male and N 3,899,488 for the female farmers. (Table 1)

Table 1. Profitability analysis of male and female cocoa farmers (N)

	Male	Female
FIXED COST		
Land	313,500	316,250
Capital consumption allowance	157,127	151,878
Total Fixed Cost	470,627	468,398
VARIABLE COST		
Labour	2,113,100	2,279,050
Fertilizer	219,410	310,310
Cocoa seedlings	1,140,500	842,000
Total Variable Cost	3,473,010	3,431,360
Total Cost	3943637	3,899,488
Revenue	5,317,280	5,311,920
Profit	1,373,643	1,412,432
GM	TR-TVC = GM	

The revenue realized from the cocoa production were N 5,317,280 and N 5,311,920 for both male and female farmers respectively while the profit of both group of farmers as N 1,373,643 and 1,414,232 respectively. This result implies that the female farmer spent lesser than the male farmers and yet had higher profit than the male farmers and so has the higher profitability in cocoa production in the study area.

The regression estimates of the factors influencing productivity of the male and female cocoa farmers is presented in table 2 and table 3 respectively.

Table 2. Factors influencing productivity of the male cocoa farmers

VARIABLES	SEMI LOG$^+$
INTERCEPT	-83066.17 (-2.28)***
EDUCATION	822.185 (2.21)**
AGE	1117.941 (0.15)
HOUSEHOLD SIZE	1818.952 (0.73)
FARM SIZE	19473.18 (2.00)**
CAPITAL INPUT	19473.08 (5.14)***
FERTILIZER INPUT	3005.85 (2.07)**
PLANTING MATERIAL	11648.54 (2.07)**
LABOUR	-2411.364 (-0.62)
R^2 R^{-2} F- RATIO	0.8969 0.8746 40.25***

Source: Survey data, 2015
*** = significant at 1 percent
** = significant at 5percent
* = significant at 10 percent
+ = lead equation
(.) t= ratio

The semi-log functional form was chosen as the lead equation for both groups of farmers. The choice of the lead equation was based on the magnitude of the coefficient of determination (R^2), the number of significant variables and the conformity of the signs borne by the coefficient variables to a priori expectation. The coefficient of determination was 0.8969 and 0.9036 for the male and female cocoa farmers respectively. These imply that 89.69% and 90.36% of the variation in productivity of the male and female cocoa farmers respectively were explained by the variables included in the model. The f-ratios were significant at 1% indicating the goodness of fit of the model.

The significant variables influencing the productivity of the male cocoa farmers were years of education, farm size, capital inputs, fertilizer and planting materials.

Table 3. Factors influencing productivity of the female cocoa farmers

VARIABLES	SEMI LOG+
INTERCEPT	6.10149 (6.12)***
EDUCATION	10896.37 (3.36)***
AGE	-91.263 (-2.83)***
HOUSEHOLD SIZE	-905.634 (-0.42)
FARM SIZE	46218.99 (3.08)***
CAPITAL INPUT	11702.76 (4.24)***
FERTILIZER INPUT	3996.006 (2.51)**
PLANTING MATERIAL	-5801.338 (-0.61)
LABOUR	33.294 (2.39)**
R^2 R^{-2} F- RATIO	0.9036 0.8838 45.70***

Source: Survey data, 2015
*** = significant at 1 percent
** = significant at 5percent
* = significant at 10 percent
+ = lead equation
(.) t= ratio

On the other hand, the significant factors influencing the productivity of the female cocoa farmers were years of education, age of the farmer, farm size, capital inputs, fertilizer and labour.

The coefficient of education is significant at 1% level of probability and positively related to productivity of the male and female cocoa farmers respectively, these imply that the higher the educational attainment of the farmer, the higher his productivity. This conforms to a priori expectation. Education increases the ability of one to understand, evaluate and adopt innovations/improved farming practices which would lead to increase in productivity.

The coefficient of the age is significant at 1% and negatively related to the productivity of the female cocoa farmers while it is insignificant for the male cocoa farmers. This is because as the farmer grows older, he becomes less energetic and his ability to cope with the labourous nature and daily demands of farm work declines.

The coefficient of the farm size of the cocoa farmers was significant at 5% and positively related to the productivity of the male farmers while it is significant at 1% and also positively related to the productivity of the female cocoa farmers. The result implies that the productivity of both male and female farmers increases with the increase in farm size of the farmers. This is because, the farmers may be enjoying economics of scale `and also making use of mechanization to be able to take care of large farm size and also maintain it.

The coefficient of capital inputs of the cocoa farmer is significant at 1% and positively related to the productivity of both male and female cocoa farmers. The result implies that the productivity of both male and female cocoa farmers increases with increase in capital inputs, the farmer can be able to increase his farm size, purchase more planting materials, fertilizers, herbicides and insecticides to improve and maintain his farmland for higher productivity.

The coefficient of fertilizer input of the cocoa farmer is significant at 5% and positively related to the productivity of male farmers and also significant at 1% and positively related to the productivity of the female farmers. The result implies that the higher the fertilizer input of the farmers, the higher the productivity. Proper applications of fertilizer in a farmland increase the nutrient capacity of that farmland and thereby increasing the level of productivity of the farmers.

The coefficient of planting materials is significant at 5% and positively related to the productivity of the male farmers, while it is insignificant for the female farmers. The result implies that productivity of the male farmers increases with increase in planting materials. This is because with the increase in planting materials, the farmer will be able to cultivate more farmlands in other to be able to exhaust the planting materials he has and that leads to increase in the productivity of that farmer.

The coefficient of labour is significant at 5% and positively related to the productivity of the female farmers while it is insignificant for the male farmers. These imply that

productivity increases with the increase in labour of the female farmers.

CONCLUSIONS

The study showed that women are more productive than their men counterpart in cocoa production in the study area. Recent studies show that women are becoming increasingly significant in production also. Men still play central roles in land preparation and ploughing but women provide the bulk of the labour for weeding, harvesting, transporting and processing. Women play an integral part in agricultural production in developing countries and based on the findings of the study the following recommendation were made. Female farmers should be encouraged by eliminating any barrier that could engender inequalities in their access to productive resources of the farm. Agricultural inputs, improved seed varieties should be made available to small-holder cocoa farmers to improve production and provision of easily accessible credit to farmers to increased production should be encouraged.

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STUDIES ON CROP BEHAVIOUR AND PRODUCTIONS OBTAINED IN SUMMER CROP FOR WHITE CABBAGE HYBRIDS

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Abstract

Since cabbage is a product frequently used in feeding the population, we tried that through the research made to find hybrids that correspond regarding the yields obtained but also from qualitative point of view, according to the market requirements. The purpose was to analyze the behaviour of some hybrids recommended by different producers in terms of climate and soil conditions found in Dâmboviţa county and in climatic conditions of 2014, following the results we can make recommendations that can be put into practice and that can satisfy the producers both from the point of view of the production potential and from the point of view of inputs needed for its maximization. The behaviour of five hybrids was studied, suitable for field crop: Cheers, Taurus, NIZ 17-1197, NIZ 17-1043, Mighty Boy. Very significant increases compared to the control were achieved by NIZ hybrids range. Unsalable leaf production reached the highest value in Taurus hybrid, 408.8 g, with the average production over 85.52 g and 93.8 g, over control production, these values mean increases of over 25%. From the economic point of view, the crop is a profitable one, the expense is lower than the revenue. Therefore, after analyzing the behavior of the hybrids used in experience on the existing soil in Dambovița county region, we can say that all studied hybrids showed good results. The highest productions and the highest production increases, for summer crop, were obtained by Taurus NIZ 17-1197 and 17-1043 NIZ hybrids.

Key words**:** *hybrids, production potential, white cabbage*

INTRODUCTION

White cabbage is a crop White cabbage is an important crop in the global vegetable economy. White cabbage (*Brassica oleracea* L., Alef. var. *capitata* f. *alba* D.C. *Brassicaceae* family) is one of the most important species in the assortment of the vegetable plants in our country, as it is demonstrated by the large grown area that represents about 20-27% of the total surface cultivated with vegetables [5].

White cabbage is grown for bulbs that are widely used in the culinary art, being used raw or pickled, with or without meat, dehydrated or frozen in different ways, in an assortment of dishes much appreciated by the consumers [6]. It also constitutes an important raw material in food can industry and especially in fortified juice, usually mixed with carrot juice [8]. Is a little perishable product during transport, temporary storage and use [2]. With a high resistance to low temperatures, its fresh consume r can be more prolonged in winter (4-5 months) by cold store (cold storage) or in the field (in improvised shelters) in quantities necessary for consume, from November to March [3].

Also, the harvest is done over a long period of the year, ensuring income from spring to autumn [1]. Similar to the trends existing in the world, the diversification of the new assortment of grown vegetables grown will occur in our country too [5].

The main purpose of the greengrocers is to obtain quality crops [4]. In order to ensure high yields of cabbage it is needed to study and improve the agricultural technology adapted to the specific climate conditions [7].

MATERIALS AND METHODS

The purpose of the analysis of five hybrids of summer cabbage was to monitor their

behavior in certain climatic conditions and to make a comparative analysis of the productions obtained in order to evaluate and then to recommend the best option in terms of capacity production and quality. It was also studied the influence of the technological links such as density and fertilization on stimulating the production yield for each of the five hybrids studied.

Testing and analyzing the behavior of the hybrids was carried out during year 2014.

In order to establish experimental crops, a varied assortment of cabbage hybrids were analyzed of different origin, as following: CHEERS F1 producer Takii (Japan); MIGHTY BOY F1 producer Mikado Kyowa (Japan);); TAURUS F1, NIZ 17-1197 F1, NIZ 17-1043 F1 producer Nickerson-Zwaan (Holland).

Cheers F1 is a hybrid of white cabbage, it is easy to grow with strong tolerance to temperature variations, and resistant to Fuzarium. Well resistant to stress conditions and it is tolerant to high temperatures. It reaches maturity after 75-80 days and it weighs 2.5-3.5 kg. The bulb shape is round.

Taurus F1 (NIZ 17-1167 F1) is a very tolerant hybrid to pests and diseases, vigorous, large size, very good for the filed crop, very good quality. It reaches maturity 100 days after planting, it produces round bulbs, 2.5-3.5 even 6.0 kg weight, blue-green color. It is very good for fresh consumption and processing. The recommended density, 25,000-35,000 pl/ha. Very resistant to Xanthomonas and Fusarium. It tastes sweet, appreciated for fresh consumption, the bulb is well protected to the transport of external leaves. It is a hybrid that adapts in different geographical areas and it is highly appreciated by growers.

NiZ 17-1197 F1 is a hybrid of white cabbage, tolerant to Fusarium and resistant to diseases. It reaches maturity in 80-90 days after planting.

NIZ 17-1043 F1 is a hybrid of white cabbage that reaches maturity at 90 days after planting. The bulbs reach a weight of 1.5-2.5 kg. It is a hybrid recommended for fresh consumption starting with March until July.

Mighty boy F1. It is an early hybrid with vegetation period of 50-55 days after planting and fruit weight of 1.3-1.6 kg. The fruit is compact, uniform, resistant to cracking, light green and round shape. The plant is adapted to difficult climatic conditions.

Recommended for crops in greenhouses or in the field.

Climatic conditions in which the research was made.

Soil. Crevedia area is characterized by typical reddish-brown soils, clay, false gleize, softness, luvic.

Climate. The average annual precipitation recorded is 547 mm. The rainfall recorded in the year of experience were 499.5 mm which shows a deficit of rainfall compared to the average annual rainfall of 47.5 mm.

The ground was prepared since autumn, by executing the shredding of vegetal remains resulting from the previous crop, work done with a disc harrow.

The basic fertilization was carried out with manure in an amount of 30 t/ha while applying doses of 250 kg/ha of superphosphate and 150 kg/ha potassium salt. All were incorporated under plow. In spring fertilizers with nitrogen were applied, herbicide work was done with Dual Gold product in dose of 1.2 l/ha, incorporated into the soil. The land was crushed and leveled. For making determinations, 5 plants were taken for analysis, randomly of each studied hybrid, making then their average. As a control, in order to compare the results, Cheers F1 hybrid was selected. Like previous plant was green onion. Seedling production was made in warm seedbeds. The seeding was made on 20th March, no more transplanters, the amount of seed used was about 400 g/ha.

Planting in the field was done on 27th April. The seedling was not hardened but it was left open, as temperatures allowed this.

As a planting scheme, it was planted at 60 cm between rows and 40 cm between plants in the row, resulting a density of 42,000 pl/ha.

RESULTS AND DISCUSSIONS

For the calculation, evaluation and analysis of the productions obtained, plants harvested from a surface of 1000 m^2 were weighted and

then transformed into production on hectare (Table 1.).

Table 1. Influence of hybrids on total obtained yield

CRT.NO.	HYBRID	YIELD T/HA	DIFFERENCE COMPARED TO AVERAGE T/HA	%	DIFFERENCE COMPARED TO CONTROL	%
1	TAURUS F1	53.2	10.2	+23.7	+11.5***	+27.6
2	CHEERS F1 MT	41.7	-1.3	-3.0	MT	MT
3	MIGHTY BOY F1	34.1	-8.9	-20.7	-7.6000	-18.2
4	NIZ 17-1197 F1	43.8	0.8	+1.9	+2.1*	+5.0
5	NIZ 17-1043 F1	42.5	-0.5	-1.2	+0,8	+1.9
	AVERAGE	43.0	MT	MT		

Dl 5%=1.98 t/ha Dl 1%=2.89 t/ha Dl 0.1%=4.33 t/ha

From the data resulted from Table 1 we can notice the productive superiority of Taurus hybrid, 53.2 t/ha compared to the productions achieved by the other hybrids (lowest 34.1 t / ha), which is a very significant production increase. Harvesting growth recorded in Taurus hybrid compared to the average of hybrids production, 43.0 t/ha was 10.2 t/ha, which is an addition of 23.7% and 11.5 t/ha as compared to the control, namely an additional of 27.6%. The lowest production was recorded in hybrid Mighty Boy, 34.1 t/ha so a minus crop of about 20%, a very significant negative growth. The other hybrids in the study were recorded with values close to the harvest, over 40 t/ha. NIZ hybrid 17-1197 was scored with a significant production increase, 2.1 t/ha and hybrid NIZ 17-1043 recorded insignificant increases of crop compared to control (Figure 1.)

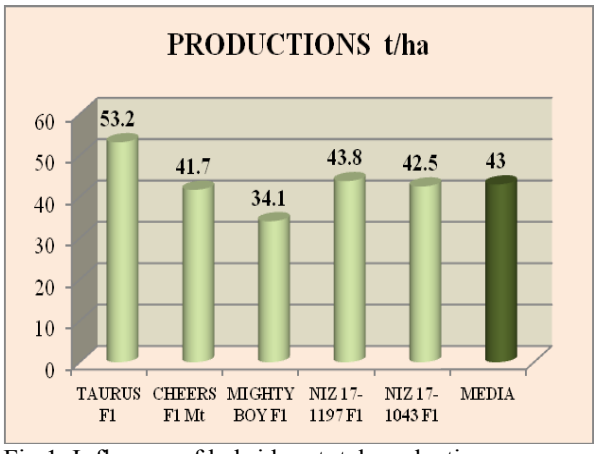

Fig.1. Influence of hybrid on total production

Among the hybrids grown for summer crop, F1 Taurus hybrid had the highest value of the plant weight, 2,436.0 g. In terms of the participation share in the formation of total production, of the bulb, the highest value was recorded in NIZ hybrid 17-1043, 84%, and the lowest in F1 Cheers hybrid, 75.9%.

Table 2. Influence of hybrid on participation share of the production components to its formation

CRT NO.	HYBRID	G. PLANT G	G. BULB. G	%	G. ROOT. G	%	G. STEM G	%	G.UNSALABLE LEAVES G	%
1	TAURUS F1	2,436.0	1,901.0	78.0	71.4	2.9	54.8	2.3	408.8	16.8
2	CHEERS F1 MT	1,553.0	1,179.2	75.9	38.4	2.5	20.4	1.3	315.0	20.3
3	MIGHTY BOY	1,802.8	1,398.4	77.6	32.4	1.7	48.2	2.7	323.8	18.0
4	NIZ 17-1197 F1	2,158.8	1,736.0	80.4	36.2	1.7	68.0	3.1	318.6	14.8
5	NIZ 17-1043 F1	1,975.6	1,658.6	84.0	23.4	1.1	43.4	2.2	250.2	12.7
	AVERAGE	1,985.24	1,574.64		40.36		46.96		323.28	

The participation share of the roots recorded a maximum in Taurus hybrid, 2.9% and a minimum in hybrid NIZ 17-1043, 1.1%. At the stem the lowest percentage was that of Cheers hybrid, 1.3% and in terms of the percentage of unsalable leaves, the lowest value was recorded in hybrid NIZ 17-1043, 12.7%. Looking at things in terms of participation share increase of the bulbs and reducing the participation share of the other components, the low values recorded at the root, stem and unsalable leaves are positive aspects (Table 2.)

According to the data written in Table 3, Mighty Boy hybrid recorded a distinct significant plus of production compared to the control, 219.2 g, lower than the other hybrids studied, which achieved very significant production increases.
The lowest value being achieved in Mighty Boy hybrid and the highest one in Taurus hybrid (Figure 2).
Compared with the control, all grown hybrids recorded production increases, ranging between 18.6 to 61.2% of their value. The lowest value being achieved in Mighty Boy hybrid and the highest one in Taurus hybrid.

Table 3.Influence of hybrid on salable production (bulb weight)

NR. CRT.	HYBRID	BULB WEIGHT. G	DIFFERENCE COMPARED TO AVERAGE-G	%	DIFFERENCE COMPARED TO CONTROL-G	%
1	TAURUS F1	1,901.0	+326.4	+20.7	+721.8^{XXX}	+61.2
2	CHEERS F1 MT	1,179.2	-395.44	-25.1	MT	MT
3	MIGHTY BOY F1	1,398.4	-176.24	-11.2	+219.2^{XX}	+18.6
4	NIZ 17-1197 F1	1,736.0	161.36	+10.2	+556.8^{XXX}	+47.2
5	NIZ 17-1043 F1	1,658.6	83.96	+5.3	+479.4^{XXX}	+40.6
	AVERAGE	1,574.64				

Dl 5%=112.705 g; Dl 1%= 163.934 g; Dl 0.1%= 245.902 g

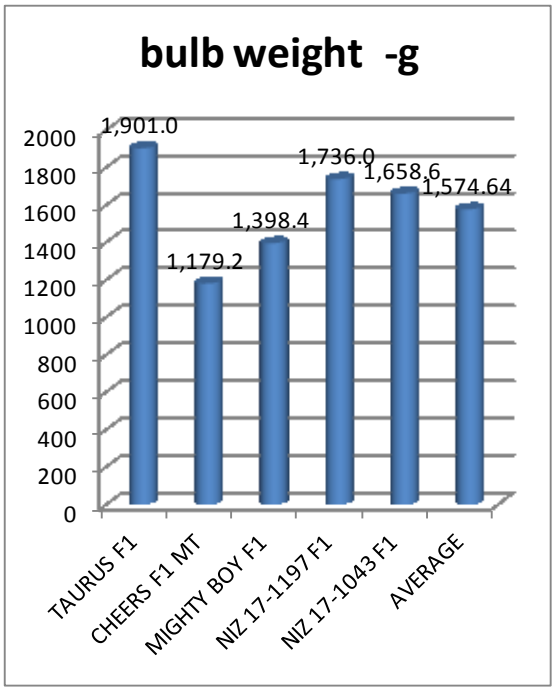

Fig. 2. Influence of hybrid on bulb weight

CONCLUSIONS

Among the hybrids used for establishing summer cabbage crop, the most productive hybrid proved to be Taurus hybrid with 53.2 t/ha, with an extra harvest compared to average of 10.2 t/ha and compared to the control of 11.5 t/ha, which means an increase of 27.6%. The lowest production was obtained in Mighty Boy hybrid, 34.1 t/ha and a minus compared to the control, of 7.6 t/ha (18.2%). Cheers hybrids,, NIZ 17-1043 and 17-1197 NIZ had relatively similar productions, all over 40 t/ha.
When making the production, all hybrids in the study had a participation share of the bulb of more than 75%, the highest level in hybrid NIZ 17-1043, 84%. The weight of the roots ranged from 1.1% to 2.9% hybrid NIZ 17-1043 and Taurus hybrid. The weight of the unsalable leaves reached a maximum in Cheers hybrid, 20.3% and a minimum in hybrid NIZ 17-1043, 12.7%. It can be concluded that hybrid NIZ 17-1043 has a balanced weight of the elements, the highest, as it is wanted, being the bulb.
The highest salable production was achieved by Taurus hybrid, 1901 g, which means an extra weight compared to the average of 326.4 g (20.7%) and 61.2% above control. The lowest production was recorded in Cheers hybrid, 1179.2 g, namely 25.1% less than the average. Very significant increases compared to the control were achieved by NIZ hybrids range.
Unsalable leaf production reached the highest value in Taurus hybrid, 408.8 g, with the average production over 85.52 g and 93.8 g, over control production, these values mean increases of over 25%. The lowest value was recorded in hybrid NIZ 17-1043, 250.2 g, with over 20% less than the average values

and control. Productions located around 300 g obtained the other hybrids, Cheers, Mighty Boy and NIZ 17-1197.

The percentage of participation of bulbs in the formation of the crop increased to hybrids in summer crops, which means higher production.

The most productive hybrid in summer crop in the climatic conditions of the area in 2014 was Taurus, 53.2 t/ha.

From the point of view of the balance of the participation share of the plant components in the formation of the production, the highest ranked was NIZ 17-1043 and 17-1197 NIZ.

From the point of view of tamping degree, all studied hybrids were included in extra class.

From the economic point of view, the crop is a profitable one, the expense is lower than the revenue.

Therefore, after analyzing the behavior of the hybrids used in experience on the existing soil in Dâmboviţa county region, we can say that all studied hybrids showed good results. The highest productions and the highest production increases, for summer crop, were obtained by Taurus NIZ 17-1197 and 17-1043 NIZ hybrids.

The most recommended hybrids in terms of the lowest unsalable production, therefore lower losses, are hybrids NIZ and Taurus, for summer crop.

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GENDER FACTORS IN PRODUCTION OF AFRICAN EGGPLANT (*Solanum gilo*) IN ABIA STATE NIGERIA: IMPLICATION FOR EXTENSION EDUCATION

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Abstract

This study on gender factors in the production of African eggplant (Solanum gilo) was conducted in Abia State, Nigeria. Multi-stage random sampling technique was used to select 120 farmers (60 male and 60 female African eggplant farmers) on who structured questionnaire was administered in two of the three agricultural zones of the State. Data were presented and discussed using both descriptive and inferential statistical approaches in percentages, frequencies, tables and t-test analyses. The result showed that relatively more males (58.3%) than females (50%) had contact with and reported to extension agents by GSM calls/phone calls, more males (86.67%) than females (59%) had larger farmland, and received more production instructions on practices in form of advice from the extension agents. The study further revealed that extension agents procured and gave more production inputs (credit/grant, agrochemical and others) to male farmers than to the female farmers. Thus the mean output (10739.03tons/ha) of male African eggplant farmers appeared greater than that of the females (8300tons/ha) but there was no significant difference in output by the sexes. Availability of improved electricity supply and extension education was needful in the communities. It was recommended that extension agent's capacity building and land reform policies should be sensitive on gender lines in the study area.

Key words: *African eggplant, extension education, gender, production*

INTRODUCTION

The need for increased food production within a rapidly growing population in Sub-Saharan African countries has been of great concern to the national leaders and scientists. Perhaps, this is because very significant as most of the countries of the Sub-Saharan Africa are constantly threatened by to desertification and prolonged periods of drought (Onunka *et al*, 2008) [12], coupled with protracted socio-economic and political upheavals (Ochu, 2007) [7]. There is no gain-saying the fact that, presently millions of Nigerian households are low income earners and peasant farmers who suffer from hunger, poverty and acute food insecurity.

Nigeria's food problem obviously requires drastic agricultural transformation stimulate investments for the future. This will gear towards increased and sustainable food production through gender mainstreaming. Gender studies define the technologies meant for male and female farmers. It also examines and conceptualizes farming activities in terms of men and women with regard to responsibilities which determine labour allocation for increased yields (Onunka and Onunka, 2008) [12]. Increased food production and poverty eradication can be gotten not only through the farming of crops such as vegetables (African eggplant) but also the extent to which agricultural extension education is made gender sensitive and the way forward.

Vegetable production in Nigeria constituted about 4.64% of the total staple food production between 1970 and 2003 (CBN, 2004). Vegetable that have such potentials and commonly produce include African

eggplant, which is consumed raw as snacks and recommended to patients with bad sight, high blood pressure, stomach disorder and over weight (FAO, 1990) [4]. It is also a delicacy used to entertain visitors a long side with *Cola accumilata* (Kola) in the homes and at ceremonies in Igboland of south eastern Nigeria (Okafor, 1993) [8].

Gender in the context is not mere biological or sex difference (man and woman) but word used to describe the roles, activities contributions, responsibilities, needs and problems of males and females in relation to their importance in agricultural production processes (Onunka, 2011) [11]. It is therefore expedient to understand the contributions or role of extension services to male and female African eggplants farmers for an increase food production and improved income, thereby reducing poverty. This is necessary as Okoye *et al,* (2009) [9] noted that farm household out comes have yielded evidence of inefficient allocation of resources along gender lines, and to the detriment of women. This situation according to Balakrishan (2004) [1] has been attributed to gender insensitivity of technology development and transfer systems. Ewuziem *et al* (2010) [3] showed that women in Sub-Saharan African, including Nigeria, are responsible for the production of 70% of total food supply, yet they least benefit from agricultural extension education and technologies that would improve their production. The specific objectives of the study were to:

(i)examine agricultural extension contact by the male and female African eggplant farmers in the study area;

(ii)estimate the respondent's farm size by gender and extension advice;

(iii)examine the extension contact to male and female respondents to production practices;

(iv)determine differences in the mean output of African eggplant farmers by gender.

Agricultural extension education is carried out by the extension agents who are technically trained (change agents) and link the farmers with scientific findings by dissemination of useful and practical information relating to agriculture and home economics. Onunka (2005) [10] indicated that the use of new and improved technologies in agriculture was correlated with access to extension agents. It is therefore necessary to find out how this (extension education) affected male and female African eggplant farmers in the production of this crop and to propose ways of improving the situation in the study area.

MATERIALS AND METHODS

The study was conducted in Abia State of Nigeria. Two zones were purposively selected because they produce large quantities of African eggplant (Onunka, 2011) [11]. These zones were Abia South and Abia Central. It occupies about 2/3 (two thirds) of the total land area (5,084.8 sq km) of the State, lie within the humid tropical rainforest zone and majority of people are small scale farmers who use traditional method of farming. One extension block was randomly selected from each zone and six (6) circles from each block. Twenty African eggplant farmers (10 males and 10 females) were randomly selected from each of the circles to give a total of 120 farmers (60 males, 60 females). They were interviewed with two (2) sets of structured questionnaires and necessary information were elucidated. Data obtained were analyzed using descriptive statistics and t-test.

The t-test is given by

$$\text{t-cal.} = \frac{X_1 - X_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

at n1 + n2 -2 degrees of freedom

Where: X_1 = mean output of the male African eggplant farmers

X_2 = mean output of the female African eggplant farmers

S_1^2 = variable of the output of the males

S_2^2 = variable of the output of the females

n_1 = number of the male African eggplant farmers

n_2 = number of the female African eggplant farmers

df = degrees of freedom

Decision rule: Reject the null hypothesis if the t-cal > t-tab, implying a significant difference between the mean output of the male and female African eggplant farmers.

RESULTS AND DISCUSSIONS

Table 1 showed that a good proportion of African eggplant male farmers (58.3%) than the females (50%) had contact with extension agents by GSM and more male farmers (63.4%) than the females (41.7%) had feedback contact with the extension agents. This result agrees with a prior expectation and the findings of Onunka (2005 and 2011) [10, 11] that majority (68.8%) of sweet potato farmers had contact with the extension personnel in Abia State. This implied that more female African eggplants farmers than males got information from extension agent through GSM calls/phone calls and more males than females also reported or feedback to extension agents on GSM calls/phone. The result also agreed with the findings of Ironkwe and Asumugha (2007) [5] who reported that majority (78% of the male and 82% of the female) of the cassava farmers had contact with agents and sent their feedback by face to face in Enugu State.

Table 1. Distribution of Respondents by Gender and ways of Extension Contact and feedback

Ways of contact and feedback	Extension Contact		Extension Feedback	
	Males *Freq.	Females *Freq.	Males *Freq.	Females *Freq.
Radio/TV	0	0	0	0
GSM calls/phone calls	35 (58.3)	30 (50.0)	38 (63.4)	25 (41.7)
Visits (face to face)	20 (33.3)	4 (45.0)	20 (4.7)	12 (20.0)
Others (other farmers, Friends use of letters)	05 (8.3)	03 (5.0)	05 (8.3)	10 (16.6)
Total	60 (100.0)	60 (100.0)	60 (100.0)	60 (100.0)

Source: Field Survey, 2014. Note: *figures in brackets are percentages.

Table 2 revealed that a greater percentage (58.33%) of the males and 65.66% of the females of African eggplant farmers had farm size of less than 1.20 hectares while smaller proportion (41.67% and 34.34%) respectively had farm size of less than 1.20 hectares. The result also showed that more males (86.67%) than females (59%) had farm size of more than 1.20 hectares. This implied that the farm size for African eggplant production is generally, small, especially the female's folk. Nwaru (2004) [6] noted that farm size in Nigeria are generally small and hence recommended that there is need for urgent land reform policies and programmes that would give farmers access to more land holdings for increased production.

Table 2. Distribution of Respondents according to farm size(ha).

Gender	Males		Females	
Farm size (ha)	Freq.	Percentage	Freq.	Percentage
0.01-0.40	6	10.0	14	20.66
0.41-0.80	8	13.33	10	16.67
0.81-1.20	21	35.0	17	28.33
1.21-1.60	9	15.0	10	16.67
1.61-2.00	7	11.67	8	13.33
2.01-2.40	9	15.0	1	1.67
Total	60	100	60	100

Source: Field Survey data, 2014.

Table 3 revealed that more male African eggplant farmers (86.6%) than females (66.6%) received advice on pesticide spraying technology, 76.6 % males and 50 % females on fertilizer application, 66.6 % males and 53.3 % on nursery technology and others.

Table 3. Distribution of Respondents by gender and type of production practice advice received from extension agents.

Type of production advice received	Males		Females	
	*freq.	Percentage (%)	*freq.	Percentage
Land clearing	27	45.0	24	40.0
Land preparation	28	46.0	22	33.6
Planting methods/season	32	53.3	25	41.7
Nursery technology	40	66.6	32	53.3
Weeding technology	20	33.3	15	24.9
Fertilizer application tech.	46	76.6	30	50.0
Pesticide spraying tech.	52	86.6	40	66.6
Harvesting	30	50.6	20	33.3
Grading/sorting	20	33.3	10	16.6
Marketing/distribution	35	58.5	19	31.6
Control of expenditure	15	24.9	10	16.6

Source: Field Survey data, 2014. *Multiple responses recorded

This result is in consonance with a priori expectation that more male eggplant farmers received more advice on production practices

than their female counterpart.

Table 4 indicated that even though majority of both farmers (males and females) got their inputs from extension agents, more male farmers received credit/grants than females (83.6% males and 41.7%females) and agro-chemicals (83.6% males and 75% females), improved seeds/seedlings (66.6% males and 58.7% females) and labour management (58.3% males and 50% females). This implied that more male than female African eggplant farmers sourced their farm inputs from the extension agents. This result explained that more males than females were interested and serious with the extension agents on useful inputs that will increase their yield and output.

Table 4. Distribution of Respondents by gender according to farm inputs (credit, agrochemical) from extension agents.

Sources of inputs by gender	Males		Females	
	*Frequency	Percentage	*Frequency	Percentage
Credit/grants	50	83.6	25	41.7
Improved seeds/seedlings	40	66.6	35	58.7
Labour management	35	58.3	30	50.0
Land acquisition	10	16.6	12	20.0
Agro-chemicals	50	83.6	45	75.0

Source: Field Survey data, 2014. *Multiple responses recorded

Table 5 indicated that the male farmers had a mean output of 1,073.03 tonnes per hectare and females had a mean output of 8,300.00 tonnes per hectare while the mean difference was 2,437.07 tonnes of African eggplant but t-calculated 1.063 was less than t-tabulated (2.0663). However, the result showed that males produced greater output than the female African eggplant farmers even though it was not significant in the study area. Therefore, the null hypothesis (Ho_2) was thereby, accepted. The implication of the result might be that more male than female African eggplant farmers were taught by the extension agents on how to source and get their production inputs. Another reason for this result might be that more males than females had more farmland. This agrees with the saying that the more the production input the more the yield or output all things being equal.

Table 5. Comparison of mean output of respondents by gender in the study area.

Variable	Observation	Mean	Mean deviation	Standard deviation	T-cal	T-tab
Male	60	10,739.03	2,437	5914077	1.063	2.0663
Female	60	8,300		39.39		

Source: Field Survey data, 2014.

CONCLUSIONS

The result of this study revealed that both males and females produced African eggplant in the study area, but more males than females had extension contact and received more extension feedback by GSM calls on the production techniques. The more males than females that had personal contact with extension agents received more advice and more education on production practices; farm input and had relatively greater output. This suggests that when female African eggplant farmers, receive equal opportunity (ownership of farmland) like their male folks, they will perform better in increasing their output.

Therefore, extension programmes and land reform policies that address gender issues especially gender differences and preferences (gender sensitivity) will go a long way increasing agricultural production including African eggplant production in the study area. Further, availability of improved electricity supply to rural communities is needful to both extension agents and farmers' (males and females) for more effective use of mobile phones for contact purposes. Equally, for increased technical know-how among extension workers, there is need for capacity building to enable them be gender sensitive in educating farmers (male and female farmers) in the study area.

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ASPECTS OF FINANCIAL AND ECONOMIC ACTIVITY AT EUROFIORE LLC, CELARU, DOLJ COUNTY (2011-2013)

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Abstract

Celaru locality is located in Dolj County, located along the road that goes from Dăbuleni to Craiova, on the edge of the sand dunes that reach up here, extending from Jiu. The unit was established in 2010, having as main object of activity "growing cereals (except rice), legumes and oilseeds producing plant" - CAEN code 0111 from 12.07.2010. The study goal was to follow the constitution of the financial indicators (indicators of income, expenditure indicators, profitability indicators) the company analyzed their values and financial results. The working method is based on comparison in time of indicators so that the analysis was carried out based on a dynamic consists of three years, subjected to analysis, and the average of the period. The results show maximum for year 2013 - synthetic for the indicator and minimum one year 2012.

Key words**:** *assets, capital, customers, equipment*, *landscape, providers*

INTRODUCTION

Celaru Commune is a place in Oltenia, Dolj [9], located along the road that goes from Dăbuleni to Craiova. The village is made up of 5 villages: Ghizdăveşti, Soren, Celaru, Marotinu de Jos, Marotinu de Sus. At the last census, in 2002, Celaru have 5,289 people and 2,075 homes.

Commune Celaru is located on the road Leu - Vişina at a distance of 45 km from Craiova and 25 km from Caracal. It is located on a plot of countryside on the edge of the sand dunes that reach up here, extending from Jiu dunes that have been stopped by acacia plantations for the past 100 years.

Being located in the plains Romanaţilor, the main wealth of the village is fertile land, but also large surfaces of acacia forests in the southern village that are a dam against the sand "desert Oltenia".

At Celaru operates five schools that prepare primary school, one in each of the five villages, two of which (the Celaru and Ghizdăveşti) prepare and middle school students.

The commune has a network of water supply through an SAPARD program and network cable.

At present commune has a series of events, hold cultural and tourist facilities granted to investors and has some projects completed and put into practice. [10]

The unit was established in 2010, having as main activity object of "growing cereals (except rice), legumes and oilseeds producing plant" - CAEN Code 0111, 12 July 2010. Associated its main object of activity, appear as secondary activities included in NACE group 011 (cultivation of perennial), 012 (cultivation of perennial crops), 013 (cultivation of plants for propagation), 014 (animal husbandry), 015 (activities in mixed farming), 016 (activities ancillary to agriculture), 017 (hunting, trapping the hunting and related service activities hunting), 021 (forestry and other forestry), 022 (logging), 023 (collecting non timber forest products of spontaneous), 024 (service activities forestry), 031 (fishing), 032 (aquaculture), 081 (extraction of stone, sand and clay), 099 (service activities incidental to the extraction of minerals), 101 (production, processing and preserving of meat and meat products), 102 (processing and conservation of fish and shellfish), 103 (processing and preserving of potatoes), 104 (oils and fats of vegetable and animal), 105 (dairy production), 106 (mill products, starches and starch products), 107 (manufacture of bakery and pastry), 108 (manufacture of other foodstuffs), 109

(manufacture feed), 110 (manufacture of beverages) 131 (preparation and spinning of textile fibers), 132 (manufacture of textiles), 133 (finishing of textiles), 139 (manufacture of other textiles), 141 (manufacture of wearing apparel, except fur), 142 (manufacture fur), etc.

Commercial entity has legal form limited liability company and operates under Romanian law. The farm is run by the sole shareholder: Joiţa Nicolae Viorel who is also the administrator and solving financial and accounting problem are subordinated to the accounting officer.

The headquarters declared of the company is in Celaru commune, Dolj county, no. 742, which may establish subsidiaries, as required by law.

The registered capital is 200 lei consists of 20 social parts each of 10 lei. It does not bear interest.

Lasting of the company is one unlimited subscribed capital was 200 lei (wholly owned by the sole shareholder), increase or reduce capital and its transmission can be achieved in concrete terms stipulated in the articles of incorporation.

Constitutive Act also contains provisions concerning the rights and obligations of associates, their duties, organization and conduct of general meetings, issues of appointments and tasks, issues related to dissolution, liquidation, merger and division of society, staff of the company, the balance sheet and the profit and loss calculation and allocation of profits, litigation and final provisions [7].

The company has a number of capital items, as follows: 120 ha of arable land, of which 30 ha property and 90 ha on lease, which costs negatively influence society; mechanical means (property): tractors - three pieces Fiat, Same, Massey-Ferguson; plow - 1 piece reversible 4 furrows; disc harrow - 1 pc; precision seeder - 1 pc; Drill in dense rows - one piece; fertilizer spreader machine - 1 pc; spraying machine - 1 pc; trailers - 3 pieces; Combine - 1 pc New Holland; Storage (200 m^2).

Of the 120 hectares of land the company uses the entire surface. The palette of cultures is the current restricted (winter wheat - 70 ha, sunflower - 45 hectares and maize - 5 hectares), which will to diversify depending on the requirements organisms paying out subsidies and by agricultural policies promoted nationally.

MATERIALS AND METHODS

Development of work involved in the first instance documenting at the site by consulting company accounting documents [8]. Data collection was followed by grouping them into categories: income, expenses, profit.

The income and expenditure is a basic tool of financial management, analysis and control, which enables management to know the farm financial means and ways of action to increase the economic efficiency of the work performed [5].

Forming an overview, assumed that in addition to the years 2011, 2012 and 2013 to determine and calculate average of the period, which was included in the analysis.

RESULTS AND DISCUSSIONS

Indicators of income. At the level of agricultural units, disposable income (or cash flow) measures the cash flow achieved unity, farm during exercise. Gross disposable income expresses self-financing or the result of self - protection [4].

Table 1 shows the indicators of income for the years 2011, 2012 and 2013.

The first indicator of income is the production sold. This indicator varied from 157,864 lei in 2011 to 179,594 lei in the year 2013 while the average period reached 171,301.67 lei. It may be observed the upward evolution of the indicator, increases of 11.8% since 2012 (176,447 lei) compared to 2011, followed by further increases (smaller) by 1.8% in 2013 compared with the previous term of the series dynamic, while the average period is lower by 5.6% over 2013 specific state of affairs.

It is noteworthy that the revenue from the goods missing.

Table 1. Indicators of income

- lei –

No.	Specification	2011	2012		2013		AVERAGE	
		EF.	EF.	2012 /2011****	EF.	2013 /2012****	EF. ****	AVERAGE /2013****
1.	Production sold*	157,864	176,447	111.8	179,594	101.8	171,301,67	95.4
2	Income from sale of goods *	-	-	-	-	-	-	-
3	Income from grants *	46,936	71,214	151.7	76,403	107.3	64,851	84.9
4	Net turnover * (1+2+3)	204,800	247,661	120.9	255,997	103.4	236,152.67	92.2
5	Income related to cost of production in progress *	44,206	36,029	81.5	664	1.84	26,966.33	40.61 times
5.1.	Sold C***	44,206	36,029	81.5	664	1.84	26,966.33	40.61 times
5.2.	Sold D**	-	-	-	-	-	-	-
6	Other incomes	-	-	-	-	-	-	-
I	Operating income * (4+5+6)	249,006	283,690	113.9	256,661	90.4	263,119	102.5
7	Interest income *	12	8	66.7	-	-	6.66	-
8	Other incomes *	-	-	-	-	-	-	-
II	Financial income* (7+8)	12	8	66.7	-	-	6.66	-
III	Extraordinary income *	-	-	-	-	-	-	-
IV	Total income * (I+II+III)	249,018	283,698	113.9	256,661	90.5	263,125.67	102.5

* extracts from the profit and loss account (2011 – 2013)
** assigned revenue in balance D, are deducted from net turnover;
*** assigned revenue in the balance C is added to net turnover;
**** own calculations;

Revenues from subsidies have averaged 64,851 lei (-15.1% compared to 2013), which is based on average values sequential: 46,936 lei in 2011, 71,214 lei for 2012 (+ 51.7% compared to the previous period dynamic series) and 76,403 lei for 2013 (+ 7.3% in dynamics). Based on these values can be seen the upward evolution of the indicator over the period analyzed.

Therefore, the issues mentioned about the production sold, revenues from sales of goods and income subsidies, determined the net turnover. It can be seen that it ranged from 204,800 lei in 2011 to 255,997 lei for 2013, and the period average reached 236,152.67 lei. The dynamics of the indicator is similar to that of the production sold. Thereby was observed an increase by 20.9% in 2012 (247,661 lei) compared to the first term of the dynamic series demotions 1.03 times the reporting base for 2013 and decreases for period average by 7.8% compared to the situation from 2013 year.

The revenue related to the cost of production in progress ranged from 664 lei in 2013 to 44,206 lei for 2011 - both included in the balance of C, average of period was 26,966.33 lei, whereas for 2013 year the amount of 36,029 lei was assigned to the balance C. The dynamics of the indicator is strictly downward: -18.55 in 2012 and -98.16% 2013.

The company did not record other revenue items related to operating activities and as a result, operating income reached: 249,006 lei in 2011; 283,690 lei for 2012 - 113.9% in dynamics; 256,661 lei for 2013 - 90.4%, period average 263,119 lei (+ 2.5%).

The unit recorded interest income in 2011 and 2012-12 and 8 lei. Which led to an average period of 6.66 lei.

The unit do not achieve other financial income, as a result financial revenues are identical to those from interest.

It is worth mentioning that the company has not registered during the period under review, no extraordinary income.

Starting from the three categories of revenues (operating, financial and extraordinary) were established total income of farm (very similar to those in operation), which is as follows: 249,018 lei for 2011; 283,698 lei in the year 2012 - 113.9% in dynamics; 256,661 lei for 2013 (down 9.5% over the reporting basis); 263,125.67 lei average for the period (+ 2.5% compared to 2013 - of reference).

Indicators of expenses. Expenses render the efforts made by a manufacturer for the proper functioning of the productive activity. They are

linked, firstly, to ensure the production factors. Cost of inputs is of particular to their allocation, it must be linked to their quality [2].
Table 2 shows the indicators of expenditure for the period under review.

Raw materials and consumables ranged from 110,803 lei in 2011 to 158,580 lei in the year 2012 while the average period was 134,680 lei.

Table 2. Indicators of spending

-lei-

No.	Specification	2011	2012		2013		AVERAGE	
		EF.	EF.	2012 /2011**	EF.	2013 /2012**	EF. **	AVERAGE /2013**
1	Raw materials and consumables *	110,803	158,580	143.1	134,657	84.9	134,680	100.1
2	Other material expenses *	-	-	-	213	-	71	33.3
3	Expenditure on goods *	-	-	-	-	-	-	-
4	Trade discounts received *	-	-	-	-	-	-	-
5	Other external charges *	789	372	47.1	606	162.9	589	97.2
6	Total material expenses and related of goods * (1+2+3+4+5)	111,592	158,952	142.4	135,476	85.2	135,340	99.9
7	Salaries *	-	-	-	-	-	-	-
8	Security charges *	-	-	-	-	-	-	-
9	Staff expenditure * (6+7)	-	-	-	-	-	-	-
10	Adjustments for property *	41,499	48,229	116.2	24,611	51.0	38,113	154.9
11	Expenditure on external services *	3,487	98,447	28.23times	52,602	53.4	51,512	97.9
12	Other taxes, duties and assimilated payments *	-	9,387	-	4,471	47.6	4,619,33	103.3
13	Other expenses *	59,150	-	-	300	-	19,816,67	60.05 times
14	Other operating expenses (external services, other taxes - taxes - contributions, donations compensation, assets transferred) * (11+12+13)	62,637	107,834	172.2	57,373	53.2	75,948	132.4
I	Total operational expenses * (6++9+10+14)	215,728	315,015	146.0	217,460	69.0	249,401	114.7
15	Interest charges *	-	-	-	-	-	-	-
16	Other financial charges *	-	-	-	-	-	-	-
II	Financial charges * (15+16)	-	-	-	-	-	-	-
III	Extraordinary charges *	-	-	-	-	-	-	-
IV	Total expenses * (I+II+III)	215,728	315,015	146.0	217,460	69.0	249,401	114.7

* extracts from the profit and loss account (2011 – 2013)
** own calculation

Dynamic underlines the uneven trend of indicator, increases in 2012 (+ 43.1% compared to 2011), followed by decreases in 2013 (134,657 lei -15.1% compared with the previous term of the dynamic series) and then appear elevations for average of the period (+ 0.1%).
Other material costs occur only in 2013 - 213 lei, something which leads to an average period of 71 lei.
The unit has recorded other expenses (water, energy) as follows: in 2011-789 lei, 372 lei at the level of 2012 (-52.9% compared with the base in dynamics), 606 lei for 2013 (+ 62.9%) which resulted in an average of 589 lei for the indicator (-3.8%).
Following this situation, total expenses related materials and of goods ranged from 111,592 lei in 2011 to 158,952 lei for 2012, and in 2013 they reached the level of 135,476 lei.
In these circumstances average of period was 135,340 lei, which represented a decrease in dynamics by 0.1% over the reporting basis. Dynamics is one uneven indicator increases by 42.4% in 2012, followed by decreases by 14.8% in 2013 - compared to the previous term dynamic of the series.
The unit did not record personal expenses.
Another item of expenditure appears under the name of adjustments on assets, an indicator that has uneven developments. The year 2011 is characterized by a value of 41,499 lei adjustments, value increased to 48,229 lei for 2012 and then decreased to 24,611 in 2013. In these circumstances average of period reached 38,113 lei (154.9% compared to the base of reporting). Dynamic have indexes above unit for average of the period in 2012 (+59.9 and + 16.2% respectively) and below par (51.0%) at the level of 2012.
Expenditure on external services were 3,487 lei in 2011, increased 28.23 times in 2012 (98,447 lei), decreased by 46.6% in 2013 (52,602 lei), while the average of period (51,512 lei) was lower by 2.1% over the reporting base.

As regards the costs with other taxes, duties and assimilated payments, it can be seen that they ranged from 4,471 lei in 2013 to 9,387 lei in the year 2012 while the average of period was 4,619.33 lei (indicator it was not present in 2011). In the dynamics made, can be seen below par values for 2013 (47.6%) and above par values for average of the period (outrunning of 1.03 times of comparator term - 2013).

For the Component other expenses, the company recorded an average of 19,816.67 lei (outrunning of 60.05 times the term of reference) value that is based on sequential annual levels of 300 lei in 2013 (0.5% in dynamics) and 59,150 lei at the level 2011.

Therefore, the values quoted for the last three indicators were determined other operating expenses, which registered: 62,637 lei in 2011, 107,834 lei in 2012 (outrunning to 1.72 times the base reporting) 57,373 lei for 2013 (- 46.8% in dynamics). Based on these values it was determined that average of period who was 75,948 lei, which represented an increase in dynamics by 32.4% over the comparison period.

Total operating expenses were based on total material expenses, personnel expenses, adjustments on assets and other operating expenses. Based on indicator values, previously named, was reached levels sequential: 215,728 lei in 2011; 315,015 lei for 2012 (+ 46.0% in dynamic); 217,460 lei in the year 2013 (-31.0% compared to the benchmark); average for the period 249,401 lei (+ 14.7% in dynamic made).

Since the company did not record expenditure of financial or extraordinary expenses, we find similarity between total operating expenses and total expenses.

Profitability indicators. The profit made by companies is the added obtained from the fact that they earn more from sales than they spend to produce those goods.

Profit maximization implies to compare costs with revenues and analyze what level of production, profit will be maximized, and also what is the level of this profit [6].

Profit as an indicator determinant of profitability, represents the remainder to the farm uses to decide which goals on only under the influence of the free market of agricultural products and animal or vegetable raw materials [1].

In the terms of making profit, any business relating to the concept of economic efficiency. The economic efficiency of manufacturing activity in agriculture is an economic category that expresses the faculty of maximum economic effect with a minimum expenditure of manpower and materialized.

In the broadest sense, economic efficiency refers to all economic activity, ie the sphere of material production, the distribution process, the movement of products, as well as the various forms of economic activity in the non-production sector.

Economic efficiency is directly related to net income as the difference between the value of agricultural production marketable and total production costs, which relate to factors that the entrepreneur has to purchase from the market costs (explicit), being a ratio of effort made to obtain values use and the economic effect achieved with this effort [3].

Table 3 shows the profitability indicators for the period under review.

Profit or loss from operations is characterized by an average of 13,718 lei, value resulting from sequential levels of annual profit 33,278 lei in 2011 and 39,201 lei specify to 2013, but also due to the loss of 31,325 lei for the year 2012. These values underline the fluctuating trend of indicator, bringing forward terms of reference of 2013 (2.25 times), decreases in 2012 also for average for the period (-194.1 - 65.0% respectively).

Financial profit was 12 lei in 2011 and 8 lei at the level of 2012 which led to an average period of 6.67 lei.

Current profit or loss occurring as the sum of operating profit or loss and financial profit or loss. So we talk about values 33,290 lei in 2011 -31,317 lei for 2012, 39,201 lei in the year 2013 and to 13,724.66 lei for the average for the period. Dynamic indicator is characterized by values of index components above par for the years 2013 (exceeding 2.25 times the base of comparison), but also by subunit levels in 2012 and average for the period (-194.1 -65.0% respectively).

Table 3. Profitability indicators

No.	Specification	U.M.	2011	2012		2013		AVERAGE	
			EF.	EF.	2012 /2011**	EF.	2013 /2012**	EF. **	AVERAGE /2013**
1	Profit - operating loss *	lei	33,278	-31,325	-194.1	39,201	225.1	13,718	35.0
2	Profit - financial loss *	lei	12	8	66.7	-	-	6.67	-
3	Current profit or loss * (1+2)	lei	33,290	-31,317	-194.1	39,201	225.1	13,724.66	35.0
4	Extraordinary profit or loss *	lei	-	-	-	-	-	-	-
5	Gross profit or loss * (3+4)	lei	33,290	-31,317	-194.1	39,201	225.1	13,724.66	35.0
6	Income tax *	lei	4,177	-	-	6,807	-	3,661.33	53.8
7	Other taxes or levies *	lei	-	-	-	-	-	-	-
8	Net profit or loss * (5-6-7)	lei	29,113	-31,317	-207.6	32,394	203.4	10,063.33	31.1
9	The rate of profit or loss from operations **	%	15.42	-9.94	-164.5	18.03	281.4	5.50	30.5
10	The rate of profit or loss current **	%	15.42	-9.94	-164.5	18.03	281.4	5.50	30.5
11	Rate of extraordinary profit or loss **	%	-	-	-	-	-	-	-
12	Gross profit or loss rate **	%	15.42	-9.94	-164.5	18.03	281.4	5.50	30.5
13	The rate of net profit or loss **	%	13.49	-9.94	-173.7	14.90	249.9	4.03	27.0

* extracts from the profit and loss account (2011 – 2013)
** own calculations

Gross profit or loss is equal to the current profit or loss, as the company has not recorded an extraordinary profit or loss.
The Company paid income tax but did not pay "other taxes". Thereby finds values of profit tax as follows: 4,177 lei in 2011, 6,807 lei in 2013. In these circumstances average of period was 3,661.33 lei, a level that was lower to the reference basis (-46.2%).
Net profit or loss is characterized by an average of 10,063.33 lei, while the extreme values of the indicator appeared in 2011-29,113 lei and 2013 - 32,394 lei and 2012 is characterized by a loss of 31,317 lei.
Dynamic of the indicator is uneven one, the only outrunning of the reporting term being for 2013 of 2.03 times, while the average of period and 2012 showed decreases to the terms of reference (-207.6 -68.9% respectively).
Operating profit or loss rate was 15.42% in 2011, -9.94% in 2012, 18.03% in 2013 and 5.51% for the average for the period. The evolution over time of the indicator takes the form of an uneven trend, decreases compared to the benchmark 2012 (-164.5%), followed by increases for 2013 (2.81 times) and decreased by 69.5% - against basis of comparison (2013) - for the average of period.
It can be seen that the current rate of profit or loss is equal to the previous indicator - financial profits in 2011 and 2012, their values 12 and 8 lei, not influence decisive the indicator analyzed.
Gross profit or loss rate is equal to the current rate of profit or loss since the company did not record extraordinary profit or loss.
Last profitability indicator refers to the rate of net profit or loss. It can be seen that this indicator has averaged 4.04% (down 73.0% over the reporting basis), with extremes of -9.94% for 2012 and 14.90% in 2013. The consequence of this situation, the growth is uneven one, finding a shortfall of 173.7% (compared to the benchmark) in the year 2012, and is ahead by 2.49 times in 2013 to base of reporting (2012).

CONCLUSIONS

The study has the following conclusions:
-In total income structure prevailing operating revenue 99.99%, financial revenues is only 0.01% of the total. The components are included in operating revenue ratios: turnover 89.75%, 65.10% sold production, 24.65% income subsidies, 10.24% of production costs related revenues-Fig.1.;
-The total expenditure structure prevailing material costs and related goods - 54.27%, followed by other operating expenses - 30.45% and adjustments on assets - 15.28% - Fig.2.;
-The unit record operating profit and financial profit – 13,718 lei and 6.67 respectively, which make up the current profit – 13,724.66 lei;
-Given that the unit did not record

extraordinary profit or loss is found similarity between the gross profit and current, the latter decreasing by taxes paid (3,661.33 lei) so as to arrive at net profit 10,063.33 lei;
-With outstanding results, 2013 stands - the year of maximum and minimum 2012 as the base year - financial losses.

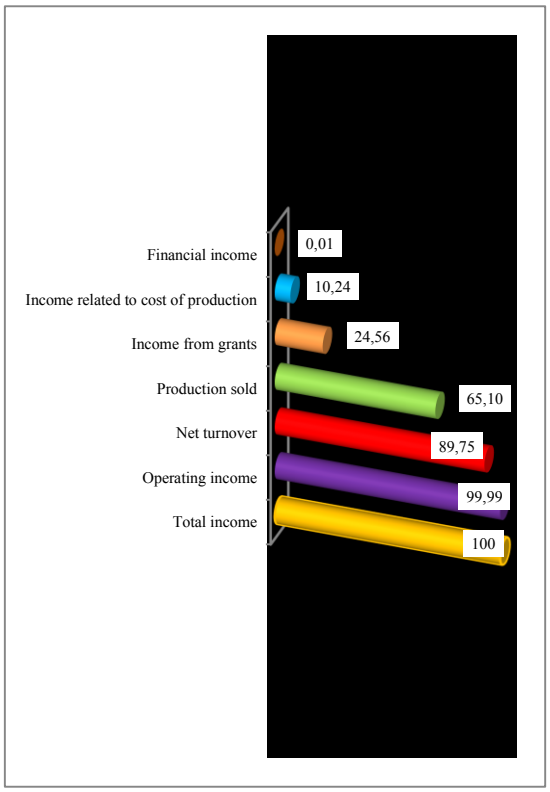

Fig.1. The ratio of total income and its main components (%)

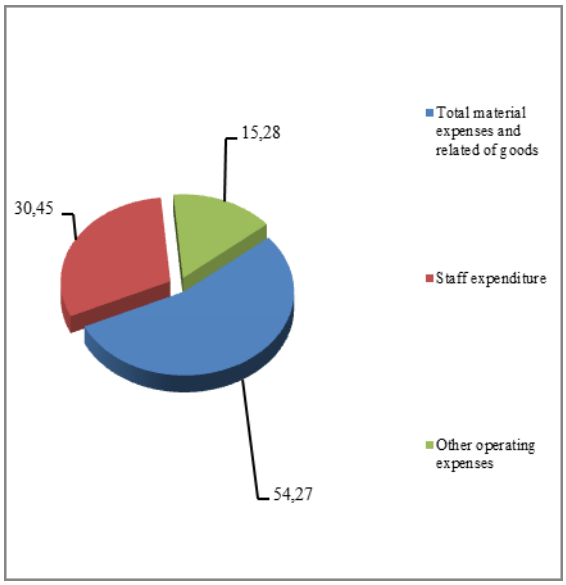

Fig.2. Structure of total expenditure (%)

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RURAL TOURISM IN THE RAZIM-SINOE AREA

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Abstract

Rural tourism is a form of tourism that takes place in rural areas and has a functional structure of heterogeneous services and housing. Revenues from tourism are permanent and services are offered by staff and specialized. Rural tourism structures are boarding houses, motels, camping sites, holiday camps, creative arts camps, camps for environmental activities, holiday villages. The purpose of this paper is to present and characterize rural tourism in the area Razim-Sinoe terms for shelters and structures catering. We look at the main indicators of tourist traffic: arrivals number, number of overnight stays, average length of stay; the number of foreign tourists arrivals by country of origin; monthly distribution of the number of tourists; arrivals and overnight stays of tourists in accommodation establishments by types of units; occupancy of accommodation establishments. For these aspects we used data provided by National Institute of Statistics,Department of Statistics Tulcea, Strategic Plan for Sustainable Tourism Development in the Danube Delta, developed under the auspices of Tulcea County Council; Master Plan, Danube Delta Biosphere Reserve, developed by Danube Delta National Institute for Research and Development. Data collected were placed in tables and processed to yield graphics that then we have interpreted and analyzed. Thus, after processing the data provided by the authorities, we conclude that it is noted that most of the tourists prefer hotel units, followed by the tourist in the tourist boarding houses and tourist villas; It is obviously an important flow of tourists during the summer and the highest percentages of foreign tourists from countries like Germany (25.4%), Italy (14.14%) and Austria (12.12%). Analyzing the weight of the number of tourists on monday is obviously an important flow during the summer.

Key words**:** *comfort, offer, potentially, rural tourism, village*

INTRODUCTION

Highlighting the provision of accommodation and services of these structures through tourism programs, contribute to the development of tourist traffic in rural areas.In the last decade, this movement is growing due to varied forms of expression.
Currently, rural tourism is developing forms of cultural tourism and ecotourism.It organizes symposia, conferences, competitions and thematic exhibitions of local interest.
These events help increase local tourist traffic and a higher level of culture, education and civilization of villagers. [3]
Also contributing to the economic growth of local communities. Cavaco (1995) considers rural tourism as "a meeting place where rural culture meets urban culture, the latter being highly sensitive and element bucolic"[2].
In this context, the paper aimed to analyze the rural torusim in the Razim-Sinoe area highlighting its potential and development in the last years and its importance in the local economy. [1]

MATERIALS AND METHODS

For this study, we used statistical data provided by the National Statistics Institute, Tulcea County Department and the Danube Delta National Institute for Research and Development. Then, the data were processed and converted into tables, graphs and then interpreted and analyzed.

RESULTS AND DISCUSSIONS

In recent years, there is an expansion of rural tourism. Consumers, especially middle-class cultural values and the importance of reassessing the landscape[8].
Rural tourism is impressed by the increasing personal mobility (purchase of personal cars) and leisure organization (possibility of shorter

periods but more holiday, which allow several options) [4].

On the other hand, farmers have struggled to diversify and raise the quality of supply to meet the challenges of the crisis in agriculture[5].

Tourism activity in the Razim Sinoe is mainly conducted in rural settlements[4].

Reception structures

Existing accommodation units in the study area are the hotels but also hostels. In 2014, the situation of accommodation units in the study area, which had functioning authorization was (Table 1) [7]:

Table 1. Accommodation units by type and comfort catgeory in the Razim-Sinoe area

Accomodation categories	Comfort category							
	1 star	2 flowers	2 stars	3 flowers	3 stars	4 flowers	4 stars	Total
Units	3	14	6	9	5	3	4	44
Rooms	96	54	108	62	104	86	84	594
Number of seats	145	98	198	92	202	166	168	1,069

Source: Department of Statistics Tulcea

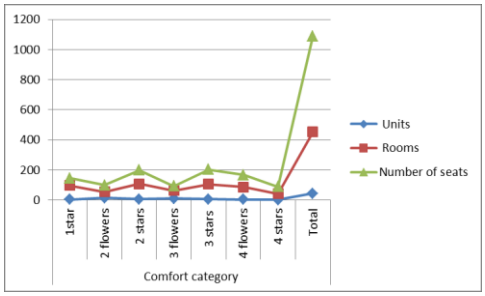

Fig. 1. Accommodation units on the classification criteria in the Razim-Sinoe

Source: Own determination.

The data presented in the table notes the existence of several categories of accommodations, hotels of 1 to 4 stars accommodation to 2-4 flowers. The number of locations is big enough and meet the accommodation of tourists. Thus, the total number of units in the year 2014 was 44 units, with a total of 594 rooms and 1,069 seats.

Food structures

Catering is another component of the material and technical base. This segment consists of units with complex designed to provide both conditions dining and entertainment with a variety typological and comfort similar to that hotel operating, most often, in a relationship of interdependence with units accommodation. They are grouped into several categories, depending on their membership in an accommodation unit or according to specific services (Table 2) [7].

Table 2. Statement of catering establishments in the Razim-Sinoe area in February 2014

Name	Unit type	Category	Number of seats
Doi iepurași	Hunter restaurant	2 stars	200
Portița	Night Club	4 stars	80
Vila Corp 1	Classic restaurant	3 stars	112
Lunca	Night Club	4 stars	100
Mon Jardin	Classic restaurant	4 stars	180
Cormoran	Classic restaurant	4 stars	20
La Nisip	Buffet bar	3 stars	20

Source: Department of Statistics Tulcea

There is a variety of establishments offering a wide range of dishes, mostly based on fish[5].

Analysis of tourist traffic

Evolution of the main indicators of tourist traffic to the Danube Delta Biosphere Reserve in 2008-2014 is shown in the Table 3.

Table 3. Tourism demand registered for Danube Delta Biosphere Reserve recorded in 2008-2014

Years	Number arrivals			Number of overnight stays			Average length of stay		
	Romanian	Foreign	Total	Romanian	Foreign	Total	Romanian	Foreign	Total
2008	28,606	8,379	36,985	56,685	17,838	74,533	2.0	2.0	2.1
2010	56,026	16,566	72,592	98,974	29,785	128,759	1.8	1.8	1.8
2014	53,322	20,445	73,767	112,368	33,610	145,978	2.0	2.1	1.7

Source: National Institute of Statistics

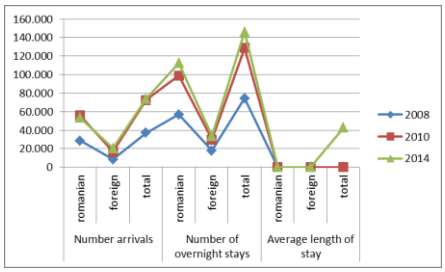

Fig. 2. Evolution of the number of arrivals of tourists in the establishments of tourists' reception with functions of tourists in Danube Delta Biosphere Reserve
Source: Own determination.

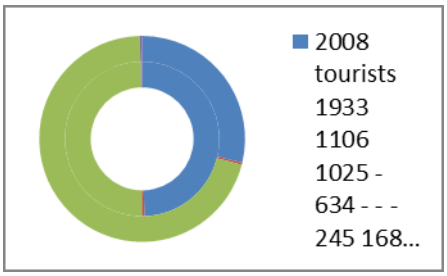

Fig. 3. Structure of foreign tourists, the countries of origin, in the years 2008-2014
Source: Own calculation.

The strategic importance of tourist traffic for analysis are types of accommodation and monthly distribution of number of tourists[6].
There is a fluctuating trend in the number of tourists arriving both overall and detailed romanian tourists and foreign tourists, registering a positive trend in 2008-2010.
Number of overnight stays increased during the study period from 56,685 in the case of romanian tourists in 2008-112,368 in 2014. And if foreign tourists recorded a positive development from 17,838 overnight stays in 2008 to a total of 145,978 in 2014 .
Regarding the evolution of average length of stay, after a value of 2.1 days in 2008, this drops to values of 1.8 for 2010 and 1.7 for 2014.

Table 4. Number of foreign tourists arrivals by country of origin, 2008-2014, the territory Danube Delta Biosphere Reserve

Country of origin	2008		2014	
	Tourists	%	Tourists	%
Germany	1,933	23.7	5,190	25.40
Italy	1,106	13.2	2,890	14.14
Austria	1,025	12.2	2,478	12.12
Norway	-	-	2,400	11,63
France	634	7.6	1,947	9.52
Spain	-	-	1,300	6.37
Greece	-	-	627	3.07
Japan	-	-	350	1.71
UK	245	2.9	275	1.35
Israel	168	2	-	-
SUA	128	1.5	-	-
Hungary	85	1	-	-
Other countries	2,990	35.8	3,000	14.69
Total	8,314	100	20,457	100

Source: National Institute of Statistics

According to data from the above table it can be seen a large number of foreign tourists in 2008-2014. Thus, the first three places are occupied by German tourists (25.4%), Italians (14.14%) and Austrians (12.12%), the last places being occupied by Japanese tourists (1.71%) and British tourists (1.35%).
The strategic importance of tourist traffic for analysis are types of accommodation and monthly distribution of number of tourists[3].
It is noted that most tourists prefer hotel units, followed by the tourist in the tourist boarding houses and tourist villas.
The percentages in addition to the foreign tourists on accommodation in hotels indicate their preference for units better equipped against a higher individual budget (Table 5).

Table 5. Arrivals and overnight stays of tourists in accommodation establishments by type of units to Danube Delta Biosphere Reserve

Accommodation units	Romanian %	Foreigners %
Hotels	76.8	90.1
Villas	6.2	2.7
Boarding houses	7.9	3.1
Campgrounds	4	0.3
Camps for students	2.1	0
Cottages	2	0.2
Other accommodation	2.5	3.6

Source: National Institute of Statistics

Another way that can be studied tourism demand, tourism is an analysis of seasonality[1].
Analyzing the weight of the number of tourists on months is obviously an important flow during the summer, but compared with the tourism balneoclimateric that can go under proper conditions especially in summer, in the

study area due to multivalent forms of tourism, demand remains relatively high and balanced throughout the year (Table 6) [10].

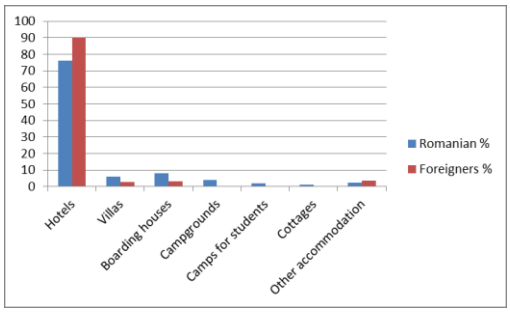

Fig. 4. Frequency of tourist reception with functions of tourists in 2008
Source: Own calculation.

Table 6. Monthly distribution in the number of tourists to the Danube Delta Biosphere Reserve

Month	Number of tourists	Weight %
January	2,320	3.14
February	2,456	3.33
March	2,552	3.46
April	4,148	5.62
May	6,546	8.87
June	8,920	12.09
July	12,000	16.18
August	10,260	13.91
September	10,328	14
October	7,062	9.57
November	4,548	6.17
December	2,705	3.67
Total	73,845	100

Source: National Institute of Statistics

Regarding net use index of accommodation places is noted that this indicator units within Danube Delta Biosphere Reserve.

Table 7. Occupancy of accommodation establishments in 2008-2014

Area	2008	2010	2012	2014
Lagoon Complex Razim-Sinoe	22 %	29 %	28.2 %	25.9 %
Total country	34.4%	34.2 %	33.5 %	33.7 %

Source: Department of Statistics Tulcea

It is far below the national average, 26.6% to 36%, and this is partly due to seasonality and a greater area of study especially during spring and summer than the rest of the country where tourist activity takes place throughout the year (Table 7) [9].

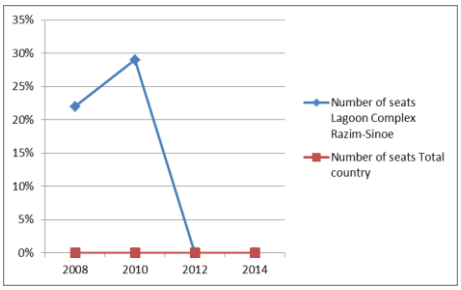

Fig. 5. Evolution of net use index of accommodation places at the country level and Danube Delta Biosphere Reserve
Source: Own calculation.

CONCLUSIONS

The data analyzed are witnessing in 2008 the 44 accommodation units, catering establishments of different categories.

There is a fluctuating trend in the number of tourists arriving both overall and detailed romanian tourists and foreign tourists, registering a positive trend in 2008-2010.

Number of overnight stays increased during the study period from 56,685 in the case of romanian tourists in 2008, 112,368 in 2014. And if foreign tourists recorded a positive development from 17,838 overnight stays in 2008 to a total of 145, 978 in 2014 .

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Thus, the first 3 places were ocupated by Germans (25.4%), Italians (14.14%) and Austrians (12.12%), and the last places being occupied by Japanese tourists (1.71%) and British tourists (1, 35%).

Analyzing the weight of the number of tourists on monday is obviously an important flow during the summer.

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TOURISM, ECONOMIC ACTIVITY WITH GREAT POTENTIAL BUT STILL INSUFFICIENT VALUED IN SETTLEMENTS OF THE LAGOON COMPLEX RAZIM-SINOE

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Abstract

Environmental quality to be the basis of all activities, including tourism, makes inseparable from the phenomenon of tourism. The variety of natural environmental quality and its aesthetic appearance, constitute basic resources for tourism today, and increasingly homogenized by the process of economic globalization. Between the environment and various forms of tourism there are complex reciprocal relations, interdependence, which are often described as a "symbiosis". The purpose of this paper is to present and characterize economic activity and tourism in the area Razim- Sinoe Lagoon Complex. Will present data on population, agriculture, industry, tourism, transport and do some actual proposals on tourism potential. For these aspects we used data from the National Institute of Statistics, Department of Statistics Tulcea Strategic Plan for Sustainable Tourism Development in the Danube Delta, developed under the auspices of Tulcea County Council; Master Plan, Danube Delta Biosphere Reserve, Danube Delta developed by National Institute for Research and Development. Data collected were placed in tables and processed to yield graphics that then we have interpreted and analyzed. Thus, after processing the data provided by the authorities, we conclude that: (i)The area study presents the following administrative-territorial structure: one city, Babadag, 10 communes with a total of 32 villages in the composition (including the common city of residence).(ii)The most important activity in terms of number of active local businesses is trade, with 50.83% of the total active units; (iii)Manufacturing attract the largest number of employees, 44.98%, is from this point of view, the most important activity. Manufacturing is followed in this trade indicator 19.37% and 10.38% of construction;(iv)The most representative activity is the fishing area is favorable for the development of such an activity, often combined with agrotourism.(v)The main categories of land use are the agricultural land (arable, pasture and hayfields, orchards and vineyards), forest vegetation surfaces, surfaces occupied by water, roads and railways construction;(vi)Sulfur forms prevalent in the Danube Delta Biosphere Reserve phytocoenosis, covering approximately 160.000 hectares, of which 100,000 ha is monodominantă reed community.(vii)In Romania especially in geographical areas close to water highlights specific types of tourism, which is distinguished from other forms of tourism in areas with higher altitudes. In the Razim-Sinoe meet as a form of tourism: tourism heliotherapy, sports tourism, rural tourism, eco-tourism, scientific tourism, health tourism, tourism movement.

Key words**:** *environment, protected areas, quality, rural, sustainable*

INTRODUCTION

Tourism accounts for Tulcea especially the industry with the most important potential for growth, issue reflected in recent years by increasing the employment of labor in this sector compared to other sectors[1].

Tourism concerns, firstly, that people take trips outside their living space and work, and temporary stays in a certain destination, the destination recreation activities and facilities used for this purpose[2].

Tourism, far from protecting the environment, is a generator of its problems, being able to destroy the very resources it is dependent. Tourism must be organized and practiced so as to use environment, but at the same time actively contribute to preserving the quality of his.

A quality environment favors the development of tourism[3].

In this context, this study aimed to analyze tourism in the Lagoon Complex Razim-Sinoe area to highlight that it has a good potential but it is still insufficinet valued.

MATERIALS AND METHODS

For this study the tourism potential of the villages in the Razim-Sinoe we used statistical data provided by the National Statistics Institute, Tulcea County Department, and

Danube Delta National Institute for Research and Development.
The data was then processed and converted into tables, graphs and then interpreted and analyzed.

RESULTS AND DISCUSSIONS

Administrative definition and network of settlements

-The study area has the following administrative-territorial structure: one city, Babadag, 10 communes with a total of 32 villages in the composition (including the common city of residence).
- The average size of municipalities by number of inhabitants is 2,978, which is a value lower than the average of 3,382 people, national coverage aspect caused vast areas occupied by water.

Table 1. Population, communes and localities related to the area of study

COMMON	TOWN	POPULATION	COMMON	TOWN	POPULATION
	BABADAG	10,437			
BAIA	BAIA	3,090	SARICHIOI	SARICHIOI	4264
	CAMENA	610		ENISALA	1258
	CAUGAGIA	212		SABANGIA	727
	CEAMURLIA DE SUS	1,006		VISTERNA	523
				ZEBIL	1.853
CEAMURLIA DE JOS	LUNCA	1,404	VALEA NUCARILOR	VALEA NUCARILOR	1.377
	CEAMURLIA DE JOS	1,280		AGIGHIOL	1.830
				IAZURILE	1.125
JURILOVCA	JURILOVCA	3,158			
	SĂLCIOARA	1,481	CORBU	CORBU	3.559
	VIȘINA	889		VADU	640
MURIGHIOL	MURIGHIOL	1,458	ISTRIA	ISTRIA	1.272
	COLINA	147		NUNTAȘI	1.144
	DUNAVĂȚU DE JOS	703			
	DUNAVĂȚU DE SUS	225	MIHAI VITEAZU	MIHAI VITEAZU	1.755
	PLOPU	649		SINOE	1.265
	SARINASUF	527			
	UZLINA	4	SĂCELE	SĂCELE	2.025
				TRAIAN	58

Source: National Institute of Statistics, Tulcea County Council, Department of Public Works

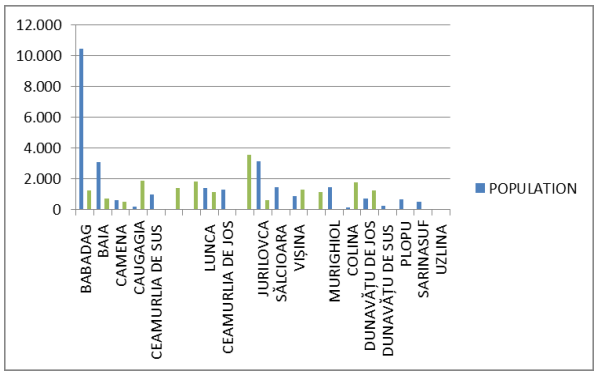

Fig.1. The evolution of population in the Razim-Sinoe
Source: Own calculation.

Observe as in table 1and figure 1 that the largest number of people who have places: Sarichioi, with 4264 inhabitants, Corbu, with 3,559 inhabitants, because revolve area of economic influence of Constanta, Baia, with 3,090 inhabitants, located strategically on E87 European road, but some communes with a rich ethnic and cultural tradition, evidenced by the unity of the homeland population bud, which are made up of common people belonging to the community of Russian-Lippovan: Sarichioi and Jurilovca.
The numerical evolution of the population has decreased now because of the aging of the population and the massive migration of young people looking for a job.
The population density in the study area has a mean of 22.7 inhabitants / km^2, value very low as compared to that at the regional level (79.1 inhabitants / km^2) and to the national average, 90.3 inhabitants / km^2 registered on 1 July 2010. This is justified by the specific relief.
In terms of population distribution by types of environments, the rural population to 80%, given that this sector is comprised one city with relatively small populations.

Table 2. Distribution of population by gender and in the Razim-Sinoe 2014

Year 2014	Razim-Sinoe sector		Romania	
	Men (%)	Ladies (%)	Men (%)	Ladies (%)
Urban	48.7	51.3	47.9	52.1
Rural	50.8	49.2	49.8	50.2

Source: National Institute of Statistics, Tulcea County Council

Fig. 2. Distribution of population by gender and in the Razim-Sinoe 2014
Source: Own calculation.

The proportions are different than the national averages: for urban areas in the country meets a rate of 52.1% women in the Razim-Sinoe, the percentage is 51.3%; there is a slight predominance of the male population in rural areas, 50.8% versus 49.8% average for the entire country, and women contain more than 49.2% in the Razim-Sinoe to the country where there is a percentage of 50.2% (Fig.2).
By ethnicity, the population is fairly homogeneous. Thus, largely as a percentage of 89.9% of the population in the 2002 census are Romanian, 5.2% Lippovan Russian, Turkish 1.5%, 1.2% Russians, 1% Rroma and 1, 2% other nationalities.
Among the components that determine the evolution numerical population stands two types of population movements: the natural movement of the two phenomena that capture, birth and death rates and migratory movement.
In 2014, the sector analyzed, the birth rate was 9.7 ‰ value. At the local level is observed significant variations in birth rate from 14.7 ‰ in common Mihai Viteazu, from 5.4 ‰ in Valea Nucarilor.
The mortality rate in 2014 was in the Razim-Sinoe value of 10.8 ‰, value lower than the figure for Romania 12 ‰. Higher values of mortality over 20 ‰ settlements are recorded in Ceamurlia de Jos and Murighiol.
Places where mortality rates have values less than the country is recorded at Mihai Viteazu 9.4 ‰ and 9.2 ‰ in Corbu . In these places there was a migration of young people due to the affordability of land, which they have purchased and built their homes.
Regarding the migratory movement of the population from the Razim-Sinoe, we can say that internal migration at regional level, while not affecting the total population, causing important changes in its structure ages and sexes of the population, so the two areas social, urban and rural, and in territorial administrative (Table 3).

Table 3. Migratory movement of the population in the Razim-Sinoe

Areas	People		Hip migration	Spore %
	Established	Left		
Razim Area	462	558	-96	-3.3‰
Sinoe Area	392	209	183	4.7‰
Babadag Area	328	378	-50	-2.5‰

Source: National Institute of Statistics, Tulcea County Council

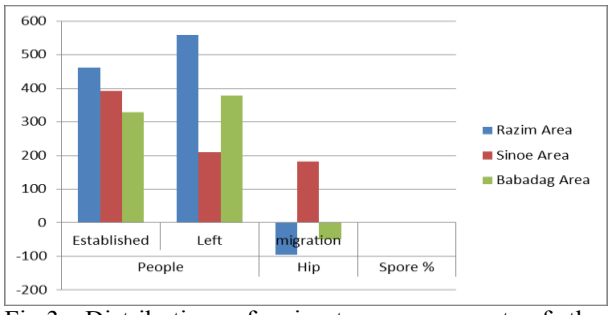

Fig.3. Distribution of migratory movement of the population in the Razim-Sinoe
Source: Own calculation.

The data shown in table 3 is observed that the negative balance of migration were recorded in the area Babadag, with values of -50 and in the Razim, with values of -96.
Consistent with this, meets a negative migratory growth in the area Babadag is -2.5%, and Razim -3.3%, led to the closure of many business units generated cee needles population displacement looking for a job. Positive migration growth is registered in the Sinoe determined on tourism.

The structure of economic activities

For spatial analysis of economic activities present in the study area was used three indicators are features for economic processes of the administrative units components (according National Institute of Statistics): the number of active local agents, defining the dominant economic profile; number of salaried employees of local businesses that causes the utilization of human resources in the economy; the turnover of the business units, indicating the level of achievement in economic activities.

Distribution activities in the number of active local business units, sales value and number of employees in the territory in 2014, resulting from the territorial level, that:
-The most important activity in terms of number of active local businesses is trade, with 50.83% of the total active units;
-Manufacturing attract the largest number of employees, 44.98%, is from this point of view, the most important activity. Manufacturing is followed in this trade indicator 19.37% and 10.38% of construction;
-In terms of economic results in 2014, the most important activity was manufacturing, followed in order by trade, construction and transport;
-In terms of productivity per employee were the most profitable activities in trade, manufacturing and agriculture, which recorded average values over the county.
Group active in local businesses after the turnover and number of employees, the first economic sectors of activity, it highlights the economic profile of the studied territory. This is:
a)third in terms of number of active economic agents;
b)secondary in terms of turnover and number of employees;
c)in profitability, turnover per employee, the most profitable is the tertiary sector (Table 4 and Figure 4).

Table 4. Statement of local economic units active at Danube Delta Biosphere Reserve presentation of turnover and number of employees within the area, the main economic sectors of activity (2014)

Sector	Number of agents	% the total area	Number of employees	% the total area	Fiscal value (thousands RON p.c.)	% the total area	Turnover / employee (RON / employee)
Primary	357	6.67	2,944	8.98	196,643	6.2	66,795
Secondary	757	14.14	18,475	56.36	1,739,198	54.88	94,138
Tertiary	4,241	79.20	11,363	34.66	1,233,424	38.92	108,547
Total area	5,355	100	32,782	100	3,169,266	100	268,712

Source: National Institute of Statistics, Tulcea County Council

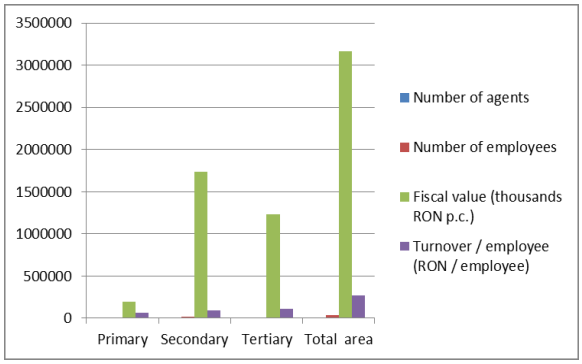

Fig. 4. The distribution of economic activity in the Danube Delta sectors Biosphere Reserve
Source: Own calculation.

In terms of diversity of economic activities of the area, as evidenced by CAEN classes, in the studied area there are over 100 specific activities with a distinct variability in space.
Analyzed the economic centers, diversity of activities is as follows: Babadag - 44, Corbu - 29 and a minimum in Istria, Ceamurlia de Jos -7 respectively.
Administrative-territorial units which have a large variety of economic activities are more likely development is not dependent on one or a small number of activities (table 5).

Table 5. Activities on the territorial administrative units as CAEN classes

Territorial administrative unit	Total classes CAEN/ u.a.t	Territorial administrative unit	Total classes CAEN /u.a.t
Babadag	44	Ceamurlia de Jos	7
Murighiol	19	Jurilovca	23
Valea Nucarilor	19	Corbu	29
Sarichioi	24	Istria	7
Baia	25	Săcele	8
Mihai Viteazu	13		

Source: National Institute of Statistics, Tulcea County Council

Economic diversity index administrative units grouped into classes of intervals:
a)2.5-5% (based on total economic activity which includes all reference judeţul- total value is 278 u.a.t.) - Ceamurlia de Jos, Mihai Viteazu, Istria, Sacele-in this interval are included administrative units with low diversity;
b)units with a value of 5.1 to 10% relative to

the benchmark, are municipalities Sarichioi, Baia, Jurilovca, Murighiol Valea Nucarilor-average reflects a diversity of CAEN classes, representing possible development centers of activities;
c)10.1 to 25% -Babadag, Corbu: centers with a diversified economic activity in the territory polarizing study(figure 5).

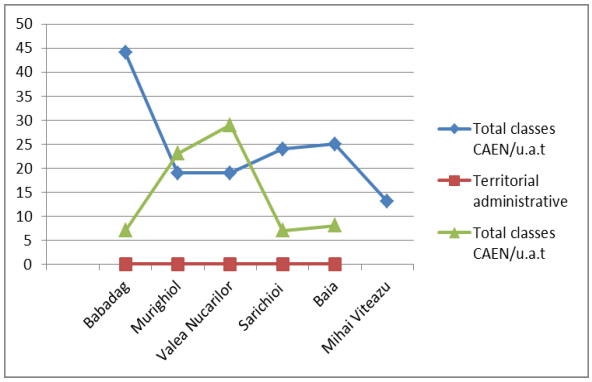

Fig.5. The distribution of economic activities on the territorial administrative units according to CAEN classes
Source: Own calculation.

The analysis group administrative units according to the main economic indicators resulted delineation of three structural zones, named after the centers of polarization of economic activities in their territory, they are: Murighiol, the Babadag and Corbu (table 6).

Table 6. Distribution of local businesses active in the 3 areas, the main sectors of activity, 2014

Area	Primary	%	Secondary	%	Tertiary	%	Total
Murigiol	23	15.33	10	6.67	117	78	150
Babadag	77	17.26	72	16.14	297	66.59	446
Corbu	18	15.25	15	12.71	85	72.03	118
Total	118		97		499		714

Source:Master Plan, Danube Delta Biosphere Reserve, developed by Danube Delta National Institute for Research and Development

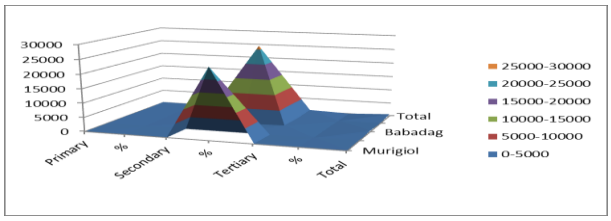

Fig. 6. Distribution of local businesses active in the main sectors of activity, 2014
Source: Own calculation.

Following the processed data in Figure 6 is observed that in Murighiol 15.33% of the activities are conducted in the primary sector, 6.67% in the secondary sector and the tertiary sector 78%.
In the area of Babadag, the percentages are different: 17.26% in the primary sector, 16.14% 66.59% in the secondary and tertiary sector.
In Corbu, the percentages are as follows: 15.25% in the primary sector, 12.71% 72.03% in the secondary and tertiary sector.
Murighiol Area, 2 administrative units: Murighiol and Valea Nucarilor is the most representative.
Babadag administrative area comprises 4 units: Baia, Ceamurlia de Jos, Sarichioi and Jurilovca is polarizing center of Razim-Sinoe region.
Area Corbu, comprises four administrative units in Constanta County: Corbu, Mihai Viteazu, Istria, Săcele. Năvodari road artery-Istria-Săcele-Mihai Viteazu, contribute to the development of economic activities in the territory area.
After distribution of active local agents and the number of employees, that Murighiol has a predominantly primary profile, a profile Babadag area primary-tertiary and secondary-tertiary in Corbu .
CAEN -represents acronym to refer to the national statistical classification of economic activities in Romania (classification of economic activities in Romania).

Fishing

The representative activity is the fishing area is conducive to the development of such an activity, often combined with agrotourism.On the surface analyzed territory can talk about the existence of an economic activity, namely fish farming on an industrial scale, organized specially designated areas.
Fisheries can be categorized fish biology, fishing methods and areas, so there are two major profiles can then classify fisheries: of freshwater fish (predominantly) and marine fish in the marine area (often mixed profile).
Commercial fishing in inland waters are conducted in natural water basins constituting national public domain, respectively Razim-Sinoe, canals and lakes adjacent.
Fishing is done with fixed gear or mobile, using small fishing boats. The number of fishermen formally rises 414 people organized

in 12 associations of professional fishermen located at: Sarichioi, Sabangia, Dunavăţ, Holbina, PopinaHolbina, Jurilovca, Iazurile, Murighiol,Plopu, Istria, Sinoe, Nuntaşi.

Dynamics catches

a)the marine sector

By 1980, the share of fisheries in the Black Sea coast was small, representing only 8% of the total catch of marine and oceanic fisheries, being produced by a stationary fishing along the coast between Sulina and Mangalia.

Since the 80s, along with passive fishing when it took the active fishing by establishing inshore fishing fleet (vessels traler first 2 - 25m), catches have doubled.

After 1990, the decline begins by gradually reducing fishing activities, especially fishing effort, the decrease in equipping .Capturile made plummeted by half, continuing a decline from year to year.

b)the internal waters

Inland fish production has decreased by nearly seven times the period until 1989. After 1990, with the privatization of the fishery occurred reduce total domestic fish production from 74,000 tons in 1989 to less than 10,000 tons at the moment. A similar evolution took and inland fisheries, which decreased from 19,582 tons to 8,000 tons at present. Before 1989 the total fish production of Romania (including ocean fisheries) approaching 300,000 tons / year and we ranked 3-4 in Europe.

Agricultural potential land use

The main categories of land use are the agricultural land (arable, pasture and hayfields, orchards and vineyards), forest vegetation surfaces, surfaces occupied by water, roads and railways, construction (table 7).

Regarding agricultural land can be seen in table 7 that the largest share is occupied by arable land at a rate of 80.4%, followed by, as a percentage of use of pastures and hayfields 16.6%, vineyards and vine nurseries 2.5% orchards and nurseries 0.5%.

Regarding the structure of land ownership, they belong to the state and private owners.

Table 7. Use of the land at Danube Delta Biosphere Reserve

The land	%
The total area of Danube Delta Biosphere Reserve, of which:	100
Agricultural, of which:	**41.22**
- arable	80.4
- pastures and hayfields	16.6
- vineyards and vine nurseries	2.5
- orchards and nurseries	0.5
Forests and other forest land	**9.5**
Wetlands	**49.2**

Source: National Institute of Statistics, Tulcea County Council

Reed and valorization

Sulfur forms prevalent in Danube Delta Biosphere Reserve phytocoenosis, covering about 160,000 hectares, of which 100,000 ha is monodominant reed community.

Physical-geographical (relief, climate, water, soil) and the hydrobiological is a habitat very favorable development associations reed, which gives the area the Danube Delta and Razim-Sinoe as the region most representative and most extensive from Europe.

Sulfur is used in traditional rural home economics in various purposes: as a building material, fuel and animal feed (in the first vegetation).

Reed as construction material is at the right height over 2 m and a diameter greater than 10 mm. The marine area characterized by greater resistance to degradation over time, is requested as a building material.

Reeds as biomass traditionally used for grazing (cattle) when young, as an energy source by the locals in the cold. Household goods such as carpets, soft furnishings, curtains, separation walls, fences, shelves or shade greenhouses. It is also used for making weaving to protect dams banks and erosion.

Sustainable tourism takes into account the basic principles of sustainable tourism and respects people, the environment, culture and local economy of the host region.

The relationship between these three pillars is represented by a conceptual model called triangle of sustainability. Consistent with this model, society is divided into three groups named sizes:

- The human dimension: population,the elements for health, knowledge, training, culture;

- Environmental dimension: natural resources, environmental quality, biological diversity;
- The economic dimension: technology, real estate, funds.

Sustainable development aims to maintain a balance between the three primary dimensions, both locally and nationally and internationally. Recently, the three dimensions mentioned above, was added a fourth dimension to the conservation of cultural heritage and traditions of the peoples[4].

The impact of tourism development on protected areas

a)The potential benefits of tourism in protected areas

Table 8. Benefits of tourism in protected areas of the Razim Sinoe

OBJECTIVES	BENEFITS OF TOURISM	WAY POSSIBLE
ENHANCING ECONOMIC OPPORTUNITY	- increasing the number of jobs; -increased revenue; - encouraging local manufacture of goods; - generating additional revenue from local taxes	- increasing the number of visitors; -extension of the streets of your stay; - provision of adequate accommodation, site-specific, combined with providing guidance information in Danube Delta Biosphere Reserve ; - events in host regions (festivals, concerts, fairs) -Use as possible with local food and drink.
CULTURAL AND NATURAL HERITAGE PROTECTION	- biodiversity conservation; - protection, preservation and valorisation of cultural and built heritage; - improving local facilities, transportation and communications	- encouraging local communities to maintain or establish the organization of cultural festivals, traditions and events with local and even to undertake the restoration of the built heritage; - Awareness of the local population to support ecological restoration and conservation actions through sustainable use of resources
IMPROVING QUALITY OF LIFE	- Promotion of the values of the aesthetic, spiritual and of all other values that bring the welfare of the population; - increasing the level of intercultural exchanges; - encouraging local people to appreciate their culture and environment	- development of tourism facilities and services which may be of benefit to local people's living conditions; - improving communication; -Improve the educational process

Source: Danube Delta National Institute for Research and Development

Tourism in protected areas produce both benefits and costs, requiring planning and development of tourism activities in order to gain an advantage in your interest to tourists in order to improve the quality of life to anyone else on that area(table8)[5].

b)The negative impact of tourism in protected areas

Negative effects can be, and sometimes are the result of the presence of tourists, but many of these can be controlled and softened.

Anthropogenic negative impact on the environment is generated from the following: the occurrence of roads and recreational vehicles;overdevelopment and overpopulation areas generated by the emergence of new guesthouses; improper storage of large quantities of waste generated by population and tourists; disturbance of wildlife; impact on habitat; destroying boats sandbars and banks; overfishing, especially of juveniles, increasing fire risk; compaction or erosion of soil damage archaeological sites; taking "souvenirs" of flora and fauna[5].

LOCAL COMMUNITY	GOVERNMENT, MINISTRY OF TOURISM	TOURIST INDUSTRY
TOURISTS	STAKEHOLDERS	GROUPS PRESSURE
VOLUNTARY SECTOR	EXPERTS, SPECIALISTS IN EDUCATION	MEDIA

Fig.7. Actors of sustainable tourism
Source:Master Plan, Danube Delta Biosphere Reserve, developed by Danube Delta National Institute for Research and Development

The institutions involved in sustainable tourism in the Danube Delta Biosphere Reserve are both individuals and the community's ability overseeing and coordinating all activity in detail. They are found in figure7 presented. Individuals must conduct a tourist activity in accordance with existing environmental conditions that do not adversely impact negatively and state institutions supervise and coordinate all this activity[6].

Suitable forms of tourism in the sector Razim Sinoe

In Romania especially in geographical areas close to water highlights specific types of tourism, which is distinguished from other forms of tourism in areas with higher altitudes.

In the Razim Sinoe area meet as forms of tourism: tourism heliotherapy, sports tourism, rural tourism, eco-tourism, scientific tourism, health tourism, tourism movement[8].

Heliotherapy tourism is a form of leisure tourism, which has seen great development, with increasing stress and occupational illnesses caused by the stress of modern life in large conurbations.

The resort which absorbs the largest number of tourists in this category is Portița-Perișor.

Sports tourism is a form of leisure tourism motivated by the desire to learn and practice different sports activities as a consequence of increasingly stronger sedentary urban population lives today.

The most important weight in sports tourism occupies summer water sports (rowing, water skiing), plus the desire to conquer nature walks and tours, fishing and hunting sports. This form of tourism is practicable over the whole area of water surface of the lake complex.

Rural tourism is practiced anywhere in the studied area, noting that the level of services offered varies from local to local or accommodation[8].

Ecotourism is a form of tourism in a responsible manner to areas with natural potential, in the interests of the local population and environment.

This form of tourism is part of the environmental tourism links with cultural and rural tourism, representing a growing niche market for tourism offer.

Scientific tourism, practitioners, researchers, students, being favored by the vast natural diversity within Danube Delta Biosphere Reserve[10].

Spa tourism is done by checking curative qualities of sludge silts from Murighiol indicated for the treatment of chronic rheumatism.

The geographical position of the territory, the beautiful landscape along the walking trails and the large number of tourist attractions valence aesthetic, cultural, historical and scientific itinerant make tourism / travel movement to be formade specific area[5].

For practicing tourism traffic required a number of measures: modernization of touristic routes, development of trade specific provision of accommodation and food services in the main towns on the tourist routes, increased promotional activities.

To achieve sustainable tourism is envisaged and technical equipping of a territorial public utilities: water supply and sewerage of settlements, transport networks and waste management.

Urban technical equipping of the territory

The development of tourism in rural areas is fueled by the technical urban amenities here including the water supply and sewerage, waste management and transport networks.

a)Water supply and sewerage

Total population in the study area is 50.074 inhabitants, according to statistics from 2009. Hydro-studied area of the settlements is a problem, both in terms of water supply and sanitation in the and wastewater treatment.

The current situation of localities that have piped water supply, sewerage and wastewater treatment in the study area is presented in following table (Table 9) [7].

Table 9. Sewerage network in the Lagoon Complex Razim-Sinoe

Subzone	Locality	Water supply systems	Sewer systems	Length of water network (km)	Treatment plant capacity (m^3/day)
Razim	Ceamurlia de Jos	X	running	18.6	182
	Jurilovca	x	X	31.4	1,540
	Murighiol	x	running	26.8	410
	Sarichioi	x	running	35.5	1,152
	Valea Nucarilor	x	-	13	410
Sinoe	Corbu	x	-	17.7	320
	Istria	x	-	14.8	350
	Mihai Viteazu	x	-	6.3	960
	Săcele	x	-	13.5	260
Babadag	Babadag	x	X	70	3,360
	Baia	x	X	12.8	967

Source: National Institute of Statistics, Tulcea County Council, Department of Public Works

All localities of the study area are supplied with water and wastewater sewage system exists in 3 localities and in 3 is running. In most towns water supply and sanitation centralized wastewater system is undergoing modernization and expansion to meet the quality requirements of the rules[6].

For all systems related to water supply in the area, the water source is surface water.În the Razim-Sinoe groundwater is characterized by an aquifer located at shallow depth, influenced by the relationship between hydrostatic level fluctuations Danube water levels.

The problem of wastewater collection is the great failure of settlements in the study area, with major implications for the protection of groundwater resources and surface water[10].

b) Transport networks

1)The network of roads

The analysis of data provided by the National Institute of Statistics, regarding the fitting of public roads (national roads, county roads, roads) in the study area, that road network comprises 2 routes roads, of which route European road E87 and county and village roads[6].

National roads are modernized, mostly with a good technical condition regarded as inconsistent as local roads, county and municipal why are modernized in a very small percentage, with technical condition deemed inappropriate.

Township roads, mostly not Tread ensure appropriate deployment of passenger traffic safely and as optimum comfort[10].

The existence of unsuitable roads or lack of certain disadvantages: difficult Seamless links between the various townships of joint or common; difficult access between municipalities and municipality, which makes local residents remain partially isolated from the center of residence; slow recovery of its products (milk, meat, agricultural products), reduced tourism potential in the area.

2)The network of railways

The area is traversed by the railway simple 804-Babadag Tulcea Medgidia with a total length of 97 km electrified. Railroad bridge linking Tulcea and Bucharest (2 daily) and Tulcea-Constanţa (4 daily flights). The technical condition of the railway network is generally good. Level technical condition of facilities and lines do not allow higher speeds of 60-80km / h (on the railway network there are areas affected by natural phenomena such as floods, landslides and erosion and subsidence of railway embankments). North-south railway stations serving analyzed territory are Zebil halt, railway Babadag, Ceamurlia de Jos, Baia and MihaiViteazu[9].

3)Network airways

Airport proximity of Tulcea, serves and study area, as well as one of Tulcea County. It is located 17 km from Tulcea and 3 km to the town charter and operates Cataloi.Aeroportul continuously provide flight services for agriculture and health. For a better functioning were executed a series of modernization works (the airport has a concrete runway of 2000x30 m, 7.5 m mower and a taxiway for 150x17m) [9].

c) Waste management

In rural areas, where the amount of household waste is reduced, there are no systems for collecting household waste, waste from being disposed of rural households in areas of land in the wrong location. Waste deposited on these surfaces are animal waste (manure, scraps of plant breeding activity) and biodegradable waste in quantities less packaging, glass, paper, plastic, metals.Waste disposal situation is shown in following table (Table 10).

Table 10. Situation landfill space

Locality	Storage as pit		Storage form of platform	
	Surface (ha)	Distance from the housing (m)	Surface (ha)	Distance from the housing (m)
Jurilovca	2	500	to dismantle	-
Murighiol	-	-	2	-
Plopu	-	-	1.5	-
Sarinasuf	-	-	1.5	-
Colina	-	-	0.8	-
Dunavățu de Sus	-	-	1	-
Dunavățu de Jos	-	-	0.8	-
Ceamurlia de Jos	-	-	1.2	100
Lunca	-	-	0.8	1,100
Sarichioi	0.6	40	1.5	200

Source: National Institute of Statistics, Tulcea County Council, Department of Public Works

Generally is not controlled waste disposal, storage is open, without leveling and coverage. Due to limited financial resources, landfill of waste from villages generally are not fenced, signposted and because of this expanded existing deposits on surfaces larger than the original perimeters ramps[10].

Recommendations

At present, on an international scale, tourism is characterised by strong competition between destinations.

And development of sustainable tourism management practices are applied to all forms of tourism in any destination, including mass tourism and other tourism segments varied.

Thus, to achieve sustainable tourism in the Razim Sinoe, we recommend the following:

- To use the resources optimally environment

is a key element in tourism development, maintaining essential ecological processes, helping the conservation of natural heritage and biodiversity;
- Respect the socio-cultural authenticity of host communities to preserve their cultural heritage existing traditional values and contribute to intercultural understanding and tolerance;
- Ensure economic stability and long-lasting, providing socio-economic benefits for all participants, including stable employment, social services for the community to contribute to poverty alleviation;
Extrapolating these aspects of sustainable tourism, reveals that they are impetuous needed six apply the sector more study than any other areas, given that there is contained a mosaic of ethno-cultural, hence the need for cultural integration and the preservation of traditions; another characteristic lies in the immense biodiversity and default start action and protection programs[9].

CONCLUSIONS

Thus, after processing the data provided by the authorities, we conclude that:
-The area study presents the following administrative-territorial structure: one city, Babadag, 10 communes with a total of 32 villages in the composition (including the common city of residence).
- The most important activity in terms of number of active local businesses is trade, with 50.83% of the total active units;
- Manufacturing attract the largest number of employees, 44.98%, is from this point of view, the most important activity. Manufacturing is followed in this trade indicator 19.37% and 10.38% of construction;
-The most representative activity is the fishing area is favorable for the development of such an activity, often combined with agrotourism.
-The main categories of land use are the agricultural land (arable, pasture and hayfields, orchards and vineyards), forest vegetation surfaces, surfaces occupied by water, roads and railways construction;
-Sulfur forms prevalent in the Danube Delta Biosphere Reserve phytocoenosis, covering approximately 160,000 hectares, of which 100,000 ha is monodominantă reed community.
- In Romania especially in geographical areas close to water highlights specific types of tourism, which is distinguished from other forms of tourism in areas with higher altitudes. In the Razim-Sinoe meet as a form of tourism: tourism heliotherapy, sports tourism, rural tourism, eco-tourism, scientific tourism, health tourism, tourism movement.
Tourism in protected areas produce both benefits and costs, requiring planning and development of tourism activities in order to gain an advantage.
Negative effects of tourism can be, and sometimes are the result of the presence of tourists, but many of these can be controlled and mitigated through constant care tourists for the environment and careful supervision by authorities in the field.
Razim Sinoe area meet as forms of tourism: tourism heliotherapy, sports tourism, rural tourism, eco-tourism, scientific tourism, health tourism, tourism movement.
Tourism development to the highest standards required a series of measures: modernization of touristic routes, development of trade specific provision of accommodation and food services in the main towns on the tourist routes, increased promotional activities.

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RESEARCH ON CONCENTRATION OF PORK PRODUCTION IN ROMANIA

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Abstract

The paper aimed to analyze the concentration of pig livestock and pork production in Romanai between 2007-2014 based on the empirical data provided by National Institute of Statistics. Pork production declined due to the continuous pig livestock decrease. Pig distribution is relatively uniform by micro region of development. The West region is in the top for the pig livestock and pork production. It is followed by South Muntenia and South East regions. In all the other regions, pork production declined. The lowest pork production is in Bucharest-Ilfov area. The values of Herfindahl-Hirschman Index varied between HHI=0.137 in 2007 and HHI= 0.154 in 2014, while the Gini-Struck coefficients ranged between GS=0.119 in 2007 and GS=0.159 in 2014, reflecting a good uniformity of production distribution but also a slight trend to a moderate uniformity to the end of the period. As long as domestic production is not enough to cover consumption, pig breeders should be supported to increase production, otherwise they will fail and imports will continue to cover market demand because of the overproduction in the Western countries.

Key words**:** *concentration, Gini-Struck Coefficient, Herfindahl-Hirschman Index, pork production, Romania*

INTRODUCTION

Pork meat represents 22.6 % of meat output. With 6.6 million pigs, Romania comes on the 8th position in the EU. About 79 % of pigs are raised in small family farms practicing an extensive growing system and only 19.2 % are grown in commercial holdings with vertical integration. (Moldovan, M., 2010) [3]
About 45 % of meat production is represented by pork, because pork is traditional in Romanian's diet. As meat production does not cover consumers' need, imports have deeply grown and about 70 % of the domestic demand is covered by import (Nistor, et al, 2010)[4], Soare, E. et al., 2015) [8].
In meat consumption per inhabitant, pork comes on the 1st position (34.18 kg), poultry meat on the 2nd position (21 kg), and beef on the 3rd position (Popescu Agatha, 2013) [5].
The distribution of pork production is different from a region to another being influenced by a large range of factors: number of pigs per farm, extensive of intensive growing technology, quality of the biological material, feeding, and live weight at delivery, local technical and economical conditions.
In this study, pork production was considered only depending on pig livestock and its distribution in the territory of Romania, all the other factors being considered constant.
The purpose of the paper was to analyze the trend of pig livestock and pork production in the eight micro regions of Romania, the dispersion in the territory of these two indicators using Gini-Struck coefficient and Herfindhal-Hirschman Index which are commonly used when concentration is studied.

MATERIALS AND METHODS

In order to set up this paper, the following indicators were taken into account: number of pigs at national level and by micro regions and pork production at national level and its distribution by micro region. Also, it was presented the situation of the share of pork production in total meat production at national level, pork consumption and its share in meat consumption per inhabitant, and also the dynamics of meat price per kg live weight.

The empirical data were collected from Romania's Statistical Yearbooks, 2008-2015[6], and also from Tempo-online Data base of the National Institute for Statistics[9]. The period of reference was 2007-2014.
The Herfindhal-Hirschman Index was calculated according to the formula:

$$\text{H-H} = \sum_{i=1}^{n} g_i^2 \qquad (1)$$

where n is the number of micro regions of development, in Romania i=1,...8, and g_i^2 is the square of the share of each micro region in the total value of the analyzed indicator, in this case, pig livestock and respectively, pork production. The H-H Index values ϵ [0,1].
The Interpretation of the H-H Index is the following one: (i) H below 0.01 indicates a high uniformity among the micro regions regarding either pig livestock or pork production; (ii) H below 0.15 indicates an unconcentrated status of pig number or production; (iii) H between 0.15 to 0.25 indicates a moderate concentration;(iv) H above 0.25 a relative high concentration and (v) H over 0.5 means a high concentration of production, producing high discrepancies among regions. (Hirschman, A.O., 1964)[1]
The Gini-Struck coefficient was determined using the formula:

$$\text{GS} = \sqrt{\frac{n\sum_{i=1}^{n} g_i^2 - 1}{n-1}} \qquad (2)$$

The values of GS coefficient ϵ [0,1]. Therefore, a similar interpretation could be given to the results. If the GS value is close to zero, it is equity regarding the dispersion of pigs or pork production among the micro development regions. If the GS value is close to 1, this means a huge inequality among regions.
In general, when the value exceeds 0.5, it is about a high concentration. When, the value is higher than 0.3, it is about a relative concentration (Iosifescu, et al., 1985[2], Săvoiu, G., 2009 [7].
The results were tabled and graphically represented and the corresponding comments were made.

RESULTS AND DISCUSSIONS

The pig livestock in Romania declined by 23.2 % from 6,564.9 thousand heads in 2007 to 5,041.7 thousand heads in 2014. Among the main causes of this declined have been the following ones: the high price of farm inputs, the high production cost, the small price per kilogram live weight offered by meat processors and the lack of support for the Romanian pig farmers, the cheaper pork imports in the market, the orientation of consumers to chicken meat, a healthier and cheaper sort of meat.
(Fig.1.)

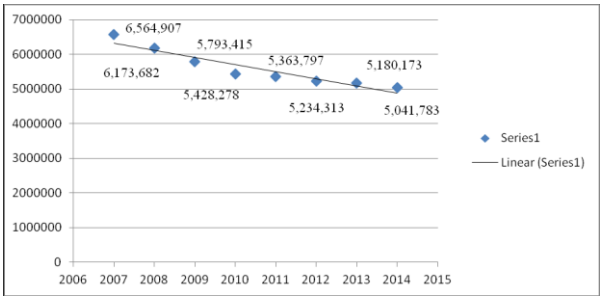

Fig.1.Dynamics of Pig Livestock, Romania, 2007-2014 (heads)
Source: Romania's Statistical Yearbook, 2008-2015[6], Own design.

Pork production also declined, being determined by the number of slaughtered pigs, and their live weight at slaughter. In 2014, pork production accounted for 535 thousand tons, being by 16.67 % less than in 2007, when it accounted for 642 tons.(Fig.2.)

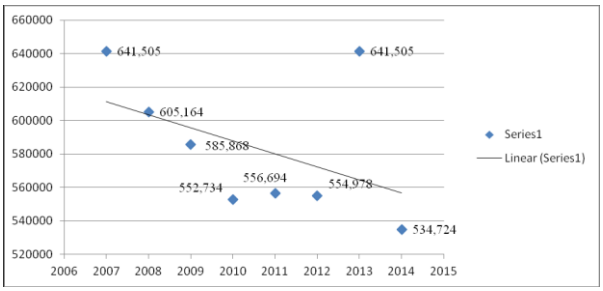

Fig.2.Dynamics of Pork Production, Romania, 2007-2014 (tons)
Source: Romania's Statistical Yearbook, 2008-2015 [6], Own design.

The share of pork production in total meat production in Romania varied from a year to another, between the minimum 40.51 % in 2009 and the maximum 49.44 % in 2013. In

2014, its weight accounted for 40.64 % compared to 42.68 % in 2007. Therefore, it was noticed a slight decreasing trend. (Table 1).

Table 1.The share of pork production in total meat production, Romania, 2007-2014 (%)

2007	2008	2009	2010	2011	2012	2013	2014
42.68	42.43	40.51	42.34	41.02	41.65	49,44	40.64

Source: Romania's Statistical Yearbook, 2008-2015 [6], Own calculations.

The average pork consumption/inhabitant declined by 10.5 % from 33.4 kg/capita in 2007 to 29 kg/capita in 2014, due to the high pork price at consumer level and orientation of consumers to chicken meat which is cheaper and with less cholesterol.

The weight of average pork consumption in the total meat consumption varied from a year to another, with a maximum 57.3% in 2010 and the minimum 50 % in 2007. In 2014, pork consumption represented again 50 % in the total meat consumption like in the year 2007. (Table 2).

Table 2. Average pork consumption compared to meat consumption/inhabitant in Romania, 2007-2014 (kg/capita)

	2007	2008	2009	2010	2011	2012	2013	2014	2014/2007 %
Average pork consumption	32.4	34.6	34.3	33.3	30.5	29.6	29.1	29	89.50
Average meat consumption	64.7	66	67.3	59.9	56	55.3	54.4	57.8	89.33
Share of pork (%)	50.0	52.4	50.9	57.3	54.5	53.5	53.5	50.2	-

Source: Own calculations based on National Institute of Statistics, Tempo-online Database, 2008-2015 [9]

The average farm gate price per kg live weight increased by 75 % from Lei 3.55/kg in 2007 to Lei 6.20/kg in 2014. However, the acquisition price is still very low compared to production cost, whose level is deeply determined by the cost of the farm inputs.(Fig.3.)

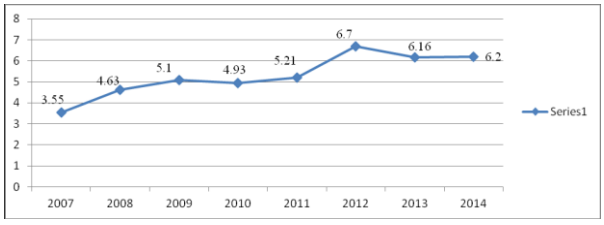

Fig.3.Dynamics of average farm gate price for pig live weight (Lei/kg)
Source: Own calculations based on National Institute of Statistics, Tempo-online Database, 2008-2015[9]

The dispersion of pig livestock in the territory by micro regions of development reflects theta the most numerous pigs are in the West region (18.77%, followed by South Muntenia region (17.72 %), South East region (16.12%), North West region (13.38 %0 and South West Oltenia region (12.41 %).

The lowest share pig livestock in the total pig livestock is recorded in Bucharest-Ilfov area (1.13 %).
The share of pig livestock has continuously increased in the West region from 14.75 % in 2007 to 18.77 % in 2014. Also, increased shares were noticed in the analyzed period in the South East region from 13.48 % in 2007 to 16.12 % in 2014 and in South Muntenia from 17.25 % in 2007 to 17.72 % in 2014.
In all the other micro regions: North West, Centre, North East, Bucharest Ilfov and South West Oltenia, the share of pig livestock in the total number of pigs in the country declined. (Table 3).
The concentration of pig livestock in terms of Herfindahl-Hirschman Index and Gini-Struck Coefficient confirms the same relatively uniform distribution of pigs on Romania's territory by micro regions.
Gini-Struck Coefficient varied between 0.119 in 2007 to 0.159 in 2014, reflecting a slight trend of loss in pig livestock concentration. Its

value ranged between the minimum value GS= 0,110 in the year 2009 and the maximum value GS= 0.159 in 2014.(Fig.4.)

Table 3. The distribution of the number of pigs by micro regions of development, Romania, 2007-2014 (%)

	2007	2008	2009	2010	2011	2012	2013	2014
Pig livestock (heads)	6,564,907	6,173,682	5,793,415	5,428,272	5,363,797	5,234,313	5,180,173	5,041,788
North West	13.48	13.67	13.01	12.67	12.69	12.95	13.14	13.38
Centre	11.58	10.43	10.49	9.78	9.96	9.78	9.45	9.59
North East	12.28	12.05	11.98	10.53	10.83	10.52	10.78	10.88
South East	13.48	14.01	14.97	16.72	16.22	15.92	16.24	16,12
South Muntenia	17.25	16.94	16.88	17.48	17.68	17.74	17.65	17.72
Bucharest-Ilfov	2.93	2.99	3.14	3.00	2.36	2.01	1.40	1.13
South West Oltenia	14.25	14.83	13.67	12.78	12.88	12.82	12.52	12.41
West	14.75	15.08	15.86	17.04	17.38	18.26	18.76	18.77

Source: Own calculations based on National Institute of Statistics, 2008-2015, [6]

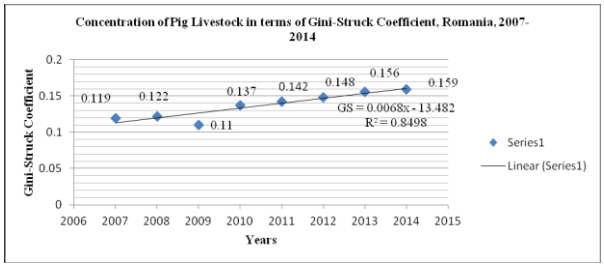

Fig.4.Concentration of pig livestock in terms of Gini-Struck Coefficient, Romania, 2007-2014
Source: Own calculations and design.

Herfindahl-Hirschman Index varied between HHI= 0.1375084 in the year 2007 and HHI= 0.1470814 in the year 2014, with the minimum value HHI= 0.1355987 recorded in the year 2009.

The values are small with a slight increasing trend like in the case of Gini-Struck Coefficient, reflecting a relative uniform dispersion of pig livestock on Romania's territory. (Fig.5.)

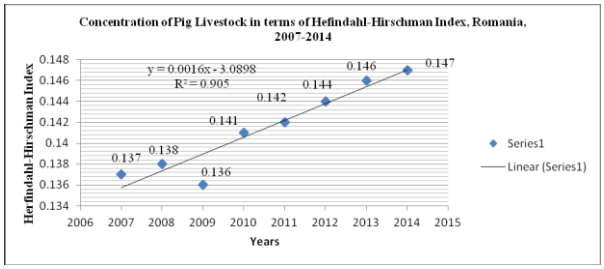

Fig.5.Concentration of pig livestock in terms of Herfindahl-Hirschman Index, Romania, 2007-2014
Source: Own calculations and design.

The dispersion of pork production in the territory by micro regions of development reflected that the most pork is produced in the West region with a share of 24.03 % in 2014 compared to 16.58 % in 2007 in the total pork production achieved in the country. In this area, pork production has continuously increased due to the pig number growth and also of a good pig live weight at slaughter.

Pig farming is deeply influenced by cereals production in the West Plain of Romania.

An ascending trend was also noticed in the South East region from 13.24 % in 2007 to 15.49 % in 2014.

In all the other regions, the pork production declined.

Bucharest-Ilfov area recorded the lowest share in total pork production, 3.1 % in 2007 and 1.3 % in 2014.(Table 4).

The concentration of pork production in terms of Herfindahl-Hirschman Index and Gini-Struck Coefficient is small, as the values of these indicators are closer to zero, reflecting a relative good uniformity in producing this sort of meat.

However, the evolution of Gini-Struck coefficient from 01.20 in 2007 to 0.183 in 2014 reflected a slight loss in pork production uniform dispersion in the territory.

The lowest Gini-Struck coefficient was GS= 0.109 recorded in 2008 and the highest one was GS= 0.195 registered in the year 2012.(Fig.6).

Table 4.The distribution of the pork production by micro regions of development, Romania, 2007-2014 (%)

	2007	2008	2009	2010	2011	2012	2013	2014
Pork production (tons)	641,505	605,164	584,868	552,734	556,694	554,978	641,505	534,724
North West	13.33	12.85	13.81	11.09	12.46	11.70	13.33	12.43
Centre	12.51	12.41	11.18	10.45	9.76	10.41	12.51	11.97
North East	11.65	11.40	10.86	10.49	9.99	10.62	11.65	10.17
South East	13.24	13.62	14.30	15.87	17.94	16.35	13.23	15.49
South Muntenia	17.13	17.29	16.82	17.71	14.51	14.47	17.12	15.52
Bucharest-Ilfov	3.18	4.05	3.38	2.31	2.06	1.82	3.19	1.31
South West Oltenia	12.38	13.15	10.74	9.57	9.07	8.74	12.39	9.08
West	16.58	15.23	18.91	22.51	24.21	25.89	16.58	24.03

Source: Own calculations based on National Institute of Statistics, 2008-2015[6]

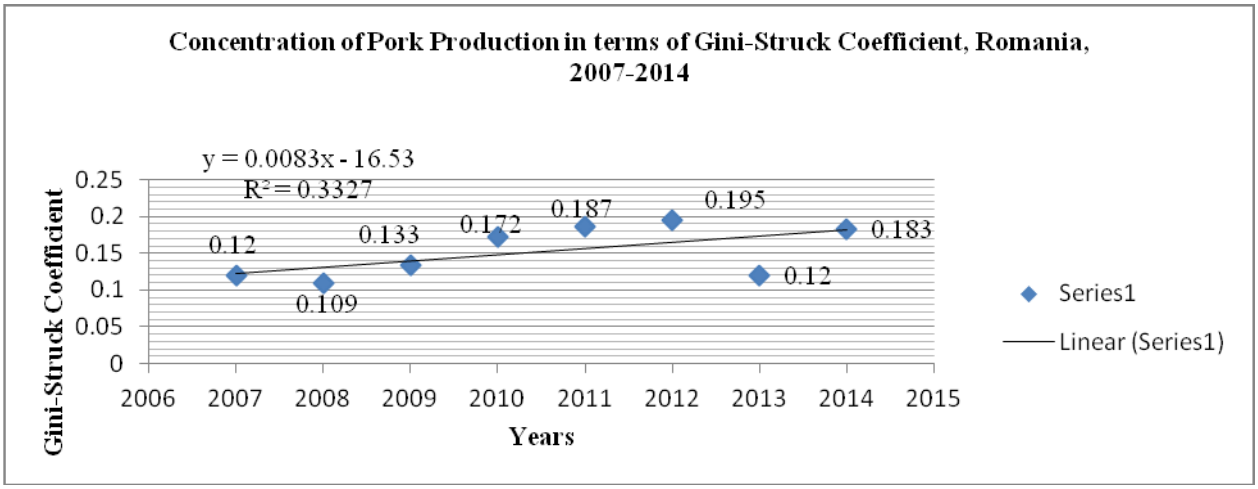

Fig.6. Concentration of pork production in terms of Gini-Struck Coefficient, Romania, 2007-2014

Source: Own calculations and design.

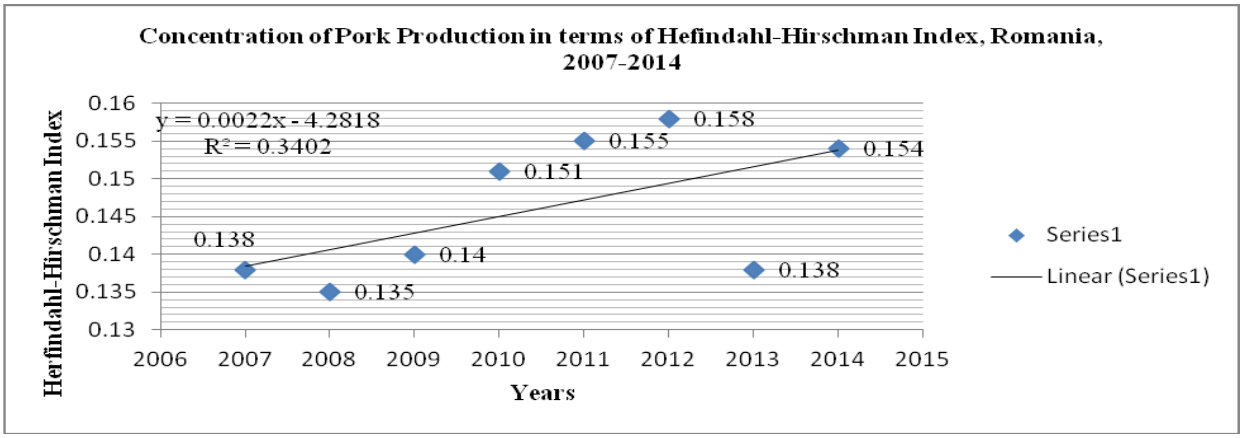

Fig.7.Concentration of pork production in terms of Herfindahl-Hirschman Index, Romania, 2007-2014
Source: Own calculations and design.

Herfindahl-Hirschman Index varied between HHI= 0.1376915 in the year 2007 and HHI= 0.1543624 in the year 2014, with the minimum value HHI= 0.1354814 recorded in the year 2008. The small values, close to zero, like in case of Gini-Struck Coefficient, showed a good dispersion of pork production on Romania's territory. (Fig.7.)

CONCLUSIONS

In Romania, pork production declined due to the continuous decrease in pig livestock. This is a consequence of high price of the farm inputs, the high production cost, the low acquisition price per kg live weight at slaughter, consumers' orientation to a lean meat like chicken meat, which is also cheaper than pork in the market, the lack of support for pig breeders and the embargo imposed by the EU-28 to Russia, which led to an overproduction in the community.

Pig dispersion in the territory is relatively uniform among the micro regions of development. The West region is in the top for the number of pigs, as here there are good conditions for raising this species favored by cereals production. Also, in South Muntenia region and South East regions the pig livestock increased for the same reason. In all the other regions, pork production decreased.

In Romania, pork production dispersion by micro regions reflected a relatively uniform cover of the population's meat demand. However, the highest pork production is produced in the West area and the lowest one in Bucharest-Ilfov area.

This trends were confirmed by the values of Herfindahl-Hirschman Index and Gini-Struck coefficients. They showed a good uniformity of production distribution but also a slight trend to a moderate uniformity mainly to the end of the period which is expected to continue in the future as illustrated by the trend slope and linear regression.

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RESEARCH ON THE ECONOMIC EFFICIENCY IN ROMANIA'S TOURISM

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Abstract

The paper aimed to analyze the economic efficiency in Romania's tourism in the period 2005-2014 using the Eurostat data base. In the analyzed period, Romania was visited by more tourists (+33%), more foreign tourists (+25 %), meaning by 46.93 % more tourists per inhabitant. Also, tourism receipts increased by 62%, and expenditures increased 2.44 times. But, tourism contribution to GDP which is just 0.9 %, very low compared to other EU countries, and Romania's contribution to EU-28 receipts is very small, just 0.24% and in a decreasing trend. The share of tourism receipts in export value is just 2.64 % and in a declining trend. Tourism receipts per international visitor increased by 33.88% not only because the increased number of foreign tourists, but also due to the high tariff per tourism services and high VAT practiced in Romania. Romania registered a deficit of - 446 Euro million in Tourism Payment Balance, and the TTC Index value was just 3.78 in 2015, placing Romania on the 66th rank. Despite its huge potential for tourism, Romania is not yet able to develop an efficient tourism. A permanent promotion and extend of services size and quality on various markets are required to increase economic efficiency and competitiveness of Romania's tourism.

Key words**:** *competitiveness, economic efficiency, EU-28, Romania, tourism*

INTRODUCTION

Tourism is the most dynamic sector of the world economy [4, 9]. Its development is based on innovative actions in the use with high efficiency of natural, material and human resources [3].

As an important driver, it has a deep impact on the economic growth, the diversification of the economy structure and the involvement in the global development [1].

Tourism plays an important role in the EU with deep implications on its economy, employment, environment. It is also an opportunity for people to discover their own country or other states and regions of the world, to meet other people and learn about their cultures and to develop a mutual respect for their patrimony values [12].

Tourism is a catalyst for change and economic growth by expanding its infrastructure and increasing the competitiveness of its human resources. This will have a positive impact on an increased number of tourist arrivals, visitors expenditures, tourism receipts, export growth and improvement of payment balance, as well as for the development of industry, trade, buildings sector and services (transport, banking, insurance, entertainment etc). [17]

After a period of decline, Romania's tourism started a recovery and the results obtained in the field during the last decade confirmed an optimistic image of the coming future for this branch of the economy [6].

Despite this positive trend, Romania's tourism is slowly developing and an analysis of its efficiency is needed in order to identify the possibilities to improve its growth and role in the economy. In Romania just a few studies approached economic efficiency in a restrained manner, mainly in terms of tourism contribution to GDP [5, 7, 8,].

In this context, the present paper aimed to analyze the economic efficiency in Romania's tourism in the period 2005-2014 using a large range of specific indicators, highlighting the difference compared to the EU-28 average and in some cases with other EU member states.

MATERIALS AND METHODS

The paper is based on the data provided by Eurostat Statistics Explained for the period 2005-2014 and other information sources which served for documentation.
The main aspects approached in this study were the following ones: evolution of the number of international arrivals, tourism intensity, international tourist arrivals/inhabitant, tourism receipts, tourism receipts/GDP, tourism receipts/inhabitant, tourism receipts/export, tourism receipts/import, tourism receipts/international tourist, tourism expenditures, tourism expenditures/GDP, net receipts from tourism in Payment Balance, expenditures per trip and per overnight stay, tourism and travel competitiveness index (TTCI).
The data were statistically processed using mainly the fixed indices and comparison method.

RESULTS AND DISCUSSIONS

Number of tourists. In Romania, the number of tourists increased by 33.70 % from 5,805 thousand in the year 2005 to 8,444 thousand in 2014. The number of foreign tourists increased by 25 % from 1,430 thousand in 2005 to 1,912 thousand in 2014.
The share of the international tourist arrivals of Romania in the EU-28 international tourist arrivals is very small, but it recorded a slight increase from 0.38% in 2005 to 0.42 % in 2014.
In 2010, it was noticed a bottleneck in the EU tourism and in Romania as well, as an impact of the economic crisis. But since 2010, it started a recovery.(Table 1).

Table 1. International tourist arrivals in Romania and EU-28, 2005-2014

	MU	2005	2010	2014	2014/2005 %
ROMANIA	THOUSAND	1,430	1,346	1,912	133.70
EU-28	MILLION	368	384	455	125.00
SHARE OF ROMANIA	%	0.38	0.35	0.42	-

Source: Own calculations based on Eurostat Data.

Tourism intensity. As a measure of how many international tourists arrived per 100 inhabitants both in Romania and in the EU-28, tourism intensity reflected the dynamism of this economic branch. The density of foreign tourists/100 Romanians accounted for 9.58 in the year 2014 compared to 6.52 in 2005. This was due to the growth of the number of international tourist arrivals by 25 %, but also due to the decreasing trend in Romania's population by 7.71 %.

Table 2. Tourism intensity-International tourist arrivals/100 inhabitants, Romania and EU-28, 2005-2014

	2005	2010	2014
ROMANIA	6.52	6.63	9.58
EU-28	80.17	76.34	89.74

Source: Own calculations based on Eurostat Data.

In the EU, the number of international tourist arrivals per 100 inhabitants registered an increase from 80.17 arrivals in 2005 to 89.74 arrivals in 2014 (Table 2).

Tourism receipts. In Romania, the tourism receipts increased by 62.42 % from 849 Euro million in 2005 to 1,379 Euro million in 2014. In the EU-28, it was noticed a similar growth by 65.30 %, but from 66,260 Euro million in 2005 to 109,532 Euro million in 2014. The share of Romania regarding tourism receipts in the EU-28 is very small: 0.36 % in 2005 and 0.24 % in 2014, as Romania comes on the last position concerning the number of tourists and receipts among the EU member states (Table 3).
The highest receipts from international tourism were recorded by Spain (49.010 Euro Billion), France (43.34 Euro Billion), Italy (34.2 Euro Billion), Germany (31 Euro Billion) and United Kingdom (30.585 Euro Billion).
Tourism receipts/GDP(%). The share of international tourism receipts in Romania's GDP is very small: 1.06 % in 2005, 0.68 % in 2010 and 0.92 % in 2014, the lowest level in the EU.

Table 3. Tourism receipts in Romania and in the EU-28, 2005-2014 (Euro Million)

	2005	2010	2014	2014/2005 %
ROMANIA	849	860	1,379	162.42
EU-28	66,260	76,630	109,532	165.30
SHARE OF ROMANIA (%)	0.36	0.33	0.24	-

Source: Own calculations based on Eurostat Data.

In 2014, the highest receipts/GDP were recorded in Croatia (17.2%), Malta (14.4%) and Cyprus (12.3%), while the lowest receipts/GDP were registered in Romania (0.9%), Germany (1.1.%), Finland (1.6%), United Kingdom (1.6%) and Netherlands (91.7%).

At the EU-28 level, the share of tourism receipts in GDP is enough small: 0.60 % in 2005 and 0.78 % in 2014 (Table 4).

Table 4.Tourism receipts/GDP in Romania and EU-28, 2005-2014 (%)

	2005	2010	2014
ROMANIA	1.06	0.68	0.92
EU-28	0.60	0.59	0.78

Source: Own calculations based on Eurostat Data.

Tourism receipts/inhabitant increased by 75.99 % in 2014, accounting for 69.13 Euro/capita, compared to 39.28 Euro/capita in 2005. In the EU-28, the tourism receipts per inhabitant increased by 50 % from 144.3 Euro/capita in 2005 to 216.06 Euro/capita in 2014.

Table 5. Tourism receipts per inhabitant in Romania and in the EU-28, 2005-2014 (Euro/capita)

	2005	2010	2014	2014/2005 %
ROMANIA	39.28	42.38	69.13	175.99
EU-28	144.30	152.99	216.06	149.73

Source: Own calculations based on Eurostat Data.

Therefore, compared to the EU-28 average, in Romania, in 2005, the receipts from international tourism were 3.67 times less while in 2014 they were 3.12 times less (Table 5).

Tourism receipts/Export ratio registered a decreasing trend in Romania compared to the EU-28 where it recorded an increase. In Romania, the decline of the share of tourism receipts in the export value from 3.81 % in 2005 to 2.62 % in 2014 is explained by the high growth of export in 2014 compared to 2005 (+135.87%), while the growth of tourism receipts was smaller (+62.42%).

At the EU-28 level, the growth of tourism receipts in the export value increased from 1.69 % in 2005 to 2.36 % in 2014. This results was due to the +65.30 % growth of tourism receipts compared to +18.38 % in export value (Table 6).

Table 6.Tourism receipts/Export value, Romania and EU-28, 2005-2014 (%)

	2005	2010	2014
ROMANIA	3.81	2.30	2.62
EU-28	1.69	1.96	2.36

Source: Own calculations based on Eurostat Data.

Tourism receipts/Import ratio. The share of tourism receipts in the import value registered a decreasing trend from 3.90 % in 2005 to 2.35 % in 2014, because import value increased by +168.99%, while tourism receipts increased by +62.42 %.

In case of the EU-28 average, it was recorded a growth from 1.63 % in 2005 to 2.41 % in 2007, explained by the slight increase of the EU import value (+11.88%) compared to the high increase in tourism receipts (+65.30%)(Table 7).

Table 7.Tourism receipts/Import value, Romania and EU-28, 2005-2014 (%)

	2005	2010	2014
ROMANIA	3.90	1.83	2.35
EU-28	1.63	1.90	2.41

Source: Own calculations based on Eurostat Data.

Tourism receipts/International tourist increased by about 33.75 % both in Romania and at the EU-28 level in the period 2005-2014.

At the EU-28 level, the average receipt/tourist recorded an increase from 180 Euro/tourist in 2005 to 240.72 Euro/tourist in 2014 with large variations from a country to another.

In Romania, the receipt/tourist increased from 539.7 Euro/tourist to 721.23 Euro/tourist (Table 8).

Table 8. Receipts per tourist from international tourism, Romania and the EU-28, 2005-2014 (Euro/tourist)

	2005	2010	2014	2014/2005 %
ROMANIA	539.7	638.9	721.2	133.88
EU-28	180.0	199.55	240.72	133.73

Source: Own calculations based on Eurostat Data.

Tourism expenditures increased in Romania by 144.31 5 from 747 Euro million in 2005 to 1,825 Euro million in 2014, while at the EU-28 level, it increased by 17.30 % from 83,572 Euro million in 2005 to 98,038 Euro million in 2014.

As a consequence, the share of Romania's expenditures in tourism in the EU-28 tourism expenditures is very small, ranging between 0.89 % in 2005 to 1.86 % in 2014 (Table 9).

Table 9. Tourism expenditures in Romania and the EU-28, 2005-2014 (Euro Million)

	2005	2010	2014	2014/2005 %
ROMANIA	747	1,238	1,825	244.31
EU-28	83,572	88,748	98,038	117.30
SHARE OF ROMANIA (%)	0.89	1.39	1.86	-

Source: Own calculations based on Eurostat Data. [11]

In 2014, the highest travel expenditures were recorded by Germany (70.2 Euro Billion), United Kingdom (47.7 Euro Billion) and France (36.6 Euro Billion).

Tourism expenditures/GDP ratio has a small value both in Romania and at the EU level. However, it recorded a slight increase from 0.92 % in 2005 to 1.21 5 in 2014 in Romania.

Table 10.The share of tourism expenditures in GDP, Romania and EU-28, 2005-2014 (%)

	2005	2010	2014
ROMANIA	0.93	0.97	1.21
EU-28	0.75	0.69	0.70

Source: Own calculations based on Eurostat Data.

At the EU-28 level, it registered a small decline from 0.75 % in 2005 to 0.70 % in 2014 (Table 10).

In 2014, the highest tourism expenditure/GDP was recorded in Luxembourg (6%), Cyprus (5.4%) and Estonia (4.4.%), while the lowest level was registered in Greece (1.2 %), Romania (1.21 %), Spain (1.3 %) and Italy (1.3%).

Net Receipts from tourism in Payment Balance. The economic importance of international tourism can be measured by looking at the ratio of international travel receipts relative to GDP; these data are from balance of payments statistics and include business travel, as well as travel for pleasure. [2]

Making the difference between tourism receipts and expenditures, it was found the net receipts in tourism payment balance. In case of Romania, in 2005, it was recorded a surplus of +102 Euro million, while in 2014 it was recorded a deficit of -446 Euro million.

In case of the EU-28, in 2005 and 2010, it was registered a deficit, while in 2014, it was recorded a surplus +11,494 Euro million (Table 11).

Table 11. Net Receipts from tourism in Payment Balance, Romania and EU-28, 2005-2014 (Euro Million)

	2005	2010	2014
ROMANIA	+102	-378	-446
EU-28	-17,312	-12,118	+11,494

Source: Own calculations based on Eurostat Data.

In 2014, the highest net receipts were recorded in Spain (+35.4 Euro Billion), Italy (+12.5 Euro Billion), Greece (+11.3 Euro Billion). The highest deficit was registered by Germany (-37.6 Euro Billion), United Kingdom (-12.5 Euro Billion) and Belgium (-7.3 Euro Billion).

Expenditures per trip and overnight stay. In 2014, the number of trips accounted for 1,182 million in the EU-28 and 17.3 million in Romania, representing 1.46 % of the EU level.

The expenditures per trip were 83 Euro in 2014, by 77 % less than in 2005. In Romania, the expenditure/trip remained constant at about 105 Euro/trip.

The number of overnight stays declined by 72.4 % in Romania from 73.1 Euro million in 2013 to 20.2 million in 2014. In the EU-28, the number of overnight stays declined by 57 % from 6,206 million in 2013 to 2,684 million in 2014.

As a result, the expenditure/night increased in Romania from 26 Euro/night in 2013 to 90 Euro in 2014, while the average EU-28 level declined from 67 Euro in 2013 to 37 Euro/night in 2014 (Table 12).

Table 12. Expenditures per trip and overnight stay in Romania and EU-28 in 2013 and 2014

	MU	2013		2014	
		ROMANIA	EU-28	ROMANIA	EU-28
EXPENDITURES	EURO MILLION	1,868	415,748	1,825	98,038
ALL TRIPS	THOUSAND	17,682	1,177,349	17,387	1,182,025
EXPENDITURES/TRIP	EURO/TRIP	106	353	105	83
OVERNIGHT STAYS	MILLION	73.1	6,206	20.2	2,684
EXPENDITURES/NIGHT	EURO/NIGHT	26	67	90	37

Source: Own calculations based on the data provided by Eurostat. [10]

These variations were determined by the number of domestic and outbound trips and also by expenditures.

In 2013, in the EU-28, the average expenditure per trip was Euro 353, but per domestic trip it accounted for Euro 211, while for outbound trip it was Euro 785.

The lowest expenditure per trip is in Romania: Euro 106/trip (Euro 91 per domestic trip and Euro 369 per outbound trip), while the highest expenditure/trip is in Belgium, Euro 855/trip, (Euro 318 per domestic trip and Euro 988 Euro per outbound trip).

About 77 % of all tourism expenditures are spent for trips to a destination inside the EU. In 2013, the intra-EU tourism accounted for 94 % of all tourism trips (75 % being domestic trips and 19 % trips to another EU country).

Of the total tourism expenditures, domestic trips accounted for 45 5, outside destinations accounted for 23 % and all the EU destinations for 77 %. [11]

Tourism and Travel Competitiveness Index (TTCI) is used as a measure of the factors and policies which support the development of the T&T sector in each country and is a term of reference for comparisons among various countries. The TTCI is based on three subindexes as follows: (i) the T&T regulatory framework subindex, (ii) the T&T business environment and infrastructure subindex, and (iii) the T&T human, cultural and natural resources subindex [13].

The TTC Index and Rank for Romania in the period 2007-2015 is presented in Table 13.

Table 13.Travel and Tourism Competitiveness Index and Rank for Romania, 2007-2015

YEAR	OVERALL		BY COMPONENTS					
	RANK	TTCI VALUE	T&T REGULATORY FRANEWORK		T&T BUSINESS ENVIRONMENT AND INFRASTRUCTURE		T&T HUMAN, CULTURAL AND NATURAL RESOURCES	
			RANK	INDEX	RANK	INDEX	RANK	INDEX
2007	76	3.91	87	3.86	74	3.20	71	4.68
2009	66	4.04	61	4.68	64	3.61	77	3.83
2011	63	4.17	51	4.85	66	3.80	66	3.84
2013	68	4.04	66	4.61	68	3.67	73	3.85
2015	66	3.78	35	4.37	65	5.42	66	2.38

Source: The Travel & Tourism Competitiveness Report 2009, 2011, 2013, 2015 [13, 14, 15, 16]

Romania came on the 76th position for overall rank in the year 2007 and the TTCI value was 3.91. In 2014, Romania came on the 66th rank and had a TTCI of 3.78.

For the three subindexes, Romania's rank is different from a subindex to another and from a year to another.

CONCLUSIONS

In the analyzed period Romania's tourism registered a significant development in terms

of number of tourists (+33%), number of foreign tourists (+ 25 %), number of tourists per inhabitant (+ 46.93 %), tourism receipts (+62%).

Tourism contribution to GDP which is just 0.9 %, very low compared to other EU countries, Romania's tourism contribution to EU-28 receipts is very small, just 0.24% and in a decreasing trend, the share of tourism receipts in export value is just 2.64 % and in a declining trend.

However, tourism receipts per international visitor increased by 33.88% not only because the increased number of foreign tourists, but also due to the high tariff per tourism services and high VAT practiced in Romania.

Tourism expenditures increased 2.44 times which is a positive aspect, but its share in the EU-28 average expenditure is very small, just 1.86 % in 2014. But, the expenditures per GDP recorded a slight growth.

Romania registered a deficit of - 446 Euro million in Tourism Payment Balance, and the TTC Index value was just 3.78 in 2015, placing Romania on the 66th rank.

As a final conclusion, despite its high potential for tourism, Romania is not yet able to develop an efficient tourism. Tourism competitiveness must grow in order to enhance the size of its services exports to various markets and support the growth of economic efficiency in this economic branch.

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THE POSITION OF TOURIST AND AGROTOURIST GUESTHOUSES IN ROMANIA'S ACCOMMODATION STRUCTURES

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Abstract

The paper aimed to analyze the position of the tourist and agrotourist guest houses in Romania's accommodation structures in the period 2007-2015. The tourist offer in terms of the number of tourist and agro-tourist guesthouses and of the number of places/beds in this type of accommodation units has continuously increased because of the demand growth in terms of the number of tourist arrivals and overnight stays. This is a consequence of the visitors need to apply for a new alternative to the classical tourism, and of the rural population to diversify the activities in order to get more incomes per family. Tourist and agritourist pensions offer a pleasant stay to their visitors at lower prices compared to hotels. The holidays planning in the middle of the year and the trend to shorten the length of the stay have led to a decline of the net use of the accommodation indices in touristic and agrotouristic pensions, in tourism in general. The results showed that tourist and agrotourist pensions play a more and more important role in Romania's tourism and their services are more attractive in comparison to other sorts of accommodation units. Important efforts must be done by the local population and communities, local authorities, entrepreneurs, local and national administrations and tourism associations in order to promote and support the growth of touristic activities in tourist and agrotourist guesthouses.

Key words**:** *accommodation structures, agritourist pension, tourist pension, Romania, trends*

INTRODUCTION

Romania has excellent conditions to develop rural tourism because 44 % of the population lives in the rural space and besides the incomes coming from agriculture, income from rural and agri-tourism is welcome for any farmer and any household.

Rural tourism is able to combine the pleasure to live in plain air far away from the civilization of the cities to enjoy learning about traditional occupations of the people, tasting traditional food, meeting folk customs, but also having contact and taking part to agricultural works, milking cows, harvesting hay or potatoes, sleeping in the hay, playing with farm animals etc. [1]

Therefore, tourism services in the rural areas are able to support local population and communities in developing economic diversity.

According to the legislation in force, agro-tourist pensions are units whose accommodation capacity is maximum 8 rooms and they act either independently or in people's houses. They accommodate tourists and offer them natural food, produced in the farm or household by local authorized producers and the possibility of taking part to handicrafts activities and other activities in the household [4].

The expansion of rural tourism is justified by the revival and development of the rural area, and by the need to offer an alternative to classical tourism form. The quality of services determines the clients satisfaction and wish to return, the income of the pension owner and the economic efficiency of the tourist pension [8].

In the rural areas of Romania, tourism is growing and the quality of accommodation and services is constantly improving. Romania's image in the international tourism depends on advertising and intensive promotion of the national values and national and local brands. The positive trend in the number of rural pensions is the result of the efforts destined to the development of tourism

in the rural space [9].
The evolution of rural tourism activities reflects both the changes in the tourism offer in terms of the number of tourist and agri-tourist guest houses, and in the tourism demand, in terms of tourist arrivals in rural tourist reception structures [5].
In this context, the present paper had the purpose to analyze the dynamics of the tourist and agritourist pensions in the period 2007-2015 in order to establish the position of this category of accommodation units in Romania's accommodation structures and the development of tourism in the rural space.

MATERIALS AND METHODS

In order to set up this paper, the date were collected from the National Institute of Statistics, more exactly from Tempo Online Data base, for the period 2007-2015.
The main indicators taken into consideration were the following ones: (i)the tourism offer in terms of the number of tourist and agro-tourist pensions, and the share of the tourist and agrotourist pensions in the total number of accommodation establishments existing in Romania, (ii) the tourism offer in terms of the number of beds/places in tourist and agritourist pensions and their share in the total number of places/beds existing in all the categories of touristic accommodation establishments in Romania, (iii) tourism demand in terms of the number of tourist arrivals in tourist and agrotourist pensions, and their share in the total number of tourist arrivals in accommodation units in the country, (iv) tourism demand in terms of the number of tourist overnight stays in tourist and agrotourist pensions and their share in the total number of overnight stays, (v) the indices of the net use of accommodation capacity in tourist pensions and agritourist pensions.
The data were statistically processed using the fixed basis indices and also the comparison method. The results were tabled and graphically represented and correspondingly commented.

RESULTS AND DISCUSSIONS

Number of tourist and agritourist pensions. In the period 2007-2015, the accommodation structure in Romania's tourism have registered a continuous development. In 2015, Romania had 6,821 accommodation units, by 45.3 % more than in 2007. The most important tourist accommodation units are hotels, tourist pensions and agritourist pensions. The number of hotels increased by 41.6 % from 1,075 units in 2007 to 1,522 units in 2015. On the 2nd position came agritourist pensions, whose number increased by 48.5 % from 1,292 units in 2007 to 1,918 units in 2015. On the 3rd position came tourist pensions, whose number has doubled in the analyzed period from 736 units in 2007 to 1,527 units in 2015. (Table 1).

Table 1.Number of tourist and agri-tourist pensions in Romania's accommodation capacity, 2007-2015

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2015/2007 %
TOTAL UNITS	4,694	4,840	5,095	5,222	5,003	5,821	6,009	6,130	6,821	145.3
TOURIST PENSIONS	736	783	878	949	1,050	1,247	1,335	1,323	1,527	207.5
AGRI-TOURIST PENSIONS	1,292	1,348	1,412	1,354	1,210	1,569	1,598	1,665	1,918	148.5

Source: Own calculations based on NIS, Tempo-online Data base, 2016 . [6]

The share of tourist and agritourist pensions in the total number of tourist accommodation units is presented in Fig.1. The agriturist pensions registered a slight increase of their share from 27.5 % in 2007 to 28.1 % in 2015, with the top share 27.7 % in the year 2009 and the lowest share 24.2 % in the year 2011.They occupy the top position in

the accommodation units structure.

The tourist pensions have continuously increased their share from 15.7 % in 2007 to 22.4 % in 2015, occupying the 2nd position after agritourist pensions.(Fig.1.).

On the 3rd position are hotels whose share varied between 22.9 % in 2007 to 26.1 % in 2011, the highest weight, and 22.3 %, the lowest level in 2015. All these three categories of accommodation units accounted for 72.81 % of the total number of tourist accommodation units in Romania.

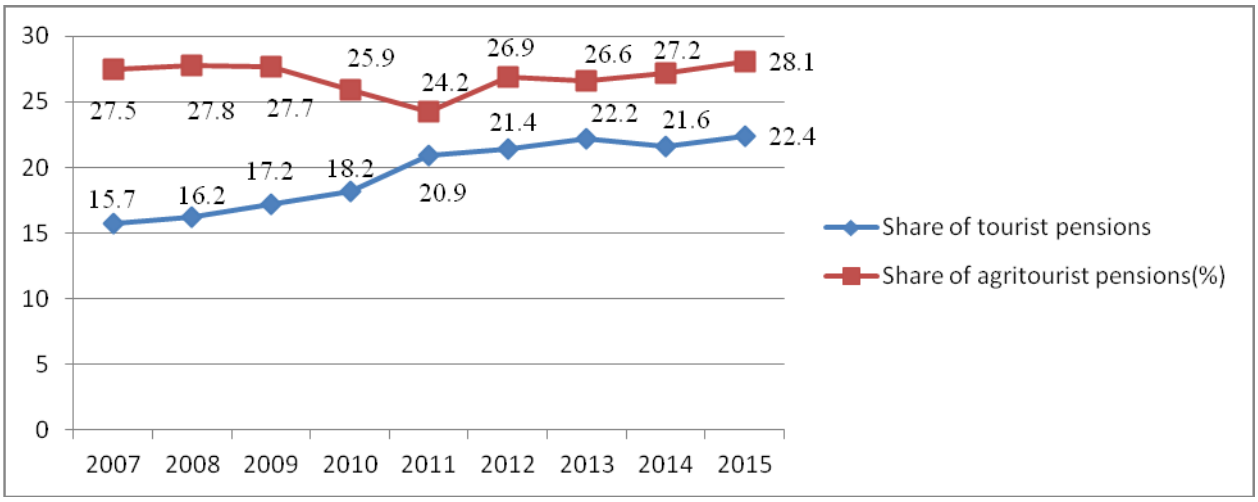

Fig.1.Share of tourist and agritourist pensions in Romania's accommodation capacity, 2007-2015 (%)
Source: Own design based on NSE Tempo online data base, 2016. [6]

The number of beds/places in tourist and agritourist pensions. A high attention was paid not only to the number of accommodation units, but also to the number of places or beds. In 2015, Romania had an accommodation capacity in terms of number beds accounting for 328,313 places, by 15.7 % higher than in the year 2007, when it had 283,701 places. The highest offer of beds is in three accommodation units, the most numerous ones: hotels, tourist pensions and agritourist pensions.

Table 2.Number of beds/places in tourist and agri-tourist pensions in Romania, 2007-2015

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2015/2007 %
TOTAL BEDS/PLACES	283,701	294,210	303,486	311,698	278,503	301,109	305,707	311,288	328,313	115.7
BEDS IN TOURIST PENSIONS	13,429	14,538	16,653	18,422	20,499	25,019	27,325	27,295	32,051	239.7
BEDS IN AGRI-TOURIST PENSIONS	15,448	16,906	19,783	20,208	20,683	27,453	28,775	30,480	35,188	227.8

Source: Own calculations based on NIS, Tempo-online, 2016 [6]

The number of places in hotels increased by 11.8% from 168,736 beds in 2007 to 188,607 beds in 2015. But the number of places in pensions has increased much more. The number of places in agritourist pensions accounted for 35,188 beds in 2015, being 2.27 times higher than in 2007. In this case, the number of beds offered by agritourist pensions came on the 2nd position. On the 3rd position was the number of places offered by tourist pensions. It accounted for 32,051 beds in the year 2015, being 2.38 times higher than in 2007.(Table 2)

The share of the places/beds in tourist and agritourist pensions in the total number of places in tourist accommodation units is presented in Fig.2. The share of beds offered

by tourist pensions increased from 4.7 % in 2007 to 9.8 % in 2015 in the total number of beds existing in Romania's accommodation units with tourism function. The number of beds offered by agritourist pensions registered a more dynamic trend, increasing from 5.4 % in 2007 to 18.7% in 2015. Looking at the figures presented in Fig.2., one can notice that in the year 2011, the number of beds existing in tourist pensions and the number of beds existing in agritourist pensions was almost similar. But, since 2012, the agritourist pensions increased more intensively their number of places, because farmers were interested to grow their income by accommodation and also traditional meals.

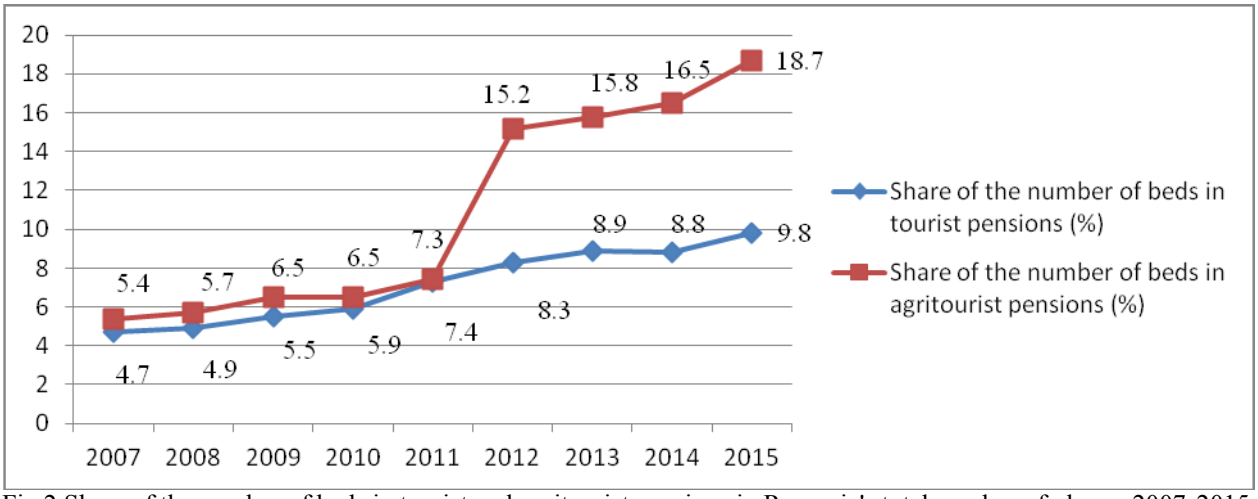

Fig.2.Share of the number of beds in tourist and agritourist pensions in Romania's total number of places, 2007-2015 (%)

Source: Own design based on NSE Tempo online data base, 2016, [6]

The number of arrivals in tourist pensions and agritourist pensions. In the analyzed period, Romania registered a continuous increase of the number of arrivals in accommodation units with tourism function. In 2014, the number of arrivals totalized 8,465,909 (residents and nonresidents), being by 21.4% higher than in the year 2007.

Table 3.Number of tourist arrivals in tourist and agri-tourist pensions in Romania, 2007-2014

	2007	2008	2009	2010	2011	2012	2013	2014	2014/2007 %
TOTAL ARRIVALS	6,971,925	7,125,307	6,141,135	6,072,757	7,031,606	7,686,489	7,943,153	8,465,909	121.4
ARRIVALS IN TOURIST PENSIONS	451,640	478,058	412,162	406,632	479,590	586,119	653,464	704,129	155.9
ARRIVALS IN AGRI-TOURIST PENSIONS	288,508	357,617	325,686	289,923	360,696	447,113	501,746	549,302	190.4

Source: Own calculations based on NIS, Tempo-online, 2016, [6]

The highest number of arrivals were in hotels: 5,212,170 tourists in 2007 and 6,314,865 tourists in 2014, by 21.2 % more than in the first year of the analysis. On the 2nd and the 3rd place came the number of arrivals in tourist pensions and, respectively in agritourist pensions. In 2014, the tourist pensions received 704,129 tourists, by 55.9% more than in 2007 (451,640 tourists), while the agritourist pensions accommodated 549,302 tourists, by 90.4 % more than in 2007 (288,508 tourists).(Table 3).

The share of arrivals in tourist and agritourist pensions in the total number of arrivals in Romania's tourism is presented in Fig.3. The share of arrivals in tourist pensions increased from 6.5 % in 2007 to 8.3

% in 2014, while the share of the arrivals in agritourist pensions increased from 4.1 % in 2007 to 6.5 % in 2014.

However, the share of arrivals in hotels remained on the top position, ranging between 74.8 % in 2007 and 74.6 % in 2014, with the maximum weight 76.2 % in the year 2011.

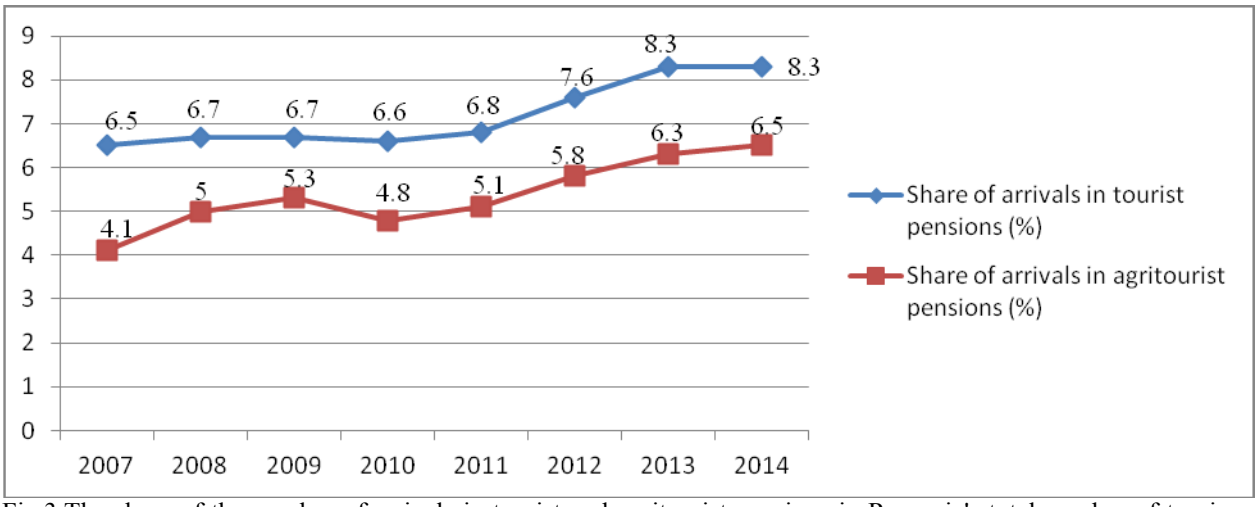

Fig.3.The share of the number of arrivals in tourist and agritourist pensions in Romania's total number of tourism arrivals, 2007-2014 (%)

Source: Own design based on NSE Tempo online data base, 2016, [6]

The overnight stays in tourist and agritourist pensions. In the analyzed period, the numbre of overnight stays registered a decreasing trend, from 20,593,349 stays in 2007 to 20,280,041 stays in 2014, meaning by 1.5 % less than at the beginning of the period.

Table 4.Number of overnight stays in tourist and agri-tourist pensions in Romania, 2007-2014

	2007	2008	2009	2010	2011	2012	2013	2014	2014/2007 %
TOTAL OVERNIGHT STAYS	20,593,349	20,725,981	17,325,410	16,051,135	17,979,439	19,166,122	19,362,671	20,280,041	98.5
OVERNIGHT STAYS IN TOURIST PENSIONS	927,604	959,391	813,281	802,222	928,535	1,083,763	1,197,200	1,273,114	137.2
OVERNIGHT STAYS IN AGRI-TOURIST PENSIONS	592,327	743,444	673,188	604,606	741,350	906,504	996,475	1,081,521	182.6

Source: Own calculations based on NIS, Tempo-online, 2016, [6]

This was due to the decline of the number of overnight stays in almost all categories of accommodation units, except tourist pensions and agritourist pensions, where the number of stays increased. This is explained by the attractive accommodation in a rustic style and beauty of the scenery and the lower tariffs compared to the one in hotels.

In case of the hotels, the number of overnight stays declined by 4.1 % from 16,603,404 stays in 2007 to 15,928,051 stays in 2014.

In case of the tourist pensions, the number of stays increased by 37.2 % from 927,604 stays in 2007 to 1,273,114 stays in 2014, while in case of the agritourist pensions the number of overnight stays increased by 82.6 % from 592,327 stays in 2007 to 1,081,521 stays in 2014 (Table 4).

The share of overnight stays in tourist and agritourist pensions in the total number of overnight stays in Romania's tourism is presented in Fig.4. The number of overnight stays in tourist pensions increased from 4.5 % in 2007 to 6.3 % in 2014, while the share of

overnight stays in agritourist pensions increased from 2.9 % in 2007 to 5.3 % in 2014. The overnight stays in hotels have the highest share in the total number of overnight stays. However, their share declined from 80.6 % in 2007 to 78.5 %, because of the tourists would like to shorten their stays or travels and to be accommodated in cheaper accommodation structures like pensions.

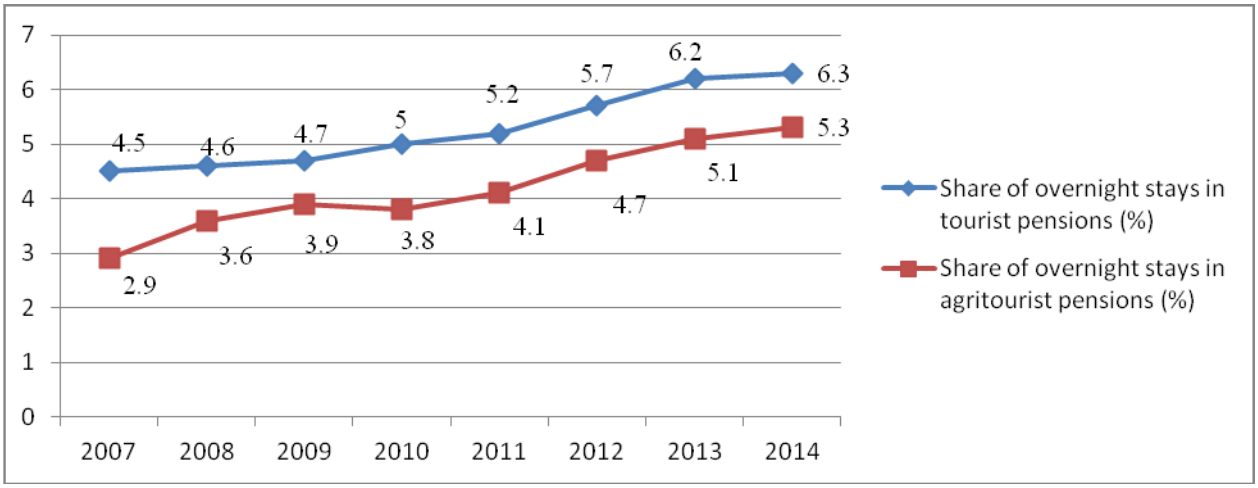

Fig.4.The share of the overnight stays in tourist and agritourist pensions in Romania's total number of overnight stays, 2007-2014 (%)
Source: Own design based on NSE Tempo online data base, 2016, [6]

The indices of the net use of accommodation capacity in tourist pensions and agritourist pensions. At country level, the indices of net use of the accommodation capacity for all the types of touristic units varied between 36 % in the year 2007 and 26.1 % in the year 2014.

Table 5.Indices of the net use of the accommodation capacity in tourist and agri-tourist pensions in Romania, 2007-2014

	2007	2008	2009	2010	2011	2012	2013	2014	2014/2007 %
AVERAGE INDICES AT COUNTRY LEVEL	36	35	28.4	25.2	26.3	25.9	25.1	26.1	72.5
INDICES FOR TOURIST PENSIONS	22.3	21.9	16.6	14.6	15.5	14.8	14.6	15.4	69.1
INDICES FOR AGRI-TOURIST PENSIONS	16.3	18.4	14.2	12.4	13.8	13.2	12.6	13.2	81.0

Source: Own calculations based on NIS, Tempo-online, 2016, [6]

Therefore, it was registered a deep decline accounting for 27.5 % in 2014 compared to 2007. This is because of the vacations planning mainly in the months of July and August, the wish of the tourists to shorten the duration of stay and the limited money allotted for vacation in close relation to the family budget. In this way, the managers of tourist units can not cover the whole accommodation capacity.

Among the macro economic factors affecting the number of arrivals and the net use index of accommodation in rural guesthouses, in tourism in general, are: family income, inflation, and unemployment. [2]

The highest indices of net use of the accommodation capacity is recorded in hotels. But even in this case, the indices varied between 43.2 % in the year 2007 and 32.9 % in the year 2014, with an obvious decreasing trend. The lowest level was 29.9 % recorded in the year 2010, but then, it started a slight recovery.

A similar decreasing trend was noticed for all the other sorts of accommodation units, except the tourist chalets and tourist houses

which recorded an increase.

In case of the tourist pensions, the indices of the net use of the accommodation capacity declined by 30.9 % from 22.3 % in the year 2007 and 15.4 % in the year 2014. In case of the agritourist pensions, the indices of the net use of the accommodation capacity declined by 19 %, from 16.3 % in 2007 to 13.2 % in 2014(Table 5).

The flows of tourists have a deep influence on the indices of the net use of the accommodation capacity and tourism receipts. The flows of tourists are characterized by seasonality along the year, because of the holidays planning mainly in the middle of the year. For example, in August the flows of tourists is 4.5 times higher than in February in agri-tourits guest houses [3].

But there are differences from a region to another regarding the tourist flows and the indices of the net use of the accommodation capacity in touristic and agri-touristic pensions. For instance in the Rucar-Bran area and Marginimea Sibiului area, the tourists flows are higher and also the the indices of the net use of the accommodation capacity are higher [7].

CONCLUSIONS

The tourist offer in Romania has continuously increased, but it is obvious a development in the rural space regarding the number of tourist and agro-tourist guesthouses and of the number of places/beds in this type of accommodation structures.

This is because of the need to diversify the activities in the rural space and to increase the income of the rural population, of the farmers and households, to preserve the rural style of buildings and internal decorations, to preserve folk traditions and offer to the visitors a pleasant and high quality services at acceptable prices.

The results of this empirical research have also confirmed that the demand for tourism services in tourist and agrotourist pensions has increased in terms of the number of tourist arrivals and overnight stays.

However, the indices of the net use of the accommodation in touristic and agrotouristic pensions declined, mainly after 2008, when the economic crisis started. A large range of factors such as family income and budget allotted for trips and holidays, as well as the vacations planning mainly in the middle of the year, and the trend to reduce the length of the stay have led to a smaller and smaller net use of the accommodation use in general, but also in touristic and agrotouristic pensions.

Therefore, tourist and agrotourist pensions play a more and more important role in Romania's tourism and their services look to be more attractive in comparison to other sorts of accommodation units due to a good correlation between the service offer and price.

The development of this category of accommodation establishments on the map of Romania depends on the efforts which local population and communities, local authorities, entrepreneurs, local and national administrations and tourism associations promote and support the growth of touristic activities in the rural space.

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RESEARCH ON THE CONCENTRATION OF TOURIST ARRIVALS IN ROMANIA

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Abstract

The paper aimed to analyze the concentration of tourist arrivals in Romania based on National Institute of Statistics Data for the period 2008-2013. In Romania the tourists arrivals increased reflecting a higher demand for touristic attractions of the country. In 2013, the number of tourist arrivals accounted for 7,943,153, being by 11.47 % higher than in 2008, when it was 7,125,307 arrivals. The highest number of tourist arrivals is in the Centre, Bucuresti-Ilfov and South East regions, totalizing 56.19 % of the total number of tourist arrivals, and the lowest number of tourists was recorded in South West Oltenia. The regions where the number of tourists increased were Centre, Bucuresti-Ilfov, South West, North East and West, and the regions where the number of tourist arrivals declined were the South East, South Muntenia and North West. The Herfindhal-Hirschman Index has small values, closer to zero, reflecting a relative uniformity among regions. It varied between 0.1387 in 2008 and 1.490 in 2013. The Gini-Struck Coefficient ranged between 0.1252 in the year 2008 and 0.1658 in the year 2013, reflecting again a relative uniform distribution of tourists arrivals by development region, in all the years, except 2012, when its value accounted for 0.51, reflecting a moderate concentration among regions. The low degree of concentration is justified by the large variety of attractions Romania could offer in all the regions. It is about cultural heritage, historical place, landscapes, gastronomy, accommodation units at various prices.

Key words**:** *concentration, development regions, Gini-Struck index, Herfindhal-Hirshman coefficient, Romania, tourist arrivals*

INTRODUCTION

The modern civilization allots an important role to tourism which is seen as a complex social and economic phenomenon, an essential activity in the life of nations. The evolution of tourism nowadays reflects the freedom of travel and the evolution of society [13].

Romania could be considered one of the most beautiful countries in Europe because of its nice landscapes, rich traditions and culture, but its touristic potential is not enough utilized. [4, 8].

In Europe, Romania is one of the countries where the number of arrivals has been increasing constantly in the past years. The only exception is the years of the economic crisis, but the same tendency appeared in these years throughout the whole continent and worldwide. Romania is on 34th position on the list of tourist arrivals [2].

The number of tourist arrivals increased and in the period 2008-2013 the growth rate was 12.89 %. This was due to the growth of household income during this period, which led to increase in spending on tourism activities of the population [3, 14].

However, despite its high touristic potential, in comparison with Slovakia, Serbia, Bosni-Hertzegovina, Belarus and Rep.Moldova, Romania has more tourist inflows. But compared to Slovenia, Bulgaria, Czech Republic, Hungary, Poland has a lower number of tourists, without making comparisons with the countries in the top: France, Spain and Italy[5].

The development of the tourism is considered as a prioritary economic option, having in mind the high potential for a large variety of tourism types. The planning of the destinations and the availability of resources are destined to support the strategies of sustainable tourism development in Romania [1, 7].

In this context, the present paper aimed to analyze the dynamics of the number of tourists arrivals and its distribution by development region and to establish the concentration degree using Herfindhal-Hirschman index and Gini-Struck coefficient.

MATERIALS AND METHODS

The paper is based on the empirical data provided by National Institute of Statistics, in Romanian Tourism Statistical Abstract 2010, 2012 and 2014 [9,10,11]. The period of reference was 2008-2013.

The concentration of tourists arrivals in Romania was determined by two methods: Herfindhal-Hirschman Index and Gini-Struck Coefficient.

The Herfindhal-Hirschman Index (HHI) was calculated using the formula:

HHI= $\sum_{i=1}^{n} g_i^2$ (1)

where n is the number of micro regions of development, in Romania i=1,...8, and g_i^2 is the square of the share of each micro region in the total number of tourists arrivals The HHI Index values could range between HHI=0, meaning a perfect uniformity among regions, and HHI=1 meaning a perfect concentration, reflecting high discrepancies among regions. [6]

The Gini-Struck coefficient was determined using the formula:

GS= $\sqrt{\frac{n\sum_{i=1}^{n} g_i^2 - 1}{n-1}}$

The values of GS coefficient also vary between GS=0, reflecting a perfect equity among regions and GS=1, reflecting a perfect inequity [12].

The results were tabled and graphically represented and the corresponding comments were made.

RESULTS AND DISCUSSIONS

The number of tourists arrivals has followed an increasing trend in the analyzed period. So, in 2013, the number of tourist arrivals accounted for 7,943,153 arrivals, being by 11.47 % higher than in 2008, when it was 7,125,307 arrivals. (Fig.1.).

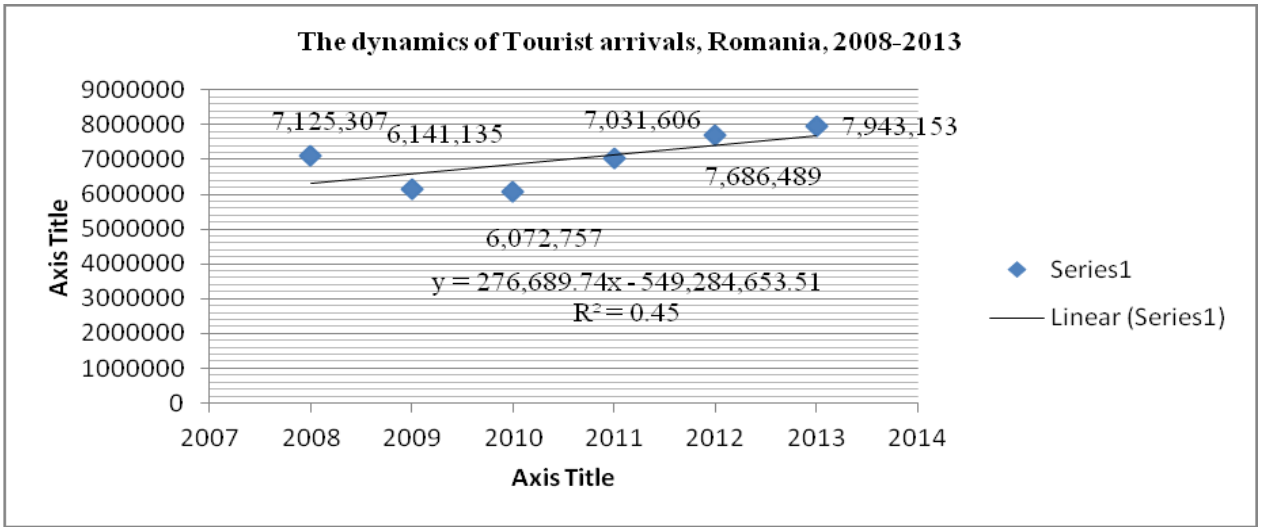

Fig.1.Tourist arrivals, Romania, 2008-2013
Source: Own designed based on NIS Data, [9,10,11].

The dispersion of tourist arrivals by development region. There are differences between the development regions regarding the number of tourist arrivals. In 2013, the highest number of tourist arrivals was noticed in the Centre (23.41 %), Bucuresti-Ilfov (18.1 %) and South East regions (14.68%). The lowest number of tourists was recorded in South West Oltenia (5.79%).

The number of tourist arrivals decreased in the period 2008-2013 in the following regions: South East (-10.87%), South Muntenia (-9.44 %), and North West (-0.96%).

But, there are regions where the number of tourists increased as follows: Centre (+44%), Bucuresti-Ilfov (+34.48%), South West (+7.13 %), North East (+4.18 %), and West (+1.55 %) (Table 1).

Table 1.Tourist arrivals by region of development, Romania, 2008-2013

	2008	2009	2010	2011	2012	2013	2013/2008 %
North East	725,646	656,501	620,961	696,188	740,577	756,006	104.18
South East	1,308,569	1,157,087	1,044,043	1,134,824	1,263,278	1,166,418	89.13
South Muntenia	750,157	591,251	572,912	616,401	692,810	679,360	90.56
South West Oltenia	429,370	355,114	337,102	426,845	454,676	460,026	107.13
West	673,814	575,118	542,801	639,657	674,981	684,303	101.55
North West	908,076	732,474	702,838	799,304	852,523	899,370	99.04
Centre	1,291,514	1,072,785	1,126,887	1,435,771	1,654,856	1,859,853	144.00
Bucuresti Ilfov	1,038,161	989,805	1,125,213	1,282,616	1,352,788	1,437,737	134.48
Total	7,125,307	6,141,135	6,072,757	7,031,606	7,686,489	7,943,153	111.47

Source: Own calculations based on NIS Statistical Data, [9,10,11].

The evolution of tourists arrivals by development region is graphically presented in Fig.2.

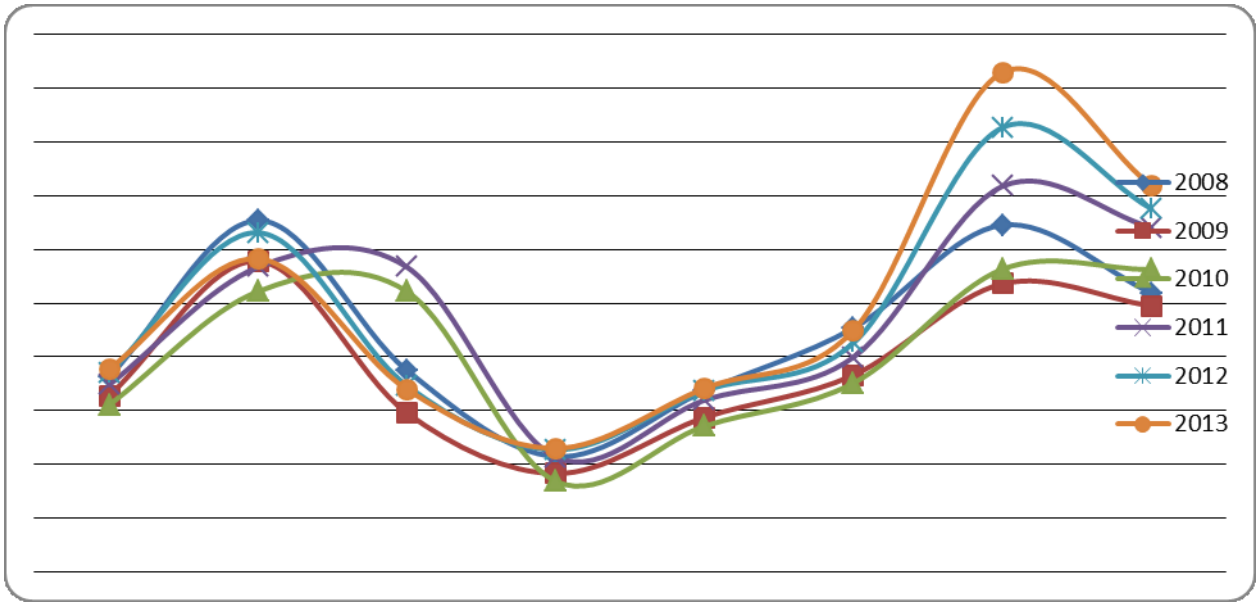

Fig.2.Evolution of tourist arrivals by development region, Romania, 2008-2013
Source: Own design based on NIS Data, [9,10,11].

The Herfindhal-Hirschman Index (HHI) is in general very small and closer to zero, reflecting a relative uniformity among regions. It ranged between 0.1387159 in 2008 and 0.149076 in 2013, showing a slight increasing trend. In the year 2009, the Herfindhal-Hirschman Index was 0.198761, the highest value in the whole analyzed period, 2008-2013 (Table 2).

The Gini-Struck Coefficient (GS) is presented in Fig.3. It ranged between 0.1252 in the year 2008 and 0.1658 in the year 2013. However, the highest value GS=0.51 was recorded in 2012 reflecting that it was a moderate concentration among regions regarding the number of tourists arrivals.

Table 2. Tourist arrival concentration, Romania, 2008-2013, Calculation of Herfindhal-Hirshman Index (HHI)(g^2)

Region	2008	2009	2010	2011	2012	2013
North East	0.010404	0.011449	0.010404	0.09801	0.09216	0.009025
South East	0.033856	0.035344	0.029584	0.025921	0.026896	0.021609
South Muntenia	0.011025	0.009216	0.008836	0.007744	0.00810	0.007396
South West Oltenia	0.003624	0.00360	0.003136	0.003721	0.003481	0.003364
West	0.0089491	0.008836	0.007921	0.008281	0.007744	0.007396
North West	0.016129	0.014161	0.0113456	0.012996	0.012321	0.012769
Centre	0.033124	0.030625	0.034596	0.041616	0.046225	0.054756
Bucuresti Ilfov	0.021609	0.025921	0.034225	0.03212	0.030976	0.032761
HHI	0.1387159	0.198761	0.142158	0.132403	0.144959	0.149076

Source: Own calculations.

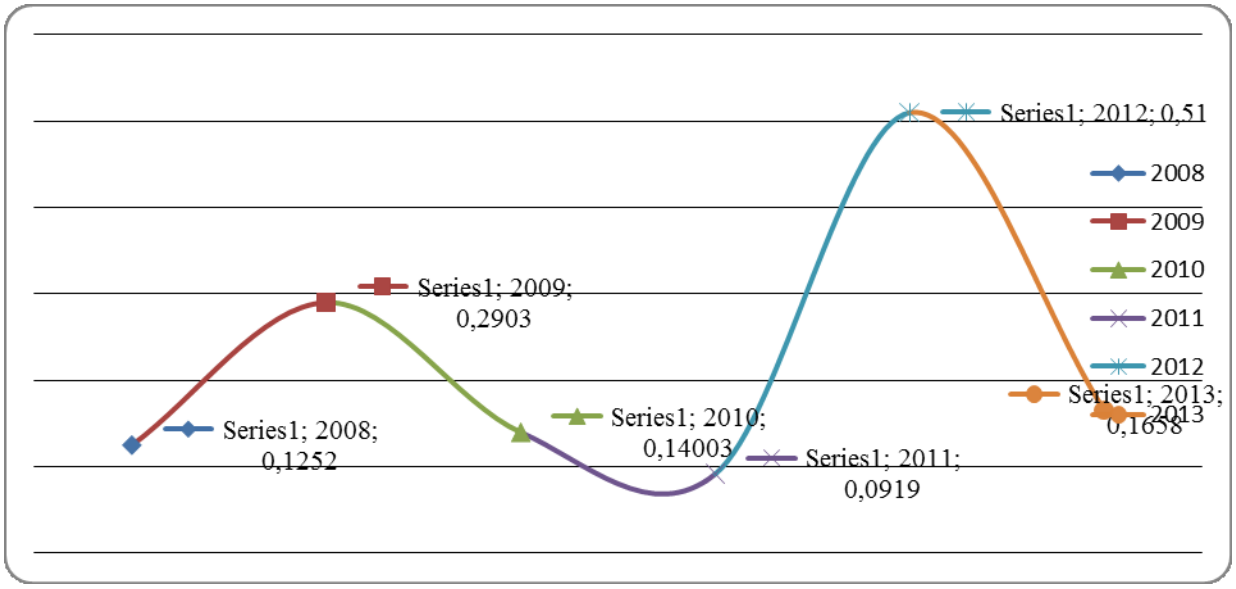

Fig.3.Evolution of Concentration of Tourist arrivals in terms of Gini Struck Coefficient
Source: Own calculations and design.

CONCLUSIONS

In Romania the tourists arrivals increased in the analyzed period reflecting a higher demand for touristic attractions of the country. But there are differences among development regions, as follows: the highest number of tourist arrivals is in the Centre, Bucuresti-Ilfov and South East regions, totalizing 56.19 % of the total number of tourist arrivals. The lowest number of tourists was recorded in South West Oltenia.

The regions where the number of tourists increased were Centre, Bucuresti-Ilfov, South West, North East and West.

The number of tourist arrivals declined in the period 2008-2013 in the South East, South Muntenia and North West.

The Herfindhal-Hirschman Index has small values, closer to zero, reflecting a relative uniformity among regions.

The Gini-Struck Coefficient ranged between 0.1252 in the year 2008 and 0.1658 in the year 2013, reflecting again a relative uniform distribution of tourists arrivals by development region, in all the years, except 2012, when its value accounted for 0.51, reflecting a moderate concentration among regions.

The low degree of concentration is justified by the large variety of attractions Romania could offer in all the regions. It is about cultural heritage, historical place, landscapes, gastronomy, accommodation units at various prices.

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DIVERSIFICATION OF THE AGRICULTURE AIMED TO BIOENERGY PRODUCTION

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Abstract

Long-term target by 2050 set by the European Commission is based on the development of the competitiveness of the economies that efficiently handles with the natural resources and contributes to reducing carbon emissions. Competitiveness can be increased also by diversification. Later it was integrated the concept of green (low carbon) economy into general policy framework at the national policies of the Member States. Diversification orientation into the bioenergy production represents the use of agricultural land for targeted growing of fast-growing plants under specific conditions. The article evaluated varietal conditionality of Populus biomass production based on soil and ecological conditions of southern Slovakia. The research was realized in the vegetation year 2012 (the last year of the first growing cycle) and 2013 (the first year of the second growing cycle) on a research area in the village Kolíňany, Slovakia. Return cut of the trees (at the end of the vegetation in 2012) influenced biomass production the first year of the second growing cycle by all grey poplar varieties. By all varieties the biomass production in the harvest moisture (t ha^{-1}) decreased in the range from 71.5% variety Monviso to 80.9% Pegaso. Production of dry mass (t ha^{-1}) decreased in the range of 80.28 to 81.70% by three varieties -Pegaso, AF-2 and Sirio. The lowest decrease of dry mass has been researched in a variety Monviso (74.85%). All grey poplar varieties exceeded in the first year of the second growing season (a year after re-section) economic yield limit (12 t of dry matter. ha^{-1}.year^{-1}).

Key words: *bioenergy, biomass, diversification, Poplar*

INTRODUCTION

Diversification of agricultural production directed towards the production of bio-energy forced a social demand for identification of habitats (soils), which are suitable for this purpose. They must fulfil the conditions for cultivation of specific species of crops, but also with regard to protection for primary food production [9].

The long-term goal by 2050 that was set by the European Commission is based on the development of the competitiveness of the economy that efficiently handles the natural resources and contributes to reducing carbon emissions. Competitiveness may increase just diversification. Later concept of green (low carbon) economy was integrated into general policy framework at the national policies of the Member States [4].

Agriculture as an economic sector is strongly specific in comparison with other sectors of the national economy. In addition to the significant role as producer of food, raw materials and energy, while ensuring for the society ecological landscape stability, biodiversity also contributes to environmental protection. The current concept of agriculture in the EU includes the environmental functions of agriculture linked to rural settlements. Agriculture is directly linked to the ecosystems and operates in the area taking into account the achievement of competitiveness [10].

Green economy brings opportunities for business development, opening up new markets with efficient and ecological use of natural resources. This transfer would mean an increase in use of natural resources and lead to increased demand for biomass. The increased demand for biomass opens up new questions about the sustainability of the green economy [11].

Under the term bioenergy production we understand the deliberate cultivation of specific plant species in order to develop cost-

effective biomass [2].
An important dimension of fast-growing energy crops is the ability to achieve in a short time a substantial annual increase in biomass and high biomass production after just a few years after planting. For this purpose, it is possible to grow willow, poplar and herbaceous species, for example *Miscanthus* [7].
The growing specific crops on agricultural land have to use special scheme. This is directly determined by Actno. 220/2004 on the protection and use of agricultural land and on Act no. 245/2003 on integrated prevention and control of environment pollution and on amendment of certain Acts [12].
The paper evaluates varietal conditionality of woody biomass production of genus *Populus*.

MATERIALS AND METHODS

Specific environmental conditions for the cultivation of fast-growing plants can be defined by Act no. 220/2004, namely Section 18a. The minimum acreage for planting fast-growing trees is 1000 m^2 for a maximum period of 20 years. Stand of fast growing plants can be set up on agricultural land, which is included by code BSEU in 5th to 9th of quality, grade contaminated soil, or is classified under code BPEJ to 3 or 4 of the quality of the land located on flood plains, is waterlogged, or exposed to wind erosion and which is outside the 3rd to 5th degree of nature protection.
An overview of the biological factors affecting growth and biomass production in soil-ecological conditions of southern Slovakia is treated in the works team of authors [5] and [6].
The research was conducted in the years 2012 - 2013 on the sites of farm of Slovak University of Agriculture in Nitra, in the village Kolíňany, Slovakia. Research habitat is located at an altitude of 180 m above sea level and it belongs to the region's warm climate, very dry and lowland. The average annual temperature is 9.9 °C, the average annual precipitation for the period 1951-2000 is 547.6 mm. The soil in the research station is moderate (loam), fluvisol with an average pH 7.26 containing 1.8% of the humus.
The subject of evaluation is the production of woody biomass of the genus *Populus*. The four Italian varieties have beenevaluated: Monviso (*Populus* × *generosa* × *Populusnigra*), Pegaso (*Populus* × *Generosa* × *Populus nigra*), AF-2 (*Populus* × *canadensis*) and Sirio (*Populus deltoids* × *Populus* × *canadensis*). The characteristics of different variety are processed in [3].

RESULTS AND DISCUSSIONS

Areas potentially suitable for planting fast-growing trees in the Slovak Republic make the space that can be used in order to diversify agricultural production. As shown in Figure 1, the land potentially suitable for fast growing tree species is found in all regions of the Slovak
Republic.

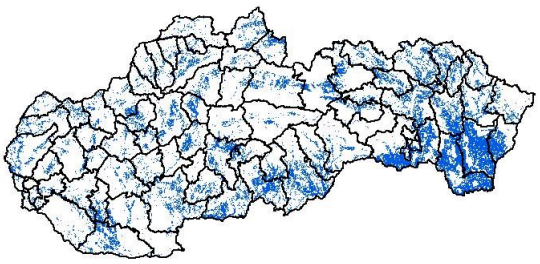

Fig. 1. Areas potentially suitable for fast growing tree species [9]

Results from the crop biomass observed in the growing poplar varieties in 2012 and 2013 are shown in Table 1.
Vegetation year 2012 is the fourth (final) vegetation year of the first growing cycle. Vegetation year 2013 represents the first year of the second growing cycle. Return cut was made at the end of the growing season of 2012.
Average yield of poplar varieties biomass (Table 1) were in the range from 15.83 kg of a variety AF-2 to 21.16 kg of a variety Monviso. These individual differences in crop biomass are also reflected in the biomass crop varieties as referred to in t ha^{-1}. The average yield of biomass in the investigated varieties harvested at moisture ranged from 140.74 t ha^{-1} in a variety of AF-2 to 188.14 t ha^{-1} of a

variety Monviso. By 44.76 and 47.91% dry mass were average yield of biomass in dry mass for different varieties in the range from 67.42 t ha^{-1} in a variety of AF-2 to 87.16 t ha^{-1} in a variety Monviso.

Table 1.Biomass yields of the varieties of *Populus* × *canescens* in the vegetation year 2012 and 2013

Varieties	Replicate		Biomass yield											
			Average biomass yield per individual plants [kg]		Average biomass yield of the studied varieties [kg]		Average biomass yield of individual plants at harvest moisture [t·ha^{-1}]		Average biomass yield of the studied varieties a harvest moisture [t·ha^{-1}]		Content of dry matter [%]		Average biomass yield of the dry matter of the studied varieties [t·ha^{-1}]	
	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013
Monviso	1	1	18.60	6.9	21.16	6.03	165.33	61.34	188.14	53.56	46.33	40.92	87.16	21.92
	2	2	17.80	7.7			158.22	68.44						
	3	3	27.10	3.6			240.89	32.00						
	-	4	-	5.9			-	52.45						
Pegaso	1	1	15.60	2.6	18.83	3.75	138.66	23.11	167.40	33.34	45.94	42.25	76.90	14.09
	2	2	16.40	1.2			145.77	10.67						
	3	3	24.50	5.3			217.75	47.11						
	-	4	-	5.9			-	52.45						
AF-2	1	1	15.90	6.6	15.83	3.43	141.33	58.67	140.74	30.45	47.91	40.53	67.42	12.34
	2	2	9.90	2.4			88.00	21.33						
	3	3	21.70	2.4			192.89	21.33						
	-	4	-	2.3			-	20.45						
Sirio	1	1	16.80	5.8	19.76	4.00	149.33	51.56	175.70	39.78	44.76	38.98	78.64	15.51
	2	2	20.00	3.3			177.78	29.33						
	3	3	22.50	5.4			200.00	48.00						
	-	4	-	3.4			-	30.22						

Source: Own calculation

Table 1 also presents the average crop biomass of the individual grey poplar varieties in the first year of the second growing cycle. It was in the range of 3.43 kg of a variety AF-2 to 3.6 kg of a variety Monviso. These individual differences in crop biomass in are also reflected in the biomass crop varieties as referred to in t ha^{-1}. The average yield of biomass of the researched varieties at harvested moisture ranged from 30.45 t ha^{-1} in a variety of AF-2 to 53.56 t ha^{-1} in a variety Monviso. At 38.98 and 42.25% dry mass average yield of biomass in dry mass for different varieties were in a range from 12.34 t ha^{-1} in a variety of AF-2 to 21.92 t ha^{-1} in a variety Monviso.

Return cut made at the end of the first growing seasons affected the production of biomass in all studied varieties of grey poplar (for all varieties were confirmed the significant decrease of biomass). The three studied varieties (AF-2, Sirio and Pegaso) decreased the biomass production in the harvested moisture (t ha^{-1}) in the range of 78.33 to 80.09%. The lowest decrease of biomass in the harvest moisture (t ha^{-1}) was confirmed by variety Monviso (71.5%).

By the three varieties Pegaso, AF-2 and Sirio was the formation of dry mass (t ha^{-1}) decreased in the range of 80.28 to 81.70%. The lowest decrease of dry mass has been confirmed by the variety Monviso (74.85%). From the economic point of view is by the cultivation of energy crops most important the production of biomass. The economic limit for growing poplar is the yield 10-12 t dry mass. ha^{-1}.year^{-1} [8].

For comparison in the US, they consider yield 12 t of dry mass. ha^{-1}.year^{-1} from an economic point of view as acceptable [1].

In this research, all varieties of grey poplar exceeded the economic yield limit.

CONCLUSIONS

The Slovak Republic has soils that are suitable for the use of non-food production and that there can be used of the diversification in agricultural production.

As suitable tree species for biomass production for energy use in order to diversification of agricultural production in the Slovak Republic can be poplar (*Populus*).

Return cut of the trees affected biomass production the first year of the second growing cycle at all grey poplar varieties. For all varieties, biomass production in harvest moisture (t ha^{-1}) decreased in the range from 71.5% variety Monviso to 80.9% variety Pegaso. There was observed the reduction of production of dry mass by the three varieties Pegaso, AF-2 and Sirio in the range of 80.28 to 81.70%. The lowest decrease of dry mass has been reported in the variety Monviso (74.85%).

All grey poplar varieties exceeded in the first year of the second growing season (a year after re-section) economic yield limit (12 t of dry matter. ha^{-1}.year^{-1}).

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PREFERENTIAL TARIFFS FOR DEVELOPING COUNTRIES: DID THEY FOSTER AGRICULTURAL EXPORTS TO SWITZERLAND?

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Abstract

We analyse the Swiss import structure of the agricultural and food sector from developing countries (DCs) and least-developed countries (LDCs) which benefit from the Generalised System of Preferences (GSP). Between 2002 and 2011, 46% and 36% of the agricultural products from the DCs and LDCs, respectively, were imported under the GSP scheme. However, most of the agricultural products from DCs and LDCs entered Switzerland under a most favoured nations (MFN) of zero. The estimations of a gravity model underpin the findings of the descriptive analysis: Being simultaneously a member of the WTO and in the GSP scheme fosters agro-food imports from DCs and LDCs significantly. Furthermore, the productivity and supply capacity within the agricultural sector depicted by the agriculture gross domestic product of a trading partner has a strong and significant positive effect on imports.

Key words**:** *agriculture and food trade*, *developing countries, gravity model, GSP*

INTRODUCTION

The ability of foreign aid to promote economic and social development is nowadays called into question. A bulk of theoretical and empirical literature in development economics finds that foreign aid is ineffective. [31] In this context preferential trade agreements like the Generalised System of Preferences (GSP) have become more and more important for the developing countries (DCs) and least-developed countries (LDCs) to reduce poverty and spur economic development. Since March 1st 1972 Switzerland has granted, like the USA, the EU, Canada and Japan, on a voluntary and non-reciprocal basis[7] preferential tariffs for DCs and the LDCs for industrial and agricultural products. The DCs and the LDCs are not charged – depending on the product – any tariffs or enjoy reduced tariffs for their exports to Switzerland. Since April 1st 2007 the imports of agricultural and food products from the LDCs have been in general duty-free, quota-free (DFQF) and are not bounded by seasonal restrictions[8]. Imports of agro-food products from DCs have been – depending on the product - possible with a lower tariff or duty-free. However, DCs are still bound by quotas.

The agricultural and food sector plays an important role for many of those countries. After the introduction of the GSP in 1968, many authors praised the positive effect of the GSP in subsequent years. [5; 23; 7] However, the recent discussion about the potential effects of the GSP has been rather sceptical. [19; 20; 10] [12] argue that LDCs, which have been granted a complete DFQF market access via the GSP of Switzerland in 2007 and the EU in 2008, would not be able to substantially increase their agricultural exports to the EU

[7] At first the non-reciprocal preferential treatment of the DCs/LDCs contradicts the most-favored nation clause of the GATT of the World Trade Organization (WTO). This preferential treatment was given a legal effect within the GATT by means of a 1971 waiver from the most-favoured-nation obligation in Article I of the GATT. The system of tariff preferences was made permanent by the 1979 'Enabling Clause'. The Enabling Clause also contains a waiver to grant additional preferences exclusively to LDCs. [6]

[8] Following Art. 6 (2) Tariff Preference Regulation, those countries equated to the LDCs, are the ones that benefit from the debt-relief initiative and which are not cleared of debt yet.

with the exception of sugar exports, also due to non-tariff barriers. Nevertheless, we argue that Switzerland's highly protected agricultural and food market has become more accessible through the GSP.

The main focus of this paper is to investigate whether the GSP has increased the integration of the DCs and the LDCs into the Swiss market. To address this issue adequately, the GSP has to be compared to the most important trading schemes/regimes (membership in the WTO and bilateral FTAs). In this context the determinants of Swiss agro-food imports are identified using a gravity model.

MATERIALS AND METHODS

Data

For the descriptive analysis the customs statistics from the Swiss Customs Administration (SCA) for the years 2002 to 2011 was used. The dataset covers annual import values in CHF from around 190 countries at the product level (HS 8 digits level) from Chapters 01–24 of the international classification of the Harmonised System (HS). HS 01–24 include all agricultural and food products. For the descriptive analysis, data at the product level were aggregated to the product-group level (HS 4 digits level) and the market level (HS 2 digits level).

For the econometric estimations data of the Swiss agro-food imports from around 190 trading partners were aggregated to the product-group level by individual country, year, product and tariff (e.g. tariff codes 230 and 330 'developing countries' or tariff code 305 'duty-free under tariff'). The aggregated dataset at the HS 4 digits level contains about 80% zero values.

The dummy variables 'DCs' and 'LDCs' indicate whether a given DC or LDC benefits from the GSP. We are mainly interested in the sign and size of the coefficients of these variables. The information concerning the individual status of a GSP-benefiting DC or LDC was derived from 'Tariff Preference Regulations' for the years 2002 and 2011. The dummy variable 'Free Trade Agreement' ('FTA') was taken from a dataset of the World Trade Organization (WTO). [34] The dummy variable 'WTO member' is based on information from the website of the WTO. [35] The 'preference margin' was calculated based on the dataset of the SCA. Because of the different tariffs, which exist for different usages of a product (e.g. human consumption or technical usage), the highest tariffs were chosen in all cases. This assumption can lead to biases when calculating the 'preference margin' because the tariff for human consumption is always higher than any other tariff. The original dataset contains MFN and GSP tariffs at the product level.

Further control variables 'Gross Domestic Product' ('GDP'), 'Agricultural GDP', 'Population' and 'Economic Remoteness' developed by [4] come from a dataset of [27]. The control variables 'Distance', 'Border', 'Landlocked', 'Island' and 'Common Official Language' are from a dataset of the French Centre d'Etudes Prospectives et d'Informations Internationales (CEPII). [18] The Worldwide Governance Indicators (WGIs) were obtained from [26]. The scale of the WGI goes from 0 (weak) to +100 (strong). The WGI covers on average 215 countries.

The remaining sample covers 85.0% of the total agricultural and food imports in HS 01−24 from all trading partners between 2002 and 2011.

Stylised Facts

The following section provides a brief descriptive analysis of the agro-food imports of Switzerland during the observation period. Switzerland's trading partners are grouped in 'Rest of the World' (ROW), and DCs and LDCs benefiting from the GSP, respectively.

The agricultural and food imports from DCs and LDCs increased constantly during the period between 2002 and 2011, with those from DCs increasing by nearly 20% and those from LDCs increasing by more than 120%. DCs reached their highest import volume in the year 2007, when the global food crisis occurred. LDCs reached their highest import volume in our last observation year 2011.

In HS Chapters 01–24, the ROW had an average market share of 84% between 2002 and 2011. In the same period, DCs had an

average market share of 15% whereas LDCs had an average market share of only 1%, even though more than half of Switzerland's trading partners were underdeveloped countries.

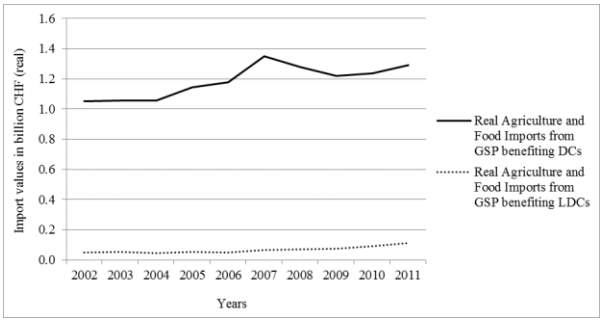

Fig. 1. Real agricultural and food imports in Switzerland from GSP-benefiting DCs and LDCs between 2002 and 2011 (values in billion CHF)

Between 2002 and 2011 a bulk of the agro-food imports from GSP benefiting DCs and LDCs entered Switzerland under a reduced tariff schedule or tariff schedule equal to zero. Figure 2 shows MFN=0[9], GSP and other reduced tariffs as a percentage of DCs' total exports to Switzerland between 2002 and 2011.

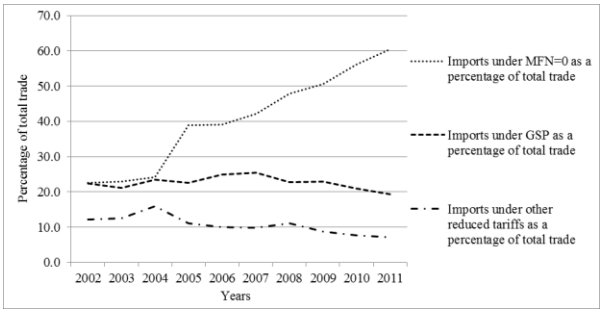

Fig. 2. Imports under MFN=0, GSP and other reduced tariffs as a percentage of DCs' total trade

From 2002 to 2004 about 50% of DCs' argro-food exports entered under reduced or zero tariffs. Therefore the remaining 50% of imports entered mostly under tariff schedule 'under tariff' (tariff code 110) which is granted to all WTO members. During 2002 and 2011, 23% of agro-food products from DCs were imported under the GSP, 41% were imported under the MFN=0 scheme and 10% were imported under other reduced tariff schedules[10]. Between 2002 and 2011, the coverage rate[11] for HS groups 01 to 24 averaged 34% according to the WTO Integrated Database. [32] From 2002 to 2011, the utilisation rate[12] of the DCs was about 46%. In total, 74% of the agricultural and food products from DCs were imported under a tariff lower than the 'under tariff' (tariff code 110) or equal to zero.

Figure 3 presents MFN=0, GSP and other reduced tariffs as a percentage of LDCs' total exports to Switzerland between 2002 and 2011.

In 2002, nearly 50% of LDCs' agro-food exports entered under the GSP, 40% under MFN=0 and 10% under other reduced tariffs. Between 2002 and 2005, imports under GSP decreased strongly. In 2005 only 16% of imports from LDCs entered under the GSP while 78% entered under MFN=0. Since 2006 and especially since the DFQF market access in 2007 imports under the GSP recovered and increased constantly.

However, on average 40% of imports entered under the GSP and about 60% under MFN=0. In contrast to GSP benefiting DCs, the coverage rate of the GSP benefiting LDCs was nearly 100% between 2002 and 2011. [33]

[9] The most-favoured-nation (MFN) principle is one of the principles of the World Trade Organization (WTO) trading system. 'A country should not discriminate between its trading partners (giving them equally most-favoured-nation or MFN-status); and it should not discriminate between its own and foreign products, services or nationals'. [32] Therefore, MFN=0 is a tariff which is equal to zero and which is granted to all WTO members.

[10] Other reduced tariffs are: tariff code 140 'customs relief', which is smaller than the tariff that is granted to WTO members (tariff code 110 'under tariff'); tariff code 355 'customs relief', which is equal to zero; tariff code 375 'commercial processing traffic', which is equal to zero; and tariff code 380 'returned goods', which is equal to zero.

[11] The 'coverage rate' is the percentage of products eligible for preferential treatment out of the total number of dutiable products. [29]

[12] The utilisation rate is calculated based on the following formula:

$$UR_{ijt} = Actual\ GSP_{ijt} / Eligible\ GSP_{ijt}$$

where UR_{ijt} denotes the utilisation rate of country i of product j at time t. $Actual\ GSP_{ijt}$ represents the actual trade flows imported under GSP conditions, and $Eligible\ GSP_{ijt}$ the GSP-eligible trade flows of country i and product j at time t. The 'utilisation rate' varies between 0 and 1. [29]

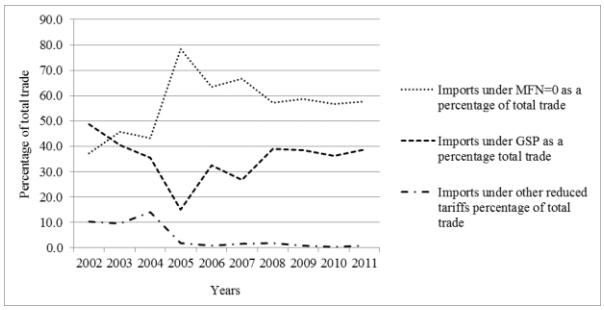

Fig. 3. Imports under MFN=0, GSP and other reduced tariffs as a percentage of LDCs' total trade

Therefore the utilisation rate of LDCs is equal to the percentage of imports from LDCs under the GSP (36%). In total 93% of agricultural and food imports from LDCs entered under an MFN or GSP tariff which was equal to zero or a GSP tariff which was smaller than the tariff that is granted to WTO members.

Method

[28] adopted the Newtonian theory of gravitation, which states that the gravitational force is proportional to the product of the masses of the two planets and inversely proportional to their squared distance, to the economic theory of international trade. Just as planets are mutually attracted in proportion to their sizes and proximity, countries trade in proportion to their relevant economic sizes (e.g. GDP or gross national income [GNI]) and their distance. [30] The gravity model performs very well statistically. Gravity models can also be used to explain and measure the effect of a policy ex post (e.g. granting trade preferences to DCs and LDCs) on trade flows. [21]

Our expanded gravity model follows [24]. Besides the integration of the classical gravity variables (GDP, Population, Distance and/or GDP per Capita), our expanded gravity equation contains a composite term measuring barriers and incentives for trade between two countries and a term measuring barriers to trade between each of them and the rest of the world. For the latter aspect, we use a simple approximation for an MRT according to [4][13].

In this study only unidirectional trade flows from ROW, GSP benefiting DCs and LDCs, respectively, to Switzerland were used. Therefore, factors which are specific for Switzerland (e.g. GDP, population or market information concerning the GSP) are captured by the constant term β_0. The basic form of the gravity model shown above can be written in the following form [equation (1)]:

$$lnIM_{ijt} = \beta_0 + \beta_1 lnY_{it} + \beta_2 lnD_i + \beta_3 lnR_{it} + \varepsilon_{ijt}$$

In equation 1, i denotes the individual trading partner, j denotes the product group at the HS 4 digits level and t denotes the time. IM_{ijt} are the import values of a given product group and year (measured in CHF and aggregated on HS 4 digits level) from a given trading partner. Y_{it} is the GDP of a trading partner, D_i represents the distance between the capital city of a trading partner to Switzerland`s capital city Bern and R_{it} approximates the MRT term which measures trade barriers that each country faces with respect to all its trading partners.

The expanded gravity model is supplemented by two additional control variables. To control for the supply capacity of a trading partner within the agricultural sector, we include the GDP of the agricultural sector of a trading partner of Switzerland.

GDP, respectively GDP in the agricultural sector together with population size of a trading partner enables us to control for the productivity (efficiency) within the entire economy's production and service sector, and in particular for the productivity within the agricultural sector.

[21] suggested that the institutional quality in the exporting country is an important determinant of the utilisation of the GSP system. Thus, we include the Worldwide Governance Index (WGI) in our gravity

[13] [4] suggest estimating a linear approximation (by means of a first-order Taylor series expansion) of the multilateral resistance terms (MRTs), thus avoiding the non-linear procedure used in [3]. The MRT of [4] can be formalised by the following equation:

$$\sum_c \theta_c \, lnDistance_c - \tfrac{1}{2} \sum_k \sum_c \theta_k \, \theta_c \, lnDistance_{ck}$$

Where θ_c represents the share of importer c in the worldwide gross national income or gross domestic product. The first term is a weighted average of the trade costs towards all potential trade partners which importer c is facing. The second term is the worldwide resistance towards trade flows. This term is identical for all of the trade partners; therefore, it is captured in the constant.

model as a proxy for the institutional quality of a nation. We assume that the higher the institutional quality of a nation (the higher the value of the WGI), the better exporters are able to overcome trade barriers, and the higher the trade volumes are for a given product group.

The gravity approach can be supplemented by various binary control variables which depict exporter specific factors affecting trade. [24] τ_{it} denotes a vector of binary control variables like "common border", "island", "landlocked", "common official language". [25]

A_t are time fixed effects (FE) and A_j are product FE. Time FE control for time-related variations, which affect all countries the same, for example a global crop failure due to extreme weather events. Product FE allow controlling for product group-related effects/characteristics which are constant over time, for example 'perishable products vs. long-lasting products' or 'animal vs. vegetable products'.

Beside a provision of the Swiss agro-food import determinants, the main focus of this paper is to evaluate whether the GSP is suitable to integrate the DCs and the LDCs into the Swiss market for agro-food products. Therefore we include an additional vector of binary variables which indicate the status of a trading partner within the most important tariff schedules of Switzerland. [16; 1; 11] By including a vector of binary tariff schedule variables, equation (2) is the following:

$$lnIM_{ijt} = \beta_0 + \beta_1 lnY_{it} + \beta_2 lnAY_{it} + \beta_3 lnP_{jt} + \beta_4 lnD_i + \beta_5 lnR_{it} + \beta_6 IQ_{it} + \delta\tau_{it} + \xi\gamma_{it} + A_t + A_j + \varepsilon_{ijt}$$

AY_{it} represents the GDP within the agricultural sector, P_{it} the population size of a trading partner and IQ_{it} the institutional quality of a trading partner measured by the WGI. γ_{it} denotes the vector of binary tariff schedule variables. It includes dummy variables that takes the value 1 if a trading partner has signed a Free Trade Agreement (FTA) with Switzerland, is a member of the GSP for DCs and LDCs, respectively, and is a member of the WTO, and zero otherwise.

In addition we have constructed three multiplicative interaction terms involving dummy variables which indicate the different memberships. Integrating multiplicative interaction terms, equation (3) becomes:

$$lnIM_{ijt} = \beta_0 + \beta_1 lnY_{it} + \beta_2 lnAY_{it} + \beta_3 lnP_{jt} + \beta_4 lnD_i + \beta_5 lnR_{it} + \beta_6 IQ_{it} + \delta\tau_{it} + \xi\gamma_{it} + \varphi(X_{WTO} * X_c) + A_t + A_j + \varepsilon_{ijt}$$

where X identifies in general the above mentioned tariff schedule dummy variables. The subscript WTO depicts the dummy variable for the WTO membership and the subscript c depicts the tariff schedules GSP for DCs, GSP for LDCs or FTA whereby the first multiplicative interaction term identifies the additional effect of being simultaneously a member of the WTO and the GSP for DCs, while the second one identifies the additional effect of being simultaneously a member of the WTO and the GSP for LDCs. The third multiplicative interaction term refers to the additional effect of being simultaneously a member of the WTO and having a FTA with Switzerland. This approach captures the opportunity for an exporter to choose between different tariff schedules, when a given product can be exported under more than one tariff schedule. For example a given product can be exported under GSP and MFN. If the costs of compliance of the GSP are not compensated by the PM, it could be expected, that the exporter would choose the MFN tariff schedule. To include a multiplicative interaction term that captures the additional effect of being a member of the GSP and FTA doesn't make sense because DCs and LDCs who have signed a FTA with Switzerland are excluded from the GSP. We expect a positive sign for all of the three multiplicative interaction terms and therefore a positive effect on the size of an import flow.

[2] Alternatively, we include the preference margin (PM) of the DCs and LDCs as a more refined measure of GSP access in the gravity equation. The preference margin is calculated according to the following formula based on Cirera (2014). [8]

$$PM = (1 + MFN\text{-}tariff) / (1 + GSP\text{-}tariff)$$

The calculation of the values for the PM is based on 'ad valorem equivalents' (AVEs)[14]. Since trade data at HS 4 digits level (product group level) is used for this study we need to aggregate tariffs from HS 8 digits level (product level) to the HS 4 digits level. This issue is addressed by constructing a uniform tariff aggregated at HS 4 digits level by means of an 'Overall Trade Restrictiveness Index' (OTRI)[15]. Since elasticities of the import demand are not available for agro-food imports of Switzerland and an econometric estimation is beyond the scope of this article, the calculation of the aggregated uniform tariff at HS 4 digits level is based on [17].
By substituting the correspondent PM for the dummy variables GSP for DCs and GSP for LDCs we get the following equation (4):

$$lnIM_{ijt} = \beta_0 + \beta_1 lnY_{it} + \beta_2 lnAY_{it} + \beta_3 lnP_{jt} + \beta_4 lnD_i + \beta_5 lnR_{it} + \beta_6 IQ_{it} + \delta\tau_{it} + \xi\gamma_{it} + \theta lnPM_{it} + A_t + A_j + \varepsilon_{ijt}$$

In this equation, the vector of dummy variables γ_{it} merely contains the dummy variables FTA and WTO member.
In a next step the dummy variable WTO member is interacted with the PM. The multiplicative interaction term captures the additional effect of being simultaneously a member of the WTO and a member a FTA. Thus, we estimate the following equation (5):

$$lnIM_{ijt} = \beta_0 + \beta_1 lnY_{it} + \beta_2 lnAY_{it} + \beta_3 lnP_{jt} + \beta_4 lnD_i + \beta_5 lnR_{it} + \beta_6 IQ_{it} + \delta\tau_{it} + \xi\gamma_{it} + \theta_1 lnPM_{it} + \theta_2(X_{WTO} * lnPM_{it}) + \varphi(X_{WTO} * X_{FTA}) + A_t + A_j + \varepsilon_{ijt}$$

Where X_{FTA} is the in equation (2) introduced binary dummy variable that indicates if a trading partner has signed a FTA with Switzerland. The multiplicative interaction terms which combine the PM and the WTO membership capture the above mentioned aspect of the opportunity for an exporter to choose between different tariff schedules, when a given product can be exported under more than one tariff schedule.
We estimate the expanded gravity models using Poisson Pseudo Maximum Likelihood (PPML). In contrast to OLS, PPML is able to include zero values and account for heteroscedasticity, which are both common in trade data. [22] The PPML is the one of the most reliable estimators which are currently available to estimate gravity models in the presence of excessive zero values. [4] Thus, we only present estimation results for PPML. Results from OLS regression are available upon request.

RESULTS AND DISCUSSIONS

Table 1 presents the regression results for PPML for the dummy setup and the model with the PM based on ad valorem uniform tariffs. If possible, we compare our regression results with regression results from the literature that deals with preferential trade agreements like the GSP. Column 2 contains estimations for equation (2) and column 3 the estimations for equation (3). Column 4 contains regression estimations for equation (4) and column 5 regression estimations for equation (5).
The emphasis of the following interpretation is dedicated to the main research question of this paper: Does the GSP foster agricultural and food imports to Switzerland from GSP benefiting DCs and LDCs?
The variables that are estimated in logs can be interpreted as elasticities. The marginal effects are presented for the model variations where the multiplicative interaction terms are

[14] Switzerland applies specific tariffs instead of ad valorem tariffs. For this purpose we calculated AVEs which are based on the following formula:

$$AVE\ (\%) = (specific\ tariff\ per\ kg\ /\ unit\ value)\ ^{x}\ 100$$

AVEs express specific taxes in percentages. The level of the AVE depends on the unit value (e.g. 1 kg), which is a proxy for the import price. [13]

[15] The formula for an OTRI is as follows:

$$OTRI_c = \sum_n m_{n,c}\,\varepsilon_{n,c}\,T_{n,c} / \sum_n m_{n,c}\,\varepsilon_{n,c}$$

Where the OTRI is the weighted sum of protection levels ($T_{n,c}$). The weights are the elasticity of import demand ($\varepsilon_{n,c}$) and the import volumes ($m_{n,c}$). [14] The formula implies a (negative or positive) correlation between the tariff rates (protection levels) and the elasticity of imports. Therefore, the main challenge is to determine an aggregated uniform tariff, which leads the national welfare unaffected. A detailed discussion on the issue of the unaffected welfare in the context of tariff aggregation can be found in [9].

included (columns 3 and 5).

Table 1. PPML regression results with the dependent variable IMP_{ijt} and PM based on AVEs (robust standard errors in parentheses); *** denotes significance on the 1% level, ** on the 5% level and * on the 10% level

Independent Variable	PPML Dummy 1	PPML Dummy 2 Interaction	PPML PM	PPML PM Interaction
GSP DCs	1.074*** (0.094)	-0.095 (0.211)		
GSP LDCs	1.055*** (0.163)	1.917*** (0.404)		
FTA	0.274*** (0.065)	0.247 (0.276)	0.038 (0.056)	0.310 (0.240)
WTO Member	1.290*** (0.168)	0.945*** (0.196)	1.369*** (0.167)	1.441*** (0.144)
(WTO * DCs)		1.096*** (0.096)		
(WTO * LDCs)		0.887*** (0.159)		
(WTO * FTA)		0.270*** (0.066)		0.038 (0.056)
lnPM DCs			0.275*** (0.052)	0.491*** (0.108)
lnPM LDCs			0.095** (0.030)	0.062 (0.071)
(WTO * lnPM DCs)				0.269*** (0.053)
(WTO * lnPM LDCs)				0.096** (0.031)
lnGDP	0.363*** (0.048)	0.369*** (0.047)	0.252*** (0.047)	0.251*** (0.048)
lnAgriculture GDP	0.712*** (0.052)	0.710*** (0.051)	0.656*** (0.050)	0.656*** (0.050)
lnPopulation	−0.476*** (0.044)	−0.480*** (0.044)	−0.315*** (0.042)	−0.314*** (0.042)
lnDistance	−0.807*** (0.066)	−0.815*** (0.066)	−0.843*** (0.065)	−0.843*** (0.066)
Border	0.739*** (0.127)	0.673*** (0.130)	0.836*** (0.130)	0.839*** (0.131)
Landlocked	−0.546*** (0.063)	−0.543*** (0.063)	−0.568*** (0.063)	−0.568*** (0.063)
Island	−0.354*** (0.079)	−0.359*** (0.079)	−0.364*** (0.078)	−0.364*** (0.078)
lnRemoteness	10.152*** (1.559)	10.201*** (1.558)	11.793*** (1.548)	11.797*** (1.548)
Common Language	−0.272** (0.108)	−0.213** (0.107)	−0.352*** (0.105)	−0.355*** (0.106)
lnWGI	1.112*** (0.123)	1.103*** (0.120)	0.999*** (0.120)	0.999*** (0.120)
Product FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
No. of observations	338,796	338,796	338,796	338,796
Pseudo R^2	0.520	0.521	0.518	0.518

Most of the classical gravity variables show their expected signs with the exception of the variable "common language". This variable shows an unexpected negative sign. Since the literature has already pointed out that common boarder, geographic distance, and other covariates do affect trade flows we omit this discussion and put more focus on the discussion about the effectiveness of the different trading schemes.

Initially, the 'Dummy 1' model shows an unambiguous picture: All of the tariff schedules show an expected positive sign and are highly significant. The strongest effect on the size of an import flow is constituted by the WTO membership. The effect of being a member of the GSP for DCs is stronger than the effect of being a member of the GSP for LDCs. The weakest effect on the size of an import flow is given by the variable 'FTA'.

For the model 'Dummy 2' where the multiplicative interaction terms are introduced, the picture changes: The positive effect on the size of an import flow of the WTO membership is still given. Though, the effect of being a member of the GSP for DCs is negative but statistically not significant, while the effect of being a member of the GSP for LDCs is positive and highly significant. The additional effect of being simultaneously a member of the WTO and the GSP, which captures the opportunity for an exporter to choose between different tariff schedules is for DCs and LDCs positive and statistically significant. However, the additional effect for DCs is stronger than the additional effect for LDCs. The effect of signing a FTA with Switzerland is positive but statistically not significant. Only the combination of being simultaneously a member of the WTO and signing a FTA causes a positive and statistically significant effect.

The positive and significant effect of the GSP for DCs and LDCs remains when introducing the PM instead of binary tariffs schedule dummies. Being a member of the WTO and signing a FTA has likewise a positive effect on the size of an import flow, while only the effect of being a member of the WTO is statistically significant.

Adding multiplicative interaction terms to the gravity model where the PM is included, the PM has a positive and statistically significant effect for the DCs, whereas the effect of the PM for the LDCs is positive but statistically not significant. The combination of being simultaneously a member of the WTO and the GSP merely triggers an additional positive and statistically significant effect for the LDCs.

In this context, [20] argue that DCs which are excluded from the GSP adopt more liberal trade policies than those remaining in the GSP. Furthermore they suggest that especially DCs may be best served by a full integration into the WTO trade regime rather than granting unilateral trade preferences via the GSP.

In accordance to the findings of our descriptive analysis, the regression estimates clearly indicate that the combination of being a member of the WTO and the GSP fosters agriculture and food imports from DCs and LDCs. Assuming that the DCs and LDCs with a higher state of economic development have comparative advantages which emerge from a high productivity within the agricultural sector, the additional cutback of protectionism through lower tariffs or a complete duty free market access via the GSP leads to an improved market access for agricultural and food products.

Most model variations of this article show a predominantly modest or negative effect of the GSP for DCs and especially for LDCs. With regard to the performance of the Swiss GSP the relatively low utilisation might be mainly due to compliance costs associated with the GSP. The findings of this article agree with [2], who evaluated the impact of non-reciprocal trade preferences at the HS 2 digits level using a gravity model with a similar dummy set-up compared with our expanded gravity model. Their results indicate that the effects of 'GSP DCs', 'GSP LDCs', 'other preferences' and 'FTA' are not always positive and statistically significant.

The GATT/WTO negotiations since 1947 have led to a gradual reduction of the average applied tariffs. A large share of the applied MFN-tariffs are nowadays near or equal to zero. [16] In accordance to [12] non-tariff barriers (NTBs) are especially for LDCs more relevant than tariffs. While the latter are mostly near or equal to zero, NTBs of the GSP in form of the restrictive rules of origin and the certificate of the direct shipment are besides sanitary and phytosanitary requirements, private product standards and environmental standards additional obstacles to benefit from a complete DFQF market access. To overcome NTBs the institutional quality of a nation is of decisive importance. Accordingly, the variable 'WGI', which measures the institutional quality of a nation, shows the expected positive sign and is highly significant for all model variations.

DCs and LDCs which are excluded from the Swiss GSP have signed a FTA with Switzerland. The results indicate for nearly all of the model variations a statistically positive effect of signing a FTA. [15] investigates the determinants of the Swiss agricultural exports by means of a gravity model. The findings indicate a weak positive effect of a FTA and therefore disagree with the results of this article for imports.

CONCLUSIONS

Although the Swiss GSP shows at first glance a modest performance, it has to be emphasised that the GSP works within the framework of the WTO.

While the multilateral openness of the WTO has grown over the past 70 years, the scepticism concerning the effectiveness of preferential trading schemes has also grown. Granting preferential market access is linked to restrictive, legal requirements (bureaucratic obstacles: certificates of origin and direct shipping).

Compliance with these bureaucratic obstacles is associated with transaction costs (costs of compliance).

These issues can be considered as the main reasons for the relatively meek performance of the Swiss GSP.

Whereas, virtually no costs of compliance occur to use the WTO tariff schedule. However, the empirical evidence of this article clearly indicates that both, being simultaneously a member of the WTO and the GSP, fosters agro-food imports from DCs and LDCs.

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MEASURING THE REGIONAL AND LOCAL COMPETITIVENESS. CASE STUDY: SOUTH-EAST REGION AND BRAILA COUNTY

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Abstract

The level at which competitiveness is generated and supported requires an approach at micro and macro economic level. At microeconomic level, competitiveness represents the productivity and efficiency by which inputs are transformed into goods and services; at microeconomic level, competitiveness means the obtained results, materialized into labour employment and income levels, as well as the factors that determine them. Thus one can speak about local, regional and national competitiveness. The study aimed to substantiate a methodology for assessing competitiveness at regional and local level, selecting the South-East Region and Braila County for the case study. This evaluation was made by using a competitiveness index adapted to the local particularities, which included a number of indicators available in the data sources and considered as representative for measuring competitiveness.

***Key words*:** *local and regional competitiveness, competitiveness index, South-East Region, Braila County*

INTRODUCTION

The notion of ”comparative advantage” was introduced by M. Porter in his work ”*The Competitive Advantage of the Nations*” and together with this the notion of competitiveness has received a major importance and new meanings, together also with similar terms, as productivity and welfare.

Starting from the already well known notion of *competition* another notion imposed itself, with specific features, that of *competitiveness*. Competitiveness, which exists at firm level does not function the same at local, regional or national level, from the very reason that these are not functioning by the same rules.

Approached at microeconomic level, respectively at firms' or companies' level, the notion of competitiveness represents the capacity of firms to compete, to develop and be profitable. Thus, competitiveness means the capacity of firms or companies to produce, constantly and efficiently, goods and services which reach the standards of an open market, in regard the price, quality, consumers' demands etc. The more competitive a firm is, in comparison with other competitors, the bigger its ability to gain a higher market share. Thus, the noncompetitive firms will register a decline of the market share and as a consequence they will become noncompetitive – being excluded from the market” [2].

Approached at macroeconomic level competitiveness represents the set of political, economic and social measures which a country decides to apply in order to maintain or improve its position on world plan. „The national competitiveness has become one of the main concerns of each nation's government” and represents „the capacity of development and innovation of the industry” [4].

The most complex definition is given by the European Commission, as following: „a country is competitive if its population can enjoy high living standards and even increasing and of a high occupation rate, in a sustainable way. More precisely, the level of the economic activity should not generate a non-sustainable external balance of the

economy, neither compromise the welfare of the next generations" [5].

From the nations' competitiveness the attention switched to the regional competitiveness, the regions being „key localizations for the organization and management of the economic increase and welfare creation" [1].

Starting from two objectives, the first, established by the European Council through the Lisbon Strategy, respectively that of transforming European Union into the most dynamic and competitive economy of the world, and the second, that of the Europe 2020 Strategy – to become a sustainable inclusive economy which could supply high levels of the occupancy, productivity and social cohesion - the real challenge is represented by the deep understanding of the competitiveness term as well as of the factors which act upon it. Thus, competitiveness raises a series of questions linked to the exact meaning of the regions', towns', localities' competitiveness. How, and in what sense competitiveness could be approached? How are the regions, towns and localities competing among themselves?

The main goal of the paper is the assessment of the county Brăila's competitiveness, a county defined by the rurality degree - intermediary, in relation to the development region to which it belongs, South-East Region. This assessment was made with the help of one index of competitiveness in the componence of which it entered a series of indicators considered as representative in competitiveness' measurement.

MATERIALS AND METHODS

The realization of the present study in which it was tried the construction of an index of local competitiveness (LCI) started from the study: "*The evaluation of rural competitiveness in creating a policy of rural development in Croatia"* [3] published in the year 2012. Within the study the authors built up an index of the rural competitiveness (RCI), based on the sustainable rural development concept. The rural competitiveness index was composed of a battery of 16 indicators grouped into four components: the human resource, the nonagricultural sector's economy, the agricultural sector economy and other activities income generating of the rural households. The calculation formula for the rural competitiveness index (RCI) was:

$$\mathbf{X_i = 100\ (x_i / X) / (p_i / P)}, \textbf{ where}:$$

x_i – the variable chosen for the zone studied (county)

X – the variable chosen at country level p_i – the number of inhabitants in the studied zone (county)

P – the number of inhabitants at country level .In the present study we wished to realize an index of local competitiveness by which we could measure the county Brăila's competitiveness versus that of the South - East Development Region.

It was tried an ample coverage of the set of indicators included in the initial pattern, the Croatian one by help of the statistical information available at territorial level in Romania.

A part of the indicators in the initial pattern were not available at desegregations county level, in the sources of official statistical data in Romania. Thus, there were identified other series of available data at level NUTS III and compatible from the point of view of statistical signification with the unavailable indicators. The Croatian pattern was adapted in function of the statistical data available in Romania, the main modifications being found in the following table and were made of:

-Replacement of indicator G*ross Value Added* with *Turn - over rate* which includes, besides the gross value added also the intermediary consumptions' value used for the goods' and services production, commercialized in a given period;

-Replacement of the indicator *Value of investments in long use corporal goods* with *Density of the local active units/1000 inhabitants,* both for the agricultural and the non agricultural sectors, being justified by the fact that a bigger density of the local active enterprises means a higher attractiveness for investors and investments within a certain space;

-The group of indicators O*thers activities*

incomes generating at agricultural farms' level was integrally replaced with a series of three indicators re-united under the name of *Specialization and innovation*. The methodological decision for changing the last set of indicators was motivated by the goal and area of coverage of the study. County Brăila is made of rural and urban communities, and the inclusion in the pattern of the information referring only to the farmers' households could have distorted the analysis (Table 1).

Table 1. Adapted pattern for competitiveness assessment at county level

Variable – Original pattern Croatia	Variable – Adapted pattern
Human resources	
Employed population in the rural zone (pers)	Employed population, thousand persons
Population with higher education (pers)	Population with higher education (pers)
The young population in the rural zone (pers)	The young population (pers)
The population density - pers/sq km	The population density– pers/sq km
The situation of the non-agricultural sector's economy	
GVA(Euro)	Turn -over rate– thousands euros
Exports' value Euro)	Exports' value- thousand euros
Investments in long term goods (Euro)	Density of local active units no/1000inhab.
The net average wage (Euro)	The net average wage (Euro)
The situation of the agricultural sector's economy	
The farm's average size - ha/farm	The farm's average size– ha/farm
GVA (Euro)	The turn-over rate–thousand euros
The exports' value (Euro)	The exports' value– thousand euros
Investments in long term goods (Euros)	The density of the local active units
The net average wage (Euro)	The net average wage (Euro)
Other generating incomes activities at agricultural farms' level	**Specialization and innovation**
The share of touristic farms	The share of employed population in non-agricultural sectors
The share of krafts' cooperatives	The salary workers in CDI at 10000 civil occupied persons
The share of processing farms	% crop production in total value of the production in agricultural branch
The share of farms gaining from other incomes' generating activities	

Source: adaptation after the pattern elaborated by O. Mikuš, R. Franić şi I. Grgić, 2012

-It is known the fact that an economy can become more and more competitive as its access to innovation increases. Thus, in the pattern adapted for this analysis was introduced an indicator which should reflect the innovative capacity at level NUTS III which is: *Salary workers in CDI at 10000 employed civil persons.*

Thus the index of local competitiveness was made of four components in which 16 indicators went (Table 2).

Table 2. Source of data for the indicators included in the pattern adapted for competitiveness assessment at county level

Group /Indicators	Source
Human resources	
Employed population (thousand persons)	NSI, tempo on-line, TEMPO_FOM103D
Higher education population (pers)	NSI, General Population and Dwellings Census 2010
The young population (pers)	NSI, tempo on-line, TEMPO_POP106A
Population's density (pers/sq km)	NSI, tempo on-line, TEMPO_POP106A, NSI, Statistical Yearbook – the area in sq. km
Situation of the non-agricultural sector's economy	
Turn-over rate– thousand euros	NSI, Demos data base
The exports' value (thousand euros)	NSI, tempo on-line, TEMPO_EXP101J
Local active units' density (no./1,000inhab.)	INS, tempo on-line, TEMPO_INT101R, TEMPO_POP106A
The net average wage (Euro)	NSI, tempo on-line, FOM106E
Situation of the agricultural sector's economy	
The agricultural farm's average size (ha/farm)	NSI, The General Agricultural Census, 2010
The turnover rate thousand euros)	NSI, _Demos data base
Exports' value (thousand euros)	NSI, tempo on-line, TEMPO_EXP101J
Local active units' density	NSI, tempo on-line, TEMPO_INT101R, TEMPO_POP106A
The net average wage (Euro)	NSI, tempo on-line, FOM106E
Specialization and innovation	
The share of population employed in non-agricultural sectors	NSI, tempo on-line, TEMPO_FOM103D
Salary workers in RDI per 1,0000 civil employed pers.	NSI, tempo on-line, TEMPO_CDP102E
% crop productions in total value of the agricultural branch's production	NSI, tempo on-line, TEMPO_AGR206A

The first component – human resources – included the indicators: employed population, higher studies population, the young population, with the age between 0-20 years old and population density. The second component - the non-agricultural sector's economy – included the indicators: the turnover rate and the exports' value, expressed in thousands euro, the density of

the local active per 1,000 inhabitants and the net average wage, expressed in euros. The third component – the agriculture sector's economy – included the indicators: the agricultural farm's average size, the turnover rate, the exports' value, the density of the local active units per 1,000 inhabitants and the net average wage. In the last component – specialization and innovation – there entered the indicators: the share of employed population in the non-agricultural sectors, the salary workers employed in research – development - innovation per 1,000 civil employed persons and the share of crop production in the total production of the agricultural branch.

For the pattern adapted at county level in Romania, the data were extracted at level of 2012 year, having in view the concrete limitations imposed by certain indicators for which the last available year was 2012. There were two indicators for which data were extracted at level of 2010 year: higher education *population* – The General Population and Dwellings Census 2010 and *average size of the agricultural farm* – The General Agricultural Census 2010.

The calculation formula of the local competitiveness (LCI) was:

$$\mathbf{X_i = 100\ (x_i / X) / (p_i / P),}$$ where

x_i – variable chosen for the county Brăila

X – variable chosen for Region South -East

p_i – population of county Brăila

P – population of the Development South-East Region.

To each indicator was allocated a specific weigh equal to that of the other indicators within the group, and for each group it was calculated an intermediary value of the index (shortened SI), utilizing the arithmetic mean; the calculation thus resulted for each group of indicators (SI) were utilized at the calculation of the value of the local competitiveness index, resulted from the calculation of the arithmetic mean of the SI values – it was considered that all components are equally important for the competitiveness expression.

It was necessary that the indicators which were included in the four components be available at county level, after that being built up those at region level.

RESULTS AND DISCUSSIONS

The main goal of the paper was that of assessing the competitiveness of county Brăila, defined by the rurality degree - as intermediary, in n relation to the development region it makes part of, South-East Region. Thus, on basis of the local competitiveness index, in the year 2012 county Brăila was with 2.32% less competitive as opposed to South-East Region (table 3).

It can be affirmed that the small value of this percentage shows that county Brăila was, in the year 2012, as competitive as the region it makes part of and that there would be necessary minor changes so as county Brăila be equal from competitiveness point of view with the South-East Region. But, if we take into account one of the four components (sub-indexes), the results show totally different.

At three components: the human resources, the economy of the non-agricultural sector specialization and innovation, county Braila was less competitive than the South-East Region, while at the component economy of the agricultural sector, county Brăila was with 28.63% more competitive than the region.

As regards the human resource, county, Brăila was with 5.74% less competitive than the South-East Region. Analyzing each indicator in the component it can be affirmed that the biggest competitiveness difference between county Brăila and South-East Region was given by: young population (county Brăila was with 7.73% less competitive than the South-East Region), higher education population, (county Brăila was with 6.7% less competitive than South-East Region), followed by the population density, (county Brăila was with 5.79% less competitive than the South-East Region).

As regards the indicator employed population, we can say that to county Brăila was lacking 2.74% to be as competitive as the South-East Region. This indicator is the only one which exceeds the mean of the indicators in the first component.

As regards the economy of the non-agricultural sectors, county Brăila was with 29.3% less competitive than the South-East Region.

Table 3. The local competitiveness Index – the county Brăila vs South-East Region, year 2012

Variables	County l Brăila pi = 319,674	Region S-E P=2,538,949	Indicator (X_i) of county Braila competitiveness Region S-E=100
	p_1/P = 0.125908		
Human resources			
Employed Population, 2012 (thousand persons.)[1]	123.8	1,011	97.26
Higher education population (no.pers.)[1]	31,522	268,348	93.30
The young population 0-20 y.o (no.pers.)[1]	62,838	540,895	92.27
The population density (no.pers./sq, km)[2]	66.7	70.8	94.21
The mean of indicators in the first component (sub-index 1)			**SI_1 = 94.26**
The non-agricultural sector's indicator			
The turnover rate (thousand euro) [1]	1,530,457.619	21,982,843.28	55.29
The exports' value (thousand euro) [1]	299,506	4,129,817	57.60
The local active units' density /1,000 inhab.) [2]	18.09	21.34	84.74
The net average wage (euro) [2]	278.05	329.67	84.34
The average of the indicators in the second component (sub-index 2)			SI_2 = 70.70
The agricultural sector's Economy			
The average size of the agricultural farm (ha/farm) [2]	7.91	4.94	160.12
The turn over rate (thousand euro) [1]	315,117.88	1,305,892.82	191.65
The exports' value (thousand euro) [1]	35,499	542,293	51.99
Local active units density (active units /1,000inhab.) [2]	1.58	1.17	134.77
The net average wage (euro) [2]	243.94	233.17	104.62
The indicators' mean in the third component (sub-index 3)			**SI_3 = 128.63**
Specialization and innovation			
% of the employed population in the non-agricultural sectors [2]	67.8	66.3	102.25
The salary workers employed in RDI per 1,000 civil employed persons [2]	15.8	16.4	96.34
% of crop production in total value of production of the agricultural branch (2012) [2]	61.32	65.67	93.37
The mean of indicators in the fourth component (sub-index 4)			**SI_4 = 97.32**
The local competitiveness index – county Brăila			*ICL_{BR} = 97.68*

Note: [1] – variable calculated with the formula: X=100*(xi/Xi)/(pi/Pi); [2] – variable calculated with the formula: X=xi/Xi*100

Thus, we can affirm that industry and services were less present in the economy of county Brăila, affirmation sustained also by the low level of the turnover rate and of the exports' volume within the non-agricultural sector. With all this, the density of the local active units per 1,000 inhabitants and the value of the average net wage in county Brăila were getting near the value of those indicators at the region's level, the value of each of them being net superior to the mean of indicators in the second component. It can be said that in county Brăila the density of the local active units per 1,000 inhabitants and the net average wage were very near the level of those in the South-East Region, but the level of the turnover rate and the export of these units was not a satisfactory one.

As regards the economy of the agricultural sector, county Brăila was situating over the level of the South-East Region. In the case of these component the level of four indicators in the county Brăila was situating over the level of those in the South-East Region, which is: the turnover rate (county Brăila was with 91.65% more competitive than the region), the average size of the agricultural farm (county Brăila was with 60.12% more competitive than the region), the density of the local active units per 1,000 inhabitants (county Brăila was with 34.77% more competitive than the region) and the net average wage (county Brăila was with 4.62% more competitive than the region). Within the economy of the agricultural sector, the value of the exports of county was much under the average of the South-East Region.

The average size of the agricultural farms and the turnover rate in the agricultural sector lead to this big competitive advantage of county Brăila, comparatively to South-East Region.

As regards the component of specialization and innovation, county Brăila was with 2,.8% less competitive than the South-East Region. The indicator the share of employed population in the non-agricultural sector made that county Brăila be with 2.25% more competitive than the South-East Region. The county Brăila was with 3.66% less competitive as regards the salary workers in research-development-innovation (RDI) per 1,000 civil persons employed and with 6.63%

less competitive at share of crop production in total of production value of the agricultural branch opposed to South-East Region.

CONCLUSIONS

In year 2012 county Brăila was with 2.32% less competitive opposed to the development region it makes part of.

The agricultural sector was that which made the county Braila be more competitive than the South-East Region. The average size of the agricultural farm and the turnover rate in this sector made that county Brăila outperform the South-East Region from point of view of competitiveness, together with the density of the local active units per 1,000 inhabitants. Having in view the mentioned above issues it is more than obvious that the average net wage in the agricultural sector in county Brăila was bigger than in the South-East Region. To be mentioned is the fact that in county Brăila a special attention should be given to the exports of products in the agricultural sector.

The specialization and the innovation was the second asset of county Brăila as regards competitiveness towards the South-East Region. The share of the salary workers employed in the non-agricultural sectors of the county Brăila was superior to that of the South-East Region.

The human resource, human capital of county Braila was the third strong point in regard the county's competitiveness opposed to the development region it makes part of. Less representative for county Brăila were the non-agricultural sectors. Even if in county Brăila the density of the local active units per 1,000 inhabitants and the average net wage of the employees of these units were almost near the region's level, the turnover rate and the value of exports in these sectors were with 44.71% and respectively 42.4% smaller than those at the level of the South-East Region. It can be affirmed that the non-agricultural sectors of county Brăila were not competitive.

The agricultural sector was the one to grant it a net competitiveness advantage, the specialization and innovation and the human resource were the two components which situated county Brăila at a competitive level near to that in the South-East Region, while the non-agricultural sectors of the county Brăila were the least competitive.

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HEALTH LEVEL OF BANK USING RISK BASED BANK RATING

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Abstract

Level of Health and financial performance of banks is the ability of a bank to conduct banking operations as normal and is able to meet all its obligations properly in a manner that complies with applicable banking. Increasing the effectiveness of health assessment of banks to cope with changes in the banking environment, the banks need improvement with risk approach. This research aims to examine and analyze the Assessment of the level of health of Commercial Banks, based on Bank Indonesia Regulation No. 13 / I / PBI / 2011. This study uses 32 banking companies listed in Indonesia Stock Exchange year period 2012-2014. The analytical tool used this study is the Assessment of the level of health of Commercial Banks against the risk factor using the ratio of net performing loans (NPLs) and Loan to Deposit Ratio (LDR), a factor of corporate governance by using the report self-assessment of good corporate governance, the earnings factor using the ratio of return on assets (ROA) and net interest margin (NIM) and the factor of capital using the ratio of capital adequacy ratio (CAR). Based on the findings, it was concluded as follows: the Assessment of the level of health of Commercial Banks that are in the category of healthy and good assessment in 2012 until 2014. Banks that were rated best based on the health of banks use the following indicators: (1) Net performing loans obtained by PT. Nationalnobu Bank Tbk; (2) Loan To Deposit Ratio by PT. Nationalnobu Bank Tbk .; (3) Return on Assets: by PT. Bank Mestika Darma Tbk, and PT. Bank Rakyat Indonesia Tbk; (4) Net Interest Margin: by PT. Bank Danamon Tbk, and PT. National Savings Bank Tbk .; (5) Capital Adequacy Ratio: by PT. Nationalnobu Bank Tbk.

Key words: *net performing loans, loan to deposit ratio, ratio of return on assets, net interest margin, capital adequacy ratio*

INTRODUCTION

The bank's business is a business that is fraught with risks of systemic and massive (endemic), could even have an impact spread (contagion effect). When one bank of the unfortunate, it can affect other banks. The banking crisis in mid-1997, for example, give rise to various problems so complex that quickly turned into an economic crisis, a crisis of social, cultural, political crisis, and the multidimensional crisis.

Public confidence can be built with a form of transparency of the banking institutions in terms of both the financial statements and state of health of the bank published. Indonesian banking institutions had felt the loss of public confidence in the bank. People feel hesitate to keep their money in the bank and withdraw their money that stored in the bank.[12]

The state of health of banks can be seen through the bank's performance, particularly the bank's financial performance. "Level health and financial performance of banks. [5] can be defined as the ability of a bank to conduct banking operations as normal and is able to meet all its obligations properly in ways that correspond to the prevailing banking regulations."

According to Bank Indonesia Regulation [2] Article 1 Paragraph 4, understanding of the bank is the result of qualitative assessments of various aspects affecting the condition or performance of a Bank through the Assessment of Quantitative and or Qualitative Assessment of the factors of capital, asset quality, management, earnings, liquidity and sensitivity to market risk.

Improvement of the effectiveness of health

assessment of banks to cope with changes in the banking environment, the banks need improvement with risk approach. It oblige banks to assess their own (self-assessment) bank by using the approach of risk (risk-Based Bank Rating / RBBR), both individual and consolidated, the scope of assessment includes risk profile (risk profile), corporate governance (Good Corporate Governance), earnings (earnings), and capital (Capital) to produce a composite rating the level health of the bank. Accordance with the provisions of Bank Indonesia Regulation [1] and [4] on the Assessment of the level of health of Commercial Banks.

The new legislation is a refinement of the method previously used CAMELS. The new method stipulated by Bank Indonesia is a methods with risk approach namely Risk-Based Bank Rating (RBBR). Metode Risk Based Bank Rating atau RBBR adalah metode yang terdiri dari empat faktor yaitu penilaian Profil Risiko, Good Corporate Governance (GCG), Produktif dan Capital. [9,10]

The risk assessment is based on Risk Based Bank Rating (RBBR) according to Bank Indonesia Regulation [1] Article 4, factors assessment, as described below.

a)Risk Profile

Risk Profile is the assessment basic of the bank at this time because any activity carried out by banks are very possible to emergence of risk. The Assessment is an assessment of inherent risk and quality of risk management in bank operations. According to Bank Indonesia Regulation [1], risks are taken into account in assessing the health of banks by the method of Risk-Based Bank Rating (RBBR) as follows: (1) credit risk, (2) market risk, (3) Liquidity Risk, (4) Operational Risk (5) Legal Risk, 6) Strategic Risk, (7) Compliance Risk, (8) Reputational Risk.

b) Good Corporate Governance

Good Corporate Governance [11], is a set of percentages and efforts to improve systems and processes in the management of the organization by organizing and clarify the relationship, authority the rights and obligations of all stakeholders (stakeholders), including the General Meeting of Shareholders (AGM), the Board of Commissioners and Board of Directors.

Good Corporate Governance [3] to give understanding: enterprise management mechanisms to ensure that management always acted in the interests of the parties associated with the company, so that the management company will always be focused on improving the company's value.

Table. 1. Matrix Parameters / Indicators Assessment Factor Good Corporate Governance (GCG) [1]

Assessment Factor GCG	Description
Parameter/assessment indicators GCG factor is the rating of the Bank's management on the implementation of corporate governance principles refer to Bank Indonesia provisions concerning GCG for Commercial Banks by taking into account the characteristics and complexity of the Bank	The results of the implementation of corporate governance principles of the Bank as stipulated in Bank Indonesia provisions concerning GCG for Commercial Banks is only one source of votes GCG Bank perigkat factor in the assessment of the Bank

National Committee for Good Corporate Governance issued general guidelines of Good Corporate Governance Indonesia which contains five basic principles as follows:

(1) Transparency is openness in expressing their material and relevant information as well as transparency in the decision making process.

(2) Accountability namely clarity of function and implementation of organ bank accountability so that effective management.

(3) Responsibility is the suitability of the bank management with the legislation in force and the principles of sound bank management.

(4) Independency that the bank management in a professional manner with no influence / pressure from any party.

(5) Fairness and Equality namely justice and equality in fulfilling the rights of stakeholders arising under treaties and legislation in force.

c) Earning (Rentabilitas)

Analysis of the profitability ratio is a tool to identify or quantify the level of business efficiency and profitability achieved by the bank concerned. In addition, the ratios used to measure the profitability of the Bank. Based on Bank Indonesia Regulation No. 13/1 / PBI / 2011, an assessment of the earnings factor

(earnings) includes assessment of the earnings performance, sources of earnings, and the sustainability of bank earnings.

d)Capital (Modal)

According to [7], Capital Ratio is an assessment of the existing capital based on the capital adequacy of banks. The greater the ratio, the better the dining capital capital position.

The soundness of banks conducted by the Composite Rating (PK) of the Bank established (Bank Indonesia Regulation [1] based on a comprehensive and structured analysis to rank each factor by taking into account the materiality and significance of each factor, as well as considering the ability banks in the face of significant changes in external conditions.

Based on the background and the formulation of the problem, then the purpose of this study was assessment of Health Level of Commercial Banks in Indonesia Stock Exchange 2012-2014 period based on PBI [1], as follows: (1) Indicators Non Performing Loan (NPL) in the category of healthy; (2) Indicators Loan to Deposit Ratio (LDR) in the category of healthy; (3) Indicators of Good Corporate Governance in both categories; (4) Indicators Return on Assets (ROA) in the category of healthy; (5) Indicators Net Interest Margin (NIM) in the category of healthy; (6) Indicators Capital Adequacy Ratio (CAR) in the category of healthy; (7) The best bank in assessment of the health of commercial banks.

MATERIALS AND METHODS

The research was conducted on all commercial banks registered as a public company on the Indonesian Stock Exchange in the report year 2012-2014. The number of banks registered as a public company at the Indonesian Stock Exchange acounted for 41 banks representing the sample in this study. This study uses Purpose Sampling, based on the following criteria: (1) Banks published annual reports (annual report) for the period of 2012 through 2014; (2) Bank which publishes reports Self Assessment Good Corporate Governance in the period of 2012 through 2014; (3) From these 41 banks a number of 32 banks were selected using criteria and remained in this research.

This study was conducted from February 2016 to July, 2016. The data required from commercial banks registered as a public company on the Indonesian Stock Exchange consists of: (1) The annual report in year 2012-2014. (2) Self Assessment Report of Good Corporate Governance in Year 2012-2014.

This study uses the ratio of Assessment for Commercial Banks on the Indonesia Stock Exchange for the period 2012-2014 is based on PBI [1].

(1) Analysis of Risk Profile

a) NPL (Non Performing Loan), is the ratio between non-performing loans to total loans. Predicate Health of Bank under the NPL (Bank Indonesia Circular Letter No. 6/23 / DPNP), namely:

(1) NPL <2%, Very Healthy;
(2) 2% <NPL ≤ 5%, Healthy;
(3) 5% <NPL ≤ 8%, Fit;
(4) 8% <NPL ≤ 12%, Less Healthy;
(5) NPL > 12%, Unhealthy.

b) LDR (Loan to Deposit Ratio) is the financial ratio of the banking company's that relate to aspects liquidity by comparing the entire amount of credit given to third-party funds. Predicate Health of Bank based LDR Bank (Bank Indonesia Circular Letter No. No. 13/30 / DPNP / 2011), namely:

(1) LDR ≤ 75%, Very Healthy;
(2) 75% <LDR ≤ 85%, Healthy;
(3) 85% <LDR ≤ 100%, healthy enough;
(4) 100% <LDR ≤ 120%, Less Healthy;
(5) LDR > 120%, Unhealthy.

(2) Good Corporate Governance

Reports Corporate Governance (GCG), ranked Determination assessment of the implementation of Good Corporate Governance factors based on self-assessment reports by the respective Good Corporate Commercial Bank Issuer in the Indonesia Stock Exchange. Predicate Health of Bank based GCG Bank (Bank Indonesia Circular Letter No. No. 13/30 / DPNP / 2011), namely:

(1) Ranked 1 Very Good;
(2) Ranked 2, Good;
(3) Ranked 3 Pretty Good ;
(4) Ranked 4 Less Good;
(5) Ranked 5, No Good.

(3)Earnings (Rentabilitas)

a) Return on Assets (ROA) is a ratio that measures a company's ability to generate

profits is by using total assets owned after adjusting for the costs of marking these assets. Predicate Health of Bank based ROA (Bank Indonesia Circular Letter No. No. 13/30 / DPNP / 2011), namely:
(1) 1.5% <ROA, Very Healthy;
(2) 1.25% <ROA ≤ 1.5%, Healthy;
(3) 0.5% <ROA ≤ 1.25%, healthy enough;
(4) 0% <ROA ≤ 0.5%, Less Healthy;
(5) ROA ≤ 0% (or negative), Unhealthy.
b) NIM (Net Interest Margin) ratio comparison between net interest income to average earning assets. Predicate Health of Bank based NIM (Bank Indonesia Circular Letter No. 13/30 / DPNP / 2011), namely:
(1) 3% <NIM, Very Healthy;
(2) 2% <NIM ≤ 3%, Health;
(3) 1.5% <NIM ≤ 2%, healthy enough;
(4) 1% <NIM ≤ 1.5%, Less Healthy;
(5) NIM <1% (or negative), Unhealthy.

(4) Capital/Capitalization

a) CAR (Capital Adequacy Ratio) is the capital adequacy ratio to gauge a bank's ability to accommodate the losses that may be faced by the Bank. Predicate Health of Banks based Capital Adequacy Ratio (Bank Indonesia Circular Letter No. No. 13/30 / DPNP / 2011), namely:
(1) 12% <CAR, Very Healthy;
(2) 9% <CAR ≤ 12%, Healthy;
(3) 8% <CAR ≤ 9%, healthy enough;
(4) 6% <CAR ≤ 8%, less healthy;
(5) CAR ≤ 6%, Unhealthy.

RESULTS AND DISCUSSIONS

Results

The results of the health bank's assessment of the risk approach (risk-Based Bank Rating) for commercial banks listed issuers / public companies in the Indonesia Stock Exchange period 2012 to 2014 based on the NPL, LDR, ROA, NIM, CAR are presented in Table 2.
The results of the highest rank and the lowest rank of bank health assessment with risk approach (risk-Based Bank Rating) for commercial banks listed issuers / public companies in the Indonesia Stock Exchange period 2012 to 2014 based on the NPL, LDR, ROA, NIM, CAR are presented in Table 3.

Table 2. Summary of Rating for Commercial Banks Issuer Year 2012-2014 (Number of bank issuers).

Classification/ Year	2012	2013	2014
NPL			
Very Healthy	19	18	15
healthy	13	13	16
healthy enough	0	0	0
Less healthy	0	0	0
Unhealthy	0	1	1
Total	**32**	**32**	**32**
LDR			
Very Healthy	5	18	15
healthy	10	13	16
healthy enough	15	0	0
Less healthy	2	0	0
Unhealthy	0	1	1
Total	**32**	**32**	**32**
ROA			
Very Healthy	21	20	12
healthy	3	4	3
healthy enough	5	6	12
Less healthy	2	1	4
Unhealthy	1	1	1
Total	**32**	**32**	**32**
NIM			
Very Healthy	30	27	26
healthy	2	5	3
healthy enough	0	0	2
Less healthy	0	0	0
Unhealthy	0	0	1
Total	**32**	**32**	**32**
CAR			
Very Healthy	31	32	32
healthy	1	0	0
healthy enough	0	0	0
Less healthy	0	0	0
Unhealthy	0	0	0
Total	**32**	**32**	**32**

Table 3. Ranked Highest and lowest in Health Assessment Bank.

Classification / Year	2012	2013	2014
NPL			
Lowest NPL	0.00% PT. Bank Nationalnobu Tbk	0.00% PT. Bank Nationalnobu Tbk	0.00% PT. Bank Nationalnobu Tbk
Highest NPL	2.81% PT. Tabungan Negara Tbk	12.28% PT. Bank Mutiara Tbk	12.24% PT. Bank Mutiara Tbk
LDR			
Lowest LDR	43.46% PT. Bank Nationalnobu Tbk	45.72% PT. Bank Nationalnobu Tbk	53.99% PT. Bank Nationalnobu Tbk
Highest LDR	103.65% PT. Bank Danamon Tbk	140.72% PT. Bank Himpunan Saudara Tbk	102.43% PT. Bank Tabungan Pensiunan Negara
ROA			
Lowest ROA	-0.74% PT. Bank Kesawan Tbk	-7.64% PT. Bank Mutiara Tbk	-5.28% PT. Bank Mutiara Tbk
Highest ROA	4.90% PT. Bank Mestika Dharma Tbk	5.19% PT. Bank Mestika Dharma Tbk	3.85% PT. Bank Rakyat Indonesia Tbk
NIM			
Lowest NIM	2.11% PT. Bank Nationalnobu Tbk	2.08% PT. Bank Nationalnobu Tbk	0.61% PT. Bank Mutiara Tbk
Highest NIM	11.41% PT. Tabungan Pensiunan Negara Tbk	11.50% PT. Tabungan Pensiunan Negara Tbk	9.66% PT. Tabungan Pensiunan Negara Tbk
CAR			
Lowest CAR	10.09% PT. Bank Mutiara Tbk	12.26% PT. Bank Himpunan Saudara Tbk	13.65% PT. Bank Mutiara Tbk
Highest CAR	68.60% PT. Bank Nationalnobu Tbk	87.49% PT. Bank Nationalnobu Tbk	48.97% PT. Bank Nationalnobu Tbk

Discussions

1.Health Assessment Bank

a.Risk Profile

1)*Net Performing Loan* (NPL)

Calculation NPL results show that in 2012 there is a classification of "very healthy" number of 19 Bank, "healthy" number of 13 Bank. In 2012 the bank received no qualification "less healthy" and "unhealthy". Banks that received best predicate to risk factors under the NPL in 2012 there are PT. Nationalnobu Bank because it is able to maintain NPL always below the value of 2%. Banks that received the highest NPL was PT. State Savings Bank Limited with a value of NPL of 2.81% but the value of this ratio is still in the category of healthy.

In 2013, health assessments of banks to factor Risk Profile is based on Net-performing loans (NPL) tended to decline compared to 2012. This year there are 18 Banks with kateori very healthy, "healthy" number 13 Bank, and "unhealthy" is 1 Bank. Bank Mutiara unhealthy awarded in 2013 with a value of NPLs amounted to 12.28%. This condition is caused by a number of the old management has been problematic (debtors of Bank Century) so it looks at the NPL increased from 3.90% last year to 12.28%.

In 2014 health assessments of banks to factor Risk Profile is based on Net-performing loans (NPL) in the classification of "very healthy" there are 15 Bank, "healthy" there are 16 Bank, and one commercial bank that received the title "unhealthy". Banks that received the predicate "unhealthy" by NPL is BCIC (PT. Bank Mutiara Tbk) with a NPL ratio of 12.24%. Values NPL are still high is related to the settlement of non-performing loans that occurred in the past that can not be implemented due to constrained legal issues.

2) Loan to Deposit Ratio (LDR)

Based on research, LDR in 2012, there were five commercial banks with a very healthy predicate, 10 commercial banks with healthy predicate, 15 banks with enought healthy predicate, and 2 banks with less healthy predicate. Banks that received the predicate of "less healthy" in 2012, among others; PT. Bank Danamon (BDMN), and PT. Bank Dinar (DNAR). And the ratio of the highest LDR is owned by PT. Bank Danamon Tbk with a ratio value of 103.65%. LDR is best to NOBU (Nationalnobu Bank Tbk) with a ratio value of 43.46%

In 2013 there is a decrease in the number of loans compared to 2012. Thus, the assessment results LDR, there are 18 banks that received the title "very healthy", and 13 banks received the predicate healthy. LDR is best to NOBU (Nationalnobu Bank Tbk) with a ratio value of 45.72%. But this year there is one commercial bank that received the title "unhealthy", namely PT. Bank Himpunan Saudara Tbk with a ratio value of 140.72%. This is because loans granted to third parties exceed the total third party funds collected by the PT. Bank Himpunan Saudara Tbk.

In 2014 LDR assessment results, 15 banks received the title "very healthy", 16 banks received the predicate of "healthy", and one bank received the predicate "unhealthy". LDR highest ratio owned by the Bank (PT. Bank Negara Savings) with a ratio value of 102.43%, which is still categorized as less healthy. LDR is best to NOBU (Nationalnobu Bank Tbk) with a ratio value of 53.99% and categorized as very healthy.

b. Good Corporate Governance (GCG)

In 2012, the bank's assessment of the health factor of Good Corporate Governance (GCG) in the classification of "excellent" scores there are 10 Bank, the "good" bank there are 15, "pretty good" was 6 Bank, and "less good" was 1 Bank. Banks that received the predicate of "less good" is the AMCOR (PT. Bank Windu Kentjana Tbk).

In 2013, the bank's assessment of the health factor of Good Corporate Governance (GCG) in the classification of "very good" there are 5 Bank, the "good" bank there are 24, "pretty good" there are two bank, and "less good" was 1 Bank. Banks that received the predicate of "less good" is BCIC (Bank Mutiara Tbk).

In 2014 the bank's health assessment of factor of Good Corporate Governance (GCG) in the classification of "very good" there are 6 Bank, the "good" there are 25 Bank and "less good" was 1 Bank. Banks that received the title of "less good" is BCIC (Bank Mutiara Tbk).

Banks that obtain predicate of excellent for the period 2012 to 2014 is PT. Bank Central

Asia Tbk, PT. Bank Rakyat Indonesia Tbk and PT. Bank Negara Indonesia Tbk.

c. Earning

1) *Return on Asset* (ROA)

Factor analysis of earnings by using ROA shows that there are still some banks that have a negative ROA value. This means that the profitability of the bank in a position that is not healthy. ROA is Very healthy, it's shows excellent ability of banks in terms of asset management to increase revenue or reduce costs.

The 2012 assessment of the health of banks to factor Earning based on Return On Asset (ROA) in the classification of "very healthy" there are 21 Bank, "healthy" there are 3 bank, "pretty healthy" there are 5 Bank, "less healthy" there are 2 Bank and "not healthy "there are 1 Bank. Banks which obtain best value ROA ratio is BBMD (Bank Mestika Dharma Tbk) with a value of 4.90% ROA. Banks that received the predicate of "unhealthy" in 2012 is BKSW (Bank Kesawan Tbk) with a value of -0.74% ROA. This is because in that year the Bank Kesawan losses so that ROA is low.

In 2013 a health assessment of banks to factor Earning based on Return On Asset (ROA) in the classification of "very healthy" there are 20 Bank, "healthy" there are four bank, "pretty healthy" there are 6 Bank, and "less healthy" there are 1 Bank and " unhealthy " there are 1 Bank. Banks which obtain best value ROA ratio is BBMD (Bank Mestika Dharma Tbk) with a value of 5.19% ROA. Banks that received the predicate of "unhealthy" in 2013 is BCIC (Bank Mutiara Tbk) with a value of nationalism -7.64% due to losses incurred in the year. But this year, Bank Kesawan Tbk who previously scored the lowest ROA, in 2013 recorded a growth in earnings, so there is an increase in the value of ROA.

In 2014 assessment of the health of banks to factor Earning based on Return On Asset (ROA) in the classification of "very healthy" there are 12 Bank, "healthy" there are 3 bank, "pretty healthy" there are 12 Bank, and the "less healthy" there are 4 Bank and " unhealthy " there is 1 Bank. Banks which obtain best value ROA ratio is BBRI (Bank Rakyat Indonesia Tbk) with a value of 3.85% ROA. Banks that received the predicate of "unhealthy" 2014 is still BCIC (Bank Mutiara Tbk) with a ratio value of -5.28%.

2) *Net Interest Margin* (NIM)

An assessment of the earnings factor with a ratio of NIM is to determine whether the bank has a good ability in the management of assets. High NIM resulted portion of net interest income generated greater productive assets that are expected to increase profits.

In 2012, the bank's assessment of the health Earning factor based Net Interest Margin (NIM)) on the classification of "very healthy" there are 30 Bank and two banks with healthy ratings. Banks that received the best value is the ratio of the Bank's NIM (PT. Bank Negara Savings) with a value of 11.41% NIM. And the lowest NIM is owned by PT. Bank Nationalnobu with a ratio value of 2.11% NIM. However, these results still get in on the qualification of "Healthy". Because this year although the interest rates go down, but not too significantly reduce net interest income so that NIM remains high.

In 2013, the bank's assessment of the health Earning factor based Net Interest Margin (NIM)) on the classification of "very healthy" there are 27 Bank, and who received the predicate of "healthy" there are 5 Bank. Banks with the best value is the ratio of the Bank's NIM (National Savings Bank Tbk) with a ratio of 11.50%

In 2014 the bank's assessment of the health Earning factor based Net Interest Margin (NIM) on the classification of "very healthy" there are 26 Bank, "healthy" number 3 bank, "pretty healthy" there are two bank, "unhealthy" there are 1 Bank. Banks which obtain best value NIM ratio is the Bank's BTPN (Bank Tabungan Pensiunan Nasional Tbk) with a ratio of 9.66%. Banks that received the predicate of "unhealthy" is BCIC (Bank Mutiara Tbk). This because the losses suffered by the Bank Mutiara, interest income decreased, thus affecting the value of the ratio of NIM.

d. C*apital Adequacy Ratio* (CAR)

Results of the Capital Adequacy Ratio (CAR) showed that banks are in a healthy capital position. The entire bank is still considered to

have adequate capital so as to meet the liabilities owned banks both in the operations and anticipate the risks that may occur.

In 2012, health assessments of banks to factors Kapital / Capital by Capital Adequacy Ratio (CAR) in the classification of "very healthy" there are 31 Bank, "healthy" there are 1 Bank. Banks which obtain best value CAR ratio is NOBU (Nationalnobu Bank Tbk) with a ratio value of 68.66%.

In 2013, health assessments of banks to factor capital by Capital Adequacy Ratio (CAR) on the classification of "very healthy" there are 32 Bank. Banks which obtain best value CAR ratio is NOBU (Nationalnobu Bank Tbk) with a ratio value of 87.49%.

In 2014 health assessments of banks to factor Capital by Capital Adequacy Ratio (CAR) on the classification of "very healthy" there are 32 Bank. Banks which obtain best value CAR ratio is NOBU (Nationalnobu Bank Tbk) with a ratio value of 48.97%

2.The best rating in the assessment of the health of banks

Based on Table 3 in mind that the Bank is rated best for NPL ratio in 2012, 2013 and 2014 are NOBU (PT. Bank Natioalnobu Tbk). Banks that got the best ratings for LDR in 2012, 2013 and 2014 are NOBU (PT. Bank Nationalnobu Tbk). Banks that got the best ratings for ROA in 2012 and 2013 were BBMD (PT. Bank Mestika Dharma Tbk) with each value of the ratio of 4.90% and 5.19%. And the best ratings in 2014 were BBRI (PT. Bank Rakyat Indonesia Tbk) with a ratio value of 3.85%.

Banks that got the best ratings for the ratio of NIM in 2012, 2013 and 2014 are BTPN (PT. Bank Negara Savings) with their value maisng ratio 11.41%, 11.50% and 9.66%.

Banks that got the best ratings for the CAR in 2012, 2013 and 2014 are NOBU (PT. Bank Nationalnobu Tbk) with each value ratio of 68.60%, 87.49% and 48.97%.

CONCLUSIONS

Based on the results of research and analysis has been done, the researchers can conclude the following:

1)Health assessment of bank using non-performing loans shows there is 1 bank with a ratio value of the category of "unhealthy" in 2013 and one bank with a ratio value of the category of "unhealthy" in 2014.

2)Health assessment of bank using loan to deposit ratio shows that there are two banks with a ratio value of less healthy in 2012 and the first commercial bank to value ratio is not healthy in 2013 and 2014.

3)Health assessment of bank using Good Corporate Governance (GCG) shows there is one bank with a ratio value of the category of "not good" that one bank in 2012, one bank in 2013 and one bank in 2014.

4)Health assessment of bank using Return on Assets shows that there are two banks with less healthy category and one commercial banks with unhealthy category in 2012. In 2013 there is one category of banks with less healthy and one commercial bank in the unhealthy category. In 2014 there were four banks with less healthy category and one commercial banks with unhealthy category.

5)Health assessment of bank using Net Interest Margin indicates that there are one commercial banks with unhealthy category in 2014,

6)Health assessment of bank using Capital Adequacy Ratio shows that no bank in the "less healthy" or "unhealthy"

7)Bank which were rated best by each indicator is (a) Net performing loans: In 2012, 2013, and 2014 by PT. Nationalnobu Bank Tbk; (b) Loan To Deposit Ratio: In 2012, 2012, 2013 by PT. Nationalnobu Bank Tbk; (c) Return on Assets: In 2012, 2013 by PT. Bank Mestika Darma Tbk, 2014 by PT. Bank Rakyat Indonesia Tbk; (d) Net Interest Margin: Year 2012 by PT. Bank Danamon Tbk, in 2013 and 2014 by PT. National Savings Bank Tbk.; (e) Capital Adequacy Ratio: In 2012, 2013 and 2014 by PT. Nationalnobu Bank Tbk.

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IMPACT OF EU COMMON AGRICULTURAL POLICY 2014-2020 IMPLEMENTATION ON AGRICULTURE IN SLOVAK REPUBLIC

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Abstract

The paper aims to analyze the implementation of CAP 2014-2020 on development of agriculture in SR. Based on the findings we can evaluate that the CAP 2014-2020 measures implemented changes mainly in I. pillar. The most significant changes include reassessment of direct payments, greening, a new tool in I. Pillar, which is intended to pay for environmental services. Greening can be understood as a suitable tool for Slovak farmers to increase the possibilities for additional payments. As other positive measure for Slovak farmers is the payment for young farmers, which is being applied in SR for the first time. For young farmers in Slovakia (0,02% share on total EU young farmers) is supposed to be such a measure crucial for reaching competitiveness for their farms and even to increase the number of young farmers. As a negative impact of CAP reform for Slovak agriculture is the expiration of milk quota, which may negatively impact the livestock production. The II. Pillar remains unchanged and allows SR to focus on its specific priorities in rural development with new measure to realize flood control measures. According the evaluation of main economic indicators of Slovak agricultural farms we can state still negative economic development. Implementation of CAP and realization of EU financial support for agriculture in Slovakia represents main financial support and the support of Slovak government and national funding needs to be revised and increased.

Key words: *agricultural efficiency, Common Agricultural Policy, farm, financial support, payments, rural development*

INTRODUCTION

The reform of the Common Agricultural Policy (CAP), adopted in 2013 introduced significant changes in the implementation of the CAP in the period 2014-2020, especially in the area of market support. The most important changes include a reassessment of direct payments in the first and second pillars, including the flexible transfer of resources between the pillars, the completion of the quota system and other forms of market support, with emphasis on the environmental aspects of agriculture and the revitalization of the agricultural sector [6]. CAP reform was applied from the year 2014 based on four main legislative texts – consecutive regulations; Regulation 1305/2013 covering rural development, Regulation 1306/2013 for horizontal issues regulating funding and controls, Regulation 1307/2013 regulating direct payments and Regulation 1308/2013 adapting market measures [9]. The CAP remains on the system of two pillars while compared to the previous programming period is an evident increase of connectivity between the pillars, changes in the CAP decision-making system, in which the decision-making process was divided between the EU Council and the European Parliament in the frame of the ordinary legislative procedure. CAP for 2014-2020 remains at the set targets, but with a smaller budget, but nevertheless pursue the reform process relating to the transfer of product support to producer support and to the approach that takes more into account the requirements of the country.

Application of the CAP in the Slovak Republic is implemented in accordance with the Concept for the Development of Agriculture for the years 2013-2020 [4], where is defined the vision of Slovak agriculture, which aims to support the development of productive and competitive agriculture, ensuring economical use of agricultural land, sufficient production

capacity of agriculture of Slovak Republic in main agricultural commodities, food safety and accessibility for the population and ensuring sustainable forest management. In this respect, it is intended to promote resource efficiency for smart, sustainable and inclusive growth in agriculture and rural areas. In agriculture are therefore supporting the following objectives:

-increase production performance in supporting agricultural commodities to levels 80% of the current consumption of the population in Slovakia;

-rural development and improving the living conditions and employment of the rural population, in particular by supporting sectors that are potential sources of employment.

MATERIALS AND METHODS

The paper focuses on the assessment of the possibilities of CAP support in the years 2014 - 2020 in the Slovak Republic. In the paper were used data and results of research conducted by the project KEGA no. 025SPU-4/2015 titled Agricultural and Environmental EU policy, secondary data sources, professional literature, EU information sheets. Evidence base for the research were the SR Rural Development Programme 2014-2020 and the Annual Progress Report on the RDP in 2014. By the paper processing were used mathematical and statistical analysis, comparison method, analysis and scientific abstractions. Method of scientific abstraction refers to the whole paper as well as the theoretical and analytical part.

RESULTS AND DISCUSSIONS

CAP in the period 2014-2020 focuses on market orientation by providing income support and creating a safety net mechanism for producers with regard to the requirements of environmental protection and improved support for rural development across the EU. It is important to highlight the primary role of the CAP, and to provide a policy framework that will encourage farmers to fulfill objectives of the CAP: improving competitiveness of the agricultural sector, improve the sustainability of natural resources in the longer term, increasing efficiency and ensuring a balanced territorial development [3]. CAP 2014 - 2020 continues on the system of the two pillars. Pillar I, financed by the European Agricultural Guarantee Fund covers market measures (direct payment, payments for good agricultural practices, redistributive payment, scheme for young farmers, small farmer's scheme and the voluntary coupled support) and CMO. The measures of the first pillar, in addition to market-based measures, are mandatory for Member States and do not require co-financing. Pillar II, funded by the European Agricultural Fund for Rural Development, provides resources to farmers, food producers and foresters through the Rural development program measures. Measures under II. pillar are voluntary and co-financed from the national level.

Changes in the financial support involve direct payments which are the main source of support. The most significant changes include greening, a new tool in I. Pillar, which is intended to pay for environmental services. It refers to payments for good agricultural practices. Farmers should be rewarded for the services they provide in the context of development (landscaping, biodiversity, climate stability). Greening or green direct payment means that in addition to the basic payment scheme/the single payment scheme gives each farm and additional payments per hectare in respect of certain agricultural practices that are beneficial for the climate and the environment. The work [1] states that the majority of farms in Slovak republic already fulfill good agricultural practices by utilizing the land. Greening is understood as a legitimate public demands to fulfill the role of agriculture in the issue of dealing with environmental problems, but this measure is associated with increased costs, thus enabling such a payments for this purposes, is considered as a benefit for farmers.

In the implementation of direct payments, the Member states agreed on the redistribution of direct payments in the EU - 15 and the completion of the single payment scheme in the EU-10 by 2020. A payment for young farmers is paid on the basis of the so-called

small farmers scheme, which is based on a simplified system of aid paid to entities of primary agricultural production with maximum support to 1 250 EUR and may be supplemented by a start-up support within II.pillar. The reason for the application of this payment is the age structure of farmers and the pursuit of generational change in agriculture, since only 14% of farmers in the EU (in SR 0.02%) are younger than 40 years. SR implements this measure for the first time since the membership in EU and the government aims to support mainly young farmers producing fruit, vegetable, legumes and livestock. The obligation of cross-compliance and advisory system in agriculture persists in the program 2014 - 2020 strategy.

Member States have the possibility for better orientation of direct support through compulsory schemes, which includes redistributive payment in order to give decoupled payment for the first 28 hectares of arable land (28 ha is a average acreage of farms in Slovakia, respectively the applicant in SR) to constitute up to 65 % average payment per hectare in support of small and medium-sized enterprises, additional payments which may be up to 5% of the total amount aim for the less favoured areas. To reduce differences in the level of direct payments between Member States was introduced a minimum average national direct payment per ha by 2020.

Additional tools to secure efficiency and competitiveness of the CAP include changes in the context of market-based measures (such as expiration of the milk quota system (2015) and sugar (2017). It is possible to state that for Slovak republic in case of expiration of milk quotas is this agreement disadvantageous and will have negative impact on farm competitiveness in SR and does not constitute aid for farmers. Stabilization in the sector of milk based on milk quotas and also re-motivation of farmers to breed cattle, pigs and poultry are the objectives of the Ministry of Agriculture and Rural development. The effort of the Ministry seeks to satisfy the 80% food self-sufficiency, which is included in the medium-term Concept for the Development of Agriculture in SR for the years 2013-2020 [4]. Because so far, applying EU economic instruments supported production of energy crops at the expense of livestock. Based on the analyses of situation in livestock production in SR, the expiration of milk quota will have negative impact on fulfilling these aims of Slovak Ministry of Agriculture and rural development.

Among the instruments in place to promote the efficiency and competitiveness of farms within II. pillar are included measures for restructuring and modernization of farms, help for young farmers implementing the agricultural production as a business, farm advisory system, education and innovations. Those instruments are designed to help the agricultural sector to adapt to new trends and technologies. In the case of forestry measures, the forest managers in Slovak republic will be also able to use funds from the Rural Development Programme to realize flood control measures.

Rural Development policy 2014-2020 remains unchanged and is implemented through national/regional Rural development programs for the 7 year period. Support under II. pillar is implemented in Slovakia through the Rural Development Programme for the years 2014 - 2020 [8], which was approved by the European Commission in February,13 2015 and includes priorities of Slovakia. by the use of 2 077 million EUR for the period 2014-2020, of which 1 545 million EUR is from the EU budget and 532 million EUR of national funding, what allows Member States to better focus on their specific priorities.

The priorities of rural development in the Slovak Republic include:

P 1: Knowledge transfer and innovation in agriculture, forestry and rural areas

P 2: Strengthening the viability of farms and the competitiveness of all types of agriculture and promote innovative types of technologies and sustainable forest management

P 3: Promoting food chain organization, including the processing of agricultural products and their marketing, animal welfare and risk management in agriculture

P 4: Restoring, preserving and enhancing

ecosystems related to agriculture and forestry

P 5: Promoting resource efficiency and supporting the shift towards a low carbon economy and climate resilient in the agriculture, food and forestry sectors

P 6: Promoting social inclusion, poverty reduction and economic development in rural areas

The main priorities include following sub-measures:

-Innovation

-Enhanced measures for agricultural advisory services

-Restructuring/modernization of agricultural holdings and investment

-Young farmers: grants to start a business (up to 70 000 EUR) general investments in tangible assets, training and consulting services,

-Small farmers assistance to start a business up to 15 000 EUR for a small farm,

-Less Favoured Area support

-Agri-environmental measures

-Non-agricultural activities: grants for start-up and development of micro and small enterprises

-Basic services and village renewal

-LEADER.

The main priorities include sub-measures as innovation, enhanced measures for agricultural advisory services, restructuring/modernization of agricultural holdings and investment, young farmers: grants to start a business (up to 70 000 EUR) general investments in tangible assets, training and consulting services, small farmers assistance to start a business up to 15 000 EUR for a small farm, Less Favoured Area support, agri-environmental measures, non-agricultural activities: grants for start-up and development of micro and small enterprises, basic services and village renewal and LEADER.

We suppose that the assistance of the Rural Development Programme will continue to support innovative projects that will bring new products, technologies, techniques or ways of working. The program continues to support the protection and preservation of high nature value agricultural and forest areas aimed at sustainable use of soil and water, creating opportunities for high-quality food production and provision of rural tourism activities and diversification of products and services not covered by the agricultural sector. One of the options for them at the moment, as stated [5], is the introduction and subsequent use of biomass energy, which is significantly supported by the European Union. The introduction of the cultivation of energy plants in Slovakia can be regarded as one of the most important innovations of plant production and an important part of the agricultural sector. The current status of agriculture in Slovakia offers extensive cultivation of energy plants. Growing energy crops is one of the possibilities to use temporarily respectively unused agricultural land. Positively is to be understood that the program continues in the Leader approach in order to improve the quality of life in rural areas and creating new jobs. For the rural areas in Slovakia was the Leader program main financial source to secure rural development during the period 2007-2013. From a financing perspective (Fig.1) is a main priority of Rural Development Programme in SR for the years 2014-2020 restoring, preserving and enhancing ecosystems related to agriculture and forestry.

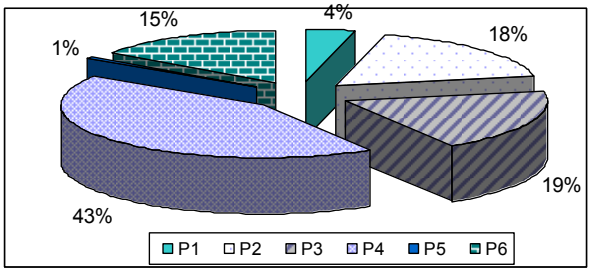

Fig.1. Redistribution of financial support in SR for the years 2014-2020 (%)
Source: Author's calculation based on VÚEPP data,2015

To finance the CAP is from the EU multiannual financial framework for the period 2014-2020 intended for agriculture 408,31 billion EUR, representing about 38% of the total EU budget. Within the I. Pillar is for market support related expenditure and direct aid allocated 312,74 billion EUR and for II.pillar was allocated 95,58 billion EUR.

Taking into account the current economic situation in the EU, the volumes of funds indicates the continued strong support of the EU agricultural policy. Most CAP funds among Member States is destined for France (20%), Germany and Spain (13%), Italy (11%) and the UK (9%). For Slovak Republic were approved 5,35 billion EUR [11], equivalent to 1.3% of the total EU budget for the CAP. The total financial support for agriculture and rural development for the Slovak Republic increased in 2014-2020 up to 7% compared to 2007-2013 (Table 1).

Table 1. Redistribution of EU financial support for SR (EUR)

	2007-2013	2014-2020
I.pillar – market support	1,944,059,000	3,054,205, 654
II.pillar – Rural development	2,597,053,717	2,076,757,259
EU co-financing	*1,996,908,078*	*1,544,699,346*
SR co-financing	*600,145,639*	*532,057,913*
Common market organization	105,000,000	105,000,000
EU co-financing	*84,000,000*	*84,000,000*
SR co-financing	*21,000,000*	*21,000,000*
State aid	327,010,305	114,258,134
TOTAL	**4,973,123,022**	**5,350,221,046**

Source: Data from Ministry for Agriculture and Rural develoPment in Slovak republic, 2015.

In the programming period 2014-2020, Member States have the possibility of EU funding flexibility between pillars, the Slovak agriculture has the possibility of transferring up to 25% of funds from II. pilllar to I. pilllar. This transfer should ensure the stabilization of Slovak agriculture and help to create a suitable business environment for stabilizing the animal production and special crop production and keep employment rates in excess of productivity growth. Financial support should serve to fulfill the objectives of the Slovak Republic in the years 2014-2020, with an emphasis on increasing the share of land ownership in the total assets of agricultural entities, as the share of own utilized land in Slovakia in total is very low in comparison to EU countries (representing only 10%). The trend in Slovakia is long-term, despite the measures of Slovak government it was not able to optimize the functioning of the land market in Slovakia. As reported [2] and [10] the main production factor in Slovak agricultural the land is still averaged only about 5% of the total property holdings. This means that the Slovak farmer leases in an average of more than 90% of agricultural land of they farm. Compared to other EU countries is this disadvantage, since the land as one of the main components of property holdings and in other EU Member States makes up about 50%. This imbalance is the less favorable the higher the average acreage on which agricultural entity farms. Average farm area in Slovakia represents more than 500 ha, which is the highest average farm area across the EU. The rent for agricultural land was in the range of € 6.50 to 120.00 EUR.ha -1 causing the increase the farm costs.

Based on evaluation of the main economic indicators in agriculture in Slovakia (Table 2) it can be stated that because of the decline in the economic performance of Slovakia from year 2011, which was affected by a decline in agricultural output in value terms (6%), with a significant decline in livestock production (12%) and a slight decline of plant production (1.2%) and the predominant crop structure (51.8%) and livestock (41.6%) production is in Slovakia's interest to support the growth of competitiveness of Slovak agriculture especially pig, poultry and cattle, vegetable and fruit growing through national aid.

Table 2.Main economic indicators in agriculture in SR (in EUR, 2015)

	2012	**2013**	**2014**
GDP (at constant prices in bilions EUR)	71,5	65,0	75,2
GDP growth rate (%)	1,2	1,8	2,2
Inflation rate (%)	3,6	1,4	-0,1
Foreign trade balance (billions EUR)	-0,4	-0,6	-1,0
Number of workers in agriculture (thousands person)	2 219	2 329	2 363
Average nominal monthly wage (EUR)	805	823	858

Source: Processed based on data NPPC VUEPP, 2015

The share of agriculture on total GDP increased. The foreign trade balance in

agriculture in Slovakia is clearly focused on the EU Member States. The negative and significant increase in the negative balance was due to a significant year- on-year reduction in the value of exports of agricultural and food products from Slovakia to the EU-28 to (14.9%), while in the same period decreased the value of imports and prices of agricultural commodities. A positive trend can be seen in the growth of average nominal monthly wage, but still continued to persist, wage disparity between the economies of Slovakia and its sub-sectors of agriculture and food industry.

As shown in (Fig.2) we can positively evaluate slight increase in amount of gross agricultural production, what was supposed to have positive effect on farm efficiency, but still the farm efficiency measured thus profit or loss is still in loss. Also the decrease of added value has negative influence on the situation in Slovak agriculture.

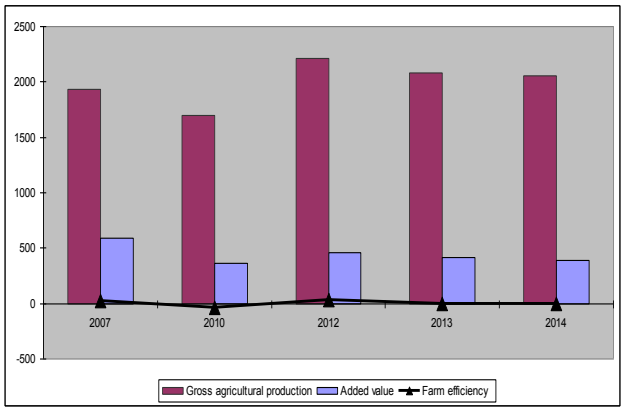

Fig.2. Development of main agricultural indicators in SR 2007-2014, processed based on NPPC – VUEPP, 2015.

The farm efficiency was also influenced by several factors, mainly by faster decline in revenues (2.7%) than costs (2.6%), increase in revenues from sales of own products (2.0%) under the influence of an increase in sales of plant products (5.6%) and a decline in sales of animal products (2.2%). As well as significant regressive price developments of agricultural products (7.8%) and plant products (15.0%), mainly cereals (18.1%) and oilseeds (11.1%) and animal products prices (0.7%). The negative impact on farm efficiency had the decrease in support policy, especially direct payments as an important part of revenue and provision of loans, because the support to agriculture in the total volume decreased by 7.9 million EUR. The decrease was caused due to the depletion of funds from the Rural Development Programme 2007 - 2013 [12] and slower payments from the initial use of the new Rural Development Programme 2014 - 2020 as well as a drop in support from the national budget of the Slovak Republic.

According the evaluation of main economic indicators of Slovak agricultural farms we can state still negative economic development. The implementation of CAP and realization of EU financial support for agriculture in Slovakia represents main financial support the support of Slovak government and national funding needs to be revised and increased.

CONCLUSIONS

CAP continues the reform process in the light of new challenges and goals. The economic challenges are food safety, globalization, price volatility, pressure on production costs due to rising input prices, and the worsening position of farmers in the food chain. Dominant environmental challenges are to achieve the efficiency of natural resources, maintain soil and water quality and threats to the natural environment and biodiversity [7].

The most significant changes in the CAP include better orientation of support through a review of direct payments to farmers. Other measures include an agreement by the end of the quota system and other forms of market support; more emphasis is placed on environmental aspects of agriculture and strengthening rural development.

Changes related to direct payments, which are in most EU member states based on the historical principle, will gradually be replaced by a minimum national average payment per hectare by 2020, to ensure a more equal redistribution of payments between Member States. Since 2003 used historical principle caused significant payment differences between MS and were replaced by a fairer system based on territorial lines. But even after twelve years of Slovakia's EU membership and the adoption of EU CAP was

not the direct payment support in Slovak agriculture equal to the level of the EU-15 countries what caused continuous disadvantage for Slovak farmers.

Based on realized research, we consider that the main goal of SR in the frame of agriculture to increase the labor productivity in agriculture to a level of 70% of the EU average will not be fulfilled, because labor productivity in the Slovak Republic in 2014 reached 46% in agriculture and in food industry 39% of the EU average and the evaluation of main economic agricultural indicators shown negative development trend. Similarly, we believe that the objective of increasing the level of diversification of agricultural production and non-agricultural activities of farmers will not be fulfilled due to the significant decline in the financial allocation for the programming period 2014-2020 for that measure. For the Slovak Republic was approved 5,35 billion EUR, equivalent to 1.3% of the total EU budget for the CAP. Based on the evaluation of RDP 2007-2013 the highest percentage of contracting was reached by measures on reconstruction and community development and support under the measure Leader (100%). Among the most demanded measures were also the measures connected to the modernizations of agricultural holdings, adding value to agricultural and forestry products, education and diversification into non-agricultural activities (89-98% contracting). For the rural areas in Slovakia was the Leader program main financial source to secure rural development during the period 2007-2013.

Instead of this fact we agree that the reform of the CAP should be more in favor of less productive and less intensive regions. Evaluating the rural development policy we assume that the territorial challenges relate to a positive impact of economic, social and demographic developments on rural areas, deceleration, falling population and location of economic activities in rural areas should in arranged way have positive impact on rural areas in Slovakia.

For the future of EU agriculture is necessary to increase the production of quality and safe food while protecting natural resources and creating a competitive and viable agricultural sector providing for the proper functioning of the supply chain, which helps the sustainability of the rural economy.

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STUDY EFFECT OF MICROBIAL INOCULANTS ON DECOMPOSITION OF BARLEY STRAW

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Abstract

The purpose of the study was to analyze the effect of microbial inoculants on the decomposition of barley straw. The field experiment, located at the soddy-podzolic sandy loam soil in order to study the effect of microbiological preparations on biotransformation of barley straw, biological properties of soddy-podzolic soil. The conclusion was that the use of microbiological agents-destructors is justified firstly when incorporation of high doses of straw in the cereal crop rotations, use of straw under cereal culture, in technology no-till, i.e. in the situations when it is necessary to provide conditions for the speedy decomposition of post-harvest crop residues, used as a fertilizer, in order to prevent its negative impact and to promote positive action.

Key words: straw decomposition, microbiological preparations, CO_2 emission, microbial biomass, number of soil microorganisms

INTRODUCTION

Russian and foreign researchers have currently evaluated crop residues as the most important resource of the reproduction of organic matter and preserve the functional properties of the soil in agrocenoses [6,9,11]. One of main requirements for an innovative system of agriculture is production of greatest possible amount of crop residues to return them to the soil in order to maintain soil health and quality. Return and incorporation of post-harvest residues into soil allows to close the cycle of nutrients and productivity and sustainability of agro-ecosystems increase.

In Russia, the excess of straw cereals and leguminous plants, which have not been used in animal husbandry and other branches, account for not less than 40-64 million tons annually. Straw incorporation into soil is being promoted as an alternative of management crop residues. However soil straw decomposes rather slowly because of the high content of cellulose and lignin and low nitrogen content, which may lead to reduction in yields. One way to enhance the decomposition of post-harvest crop residues can be obtained by processing of microbiological inoculants containing high efficiency of microorganisms-decomposers.

In some domestic and foreign studies it has been found that the use of microbiological modifiers can accelerate the processes of mineralization and humification of straw in the soil, which then reduces the phytotoxicity of the products and increases crop yields [1,2,4, 5,10]. The data of field experiments to assess the effectiveness of inoculation of crop residues microbiological preparations received to date from Russian scientists are few and insufficient and require clarification and confirmation of the results of additional researches.

The present study aimed to examine the effects of three microbial inoculants of barley straw destruction returned into soil.

MATERIALS AND METHODS

Studies were performed in a field experiment, located at the soddy-podzolic sandy loam soil experimental field of All Russian Research Institute of Organic Fertilizers and Peat. This experimental field is located in Russia, lowland Meschersky (in the center of the East

European Plain) (56 ° 03 'N, 40 ° 29' E) at 150 m above sea level. The site is situated in the zone temperate continental climate, average rainfall for the year - 599 mm, the average temperature for the year - 3.9° C. Soddy-podzolic sandy loam soil, are low in organic matter (C_{org} - 0.55-0.62 %) and nutrients, unstable water regime, acidity (pH_{kcl} - 4.5-4.9).

Experimental design: 1. No Fertilizer (NF); 2. Barley Straw (BS); 3. BS + N50; 4. BS + N50 + Barcon (B); 5.BS + N50 + Ekstrasol (E); 6. BS + N50 + Ekstrasol CS (Ecs).

In August (2012-2013), after harvesting the grain barley straw, it was comminuted to 15-20 mm and evenly distributed over the surface of the plots at a dose of 5 t / ha, a compensating dose of nitrogen (ammonium nitrate) at a rate of 10 kg per 1 ton of straw was applied, the barley straw then treated with biologics in accordance with the experimental design after that it was plowed in the arable soil layer (0-20 cm). The following spring, spring triticale (*Triticosecale Wittmack*) was sown.

In the experiment, microbiological preparations was used (were developed in All-Russia Research Institute of Agricultural Microbiology: Barcon - based on microbial cultures-destructors of cellulose and lignin plant waste; Ekstrasol - based culture effective strains of Bac. subtilis; Ekstrasol CS - with enhanced cellulolytic activity.

To assess the impact of the applied biopreparations on the decomposition of straw, the following methods were applied: emission C-CO_2 was determined by absorption method (amount of CO_2 absorbed was determined by titration of 1 M NaOH against 0.2 M HCl) [12]; soil microbial carbon (C_{mic}) was determined by rehydration-extraction method [3]; number of the soil microorganisms participating in circulation of carbon and nitrogen was determined accounting method on solid and liquid nutrient mediums [13].

RESULTS AND DISCUSSIONS

An emission of carbon dioxide from the soil is an integral indicator of actual soil biological activity and reflects the intensity of mineralization of organic matter. Monitoring of CO_2 emission from the soil of the experiment was carried out in dynamics, starting from day 1 after ploughing of straw, with an interval of 7 days before the appearance of negative soil temperatures and frosts. According to the obtained data for the entire observation period which lasted for 63 days after ploughing of straw into the soil, the minimum amount of C-CO_2 produced is from the soil registered of treatments "NF" – 72.5 g/m^2. In the variant with introduction of a 5 t/ha of straw, this value was higher by 1.5 times i.e. 109.4 g/m^2.

Additive compensating dose of N50 to straw contributed to the increase in carbon emissions by 27% i.e. 139.3 g/m^2. Everything used in the experiment biologics showed high effectiveness in the intensification of decomposition of plant biomass straw was been fixed by increasing the size of CO_2 emission, which during the period of observations were in the amount of 32-58 % higher than in the embodiment where the straw is applied without the use of biologics and N50 (BS), and 4-24 % higher compared to treatments "BS+N50" (Fig. 1).

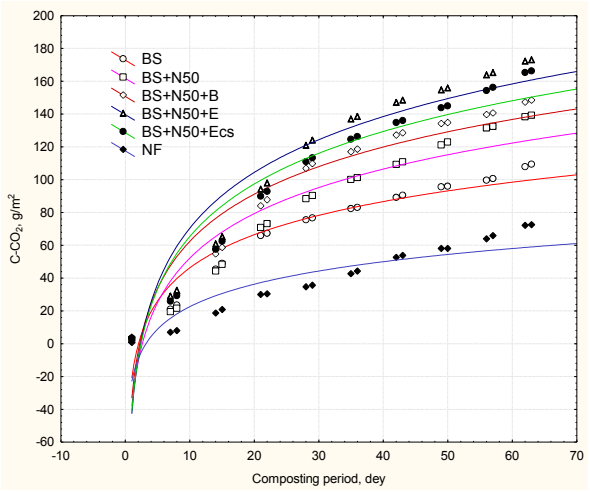

Fig. 1. Cumulative emission curves of C – CO_2

In accordance with the intensity of impact on C-CO_2 production in this experiment studied microbial inoculants can be arranged in the following sequence: Ekstrasol> Ekstrasol CS> Barcon.

The obtained experimental data are consistent

with the research results [1] in the incubation experiment (73 day), whereby of straw incorporation into the soil increased the CO_2 emission by 39 % compared with the control, while treatment with biologic showed another 10 % increase. According to research [8], in conditions of sufficient moisture soil respiration (CO_2 evolution) was increased when introduction straw inoculated with biological product based micromycetes *Limonomyces roseipellis*.

The decomposition of plant residues in the soil is carried out not only with the mineralization of labile fractions of organic matter to CO_2, but the assimilation of carbon in the microbial biomass. The increase in the organic carbon content in the microbial biomass can be an indicator of accumulation trend of biochemical processes of post-harvest residues transformation. In what follows, the microbial biomass carbon is transformed into carbon humus and thus replenishes its reserves in the soil.

As a result of analysis of the content of microbial biomass (C_{mic}), in field experiment it can be noted that the most noticeable effect of inoculation of straw biological products appeared after 1.5 months of ploughing straw into soil when the value of C_{mic} in these treatments 1,22 -1,35 times higher compared to treatments "BS+N50" (Fig. 2).

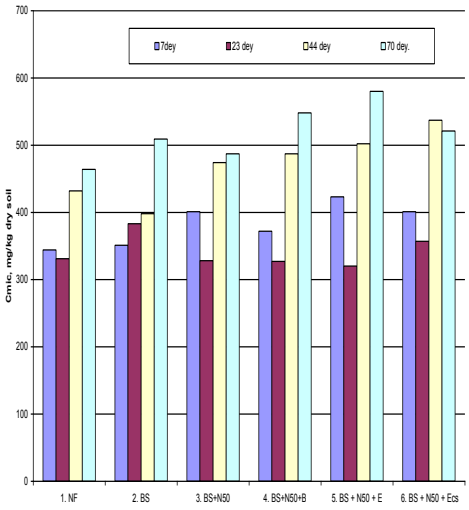

Fig. 2.The content of microbial biomass in arable layer of soddy-podzolic soil in different periods after of straw incorporation

The increase in the organic carbon content of microbial biomass, and humus has been found in studies [8], if introduced into the soil straw inoculated with biological product based on the culture of the fungus *T. reesei.*

As a result of measurement of number of the soil microorganisms participating in transformation C - and N-containing connections, it has been found that an increase in the group of proteolytic bacteria by 1.39 and 1.70 times and amylolytic bacteria by 1.62 and 1.64 times in the treatments with application of Extrasol and Extrasol CS, respectively. The positive impact of biologics on the number of microorganisms involved in the mineralization of cellulose, marked a 1 year after plowing in straw (october 3,2012), when the number of aerobic cellulolytic microorganisms in treatments with inoculation straw Barcons, Ekstrasol and Ekstrasol CS was higher by 38 -43% compared to treatments "BS + N50" (Table 1).

Table 1. Number of agronomically beneficial microorganisms in soddy-podzolic soil after straw introduction with microbial preparations (0-20 cm)

Treatments	Proteolytic	Amylolytic	Cellulolytic	Micromycetes	Nitrifiers	Cl. pasterianum
	x10^6 CFU/g dry soil		x10^3CFU/g dry soil			
NF	4.1	8.3	20.6	34.7	8.0	272
	4.5	8.9	29.6	55.1	6.7	25
BS	5.6	10.8	28.0	57.0	9.5	491
	7.7	19.8	33.1	91.2	5.5	150
BS+ N50	6.2	11.4	31.3	56.7	20.0	495
	6.8	19.1	36.5	76.7	12.0	450
BS+ N50+B	6.7	12.3	39.0	58.0	14.3	495
	6.1	15.0	50.5	81.7	12.6	25
BS+ N50+E	10.6	18.5	39.7	52.3	14.7	822
	6.6	9.8	51.0	53.6	9.7	250
BS+ N50+Ecs	8.6	18.7	31.0	59.7	15.3	822
	6.7	9.7	52.1	67.6	10.0	95

Note: Above the line – May 4, 2013; below the line – October 3, 2013.

Previous studies in laboratory experiment showed that inoculation of barley as well as winter wheat straw Barcon was the following effects: increase in the number and biomass of soil microorganisms, increased coefficient of straw humification on 52-66% and content of easily mineralized organic carbon (labile and extracted with hot water), reduced phytotoxicity straw transformation products [6]. Our findings are also consistent with the results of field tests on chernozem in which it is shown that introduction into soil of wheat straw treated with microbial preparation

Extrasol produced on the basis of *Bacillus subtilis* strain Ch-13 results in increase of activity of all main groups of microorganisms responsible for destruction and involvement of lignocellulotic compounds into the process of humus formation [7].

CONCLUSIONS

Based on the results of research in the field experiment established the effectiveness of microbiological preparations-destructors against decomposition of crop residues of cereals in the soddy-podzolic soil. The results provide a basis for further research on the development of ways to intensification of crop residues decomposition under the influence of microbial inokulants.

1. The use of microbiological agents-destructors is justified firstly when incorporation of high doses of straw in the cereal crop rotations, use of straw under cereal culture, in technology no-till, i.e. in the situations when it is necessary to provide conditions for the speedy decomposition of post-harvest crop residues, used as a fertilizer, in order to prevent its negative impact and to promote positive action.

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IRRIGATION SECTOR IN EUROPEAN UNION: EVOLUTION, CURRENT STATE AND CHARACTERISTICS

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Abstract

The irrigation sector is a major issue in European agriculture considering the potential impact of climate change and increasing demand for food in areas undergoing economic development. The main objective of this paper has taken into account the analysis and description of trends and current status of irrigation in the European Union (EU) regarding a series of technological, economic and social factors. Achieving this goal involved literature review and analysis of databases dedicated to the subject. The data analysis targeted irrigable and irrigated agricultural areas, types of used irrigation and types of irrigated crops. Results of the analysis show a picture of the wide variety of irrigation sector in the EU. The development of this sector must consider the multifunctional role of agriculture in establishing a balance between economic, social and environmental variables in different European regions and countries.

Key words: *climate change, European Union, irrigable agricultural area, irrigated area, irrigation systems*

INTRODUCTION

Agriculture is an important economic sector in Europe thanks to its special contribution to the achievement of food security and employment of a large part of the rural population. According to demographic projections, future population growth is expected to be accompanied by an increase in food demand, with direct effect on water use for irrigation [15]. Water, the most important resource for life has been considered, for several decades, a mainly important issue on the international agenda since many areas of the world suffers from water shortage [1]. Moreover, since water scarcity and droughts have increased due to climate change, it is possible to increase the competition between water use for irrigation and its use in other sectors of the economy [8].

Over the last century, the average temperature in Europe has risen by 0.8^0C and it is expected to increase by 1^0C to 5.5^0 C in 2080 [7]. The negative aspects caused by climate change may significantly influence water management, particularly at regional and farms level [8]. The biggest impact will be seen on the arid and semi-arid Mediterranean region, frequently suffering from lack of water due to the high volume of evaporation and low soil moisture. On the other hand, regions in northern Europe could benefit from a rise in temperature, which could lead to the extension of the growing season [2][12]. Regardless of the possible gains or losses, an agricultural model change from south to north would involve complex processes and structural changes that are needed, increasing production technologies adaptation. Future climate changes could modify the conditions of agricultural production and, therefore, could adversely affect food production as agricultural technologies and practices are not adapted to predict regional impacts of climate change. The severity of climate change for agriculture, however, largely depends on the vulnerability of agricultural activities and technologies, and adaptive capacities of regions and farms [14].

Efforts at a European level over the years to expand irrigated agricultural areas and increase productivity per hectare have been

justified if it takes into account current food crisis and weather-dependence of agricultural production. The current and projected climate change at the European level will adversely affect agricultural production and consequently economic development and the living standards of the population. Irrigation is used to replace losses caused to crops evapo-transpiration and to achieve high yields in the same growing environment [3]. Irrigation can have two main purposes in relation to agricultural production: i) increases the amount of obtained products; ii) improves the quality of production - for example, by preventing damage caused by extreme temperatures; iii) improving the quality of production - for example, preventing damage caused by extreme temperatures, through frost protection of sensitive crops and applying nutrients dissolved in water etc. Irrigated agriculture is largely protected from climate variability by existing hydraulic infrastructure. However, the water needs of agriculture should be viewed in the context of diminishing water availability in regards to environmental issues, population growth, economic development, etc. In conclusion, irrigation water management must be interrelated, not only with traditional management of water resources, but also with food production, rural development and with natural resource management [6].

MATERIALS AND METHODS

This paper examines the trend and the current model of irrigation in the Member States and the European Union in order to provide a clear and comprehensive picture of its relevant characteristics useful for both policy makers and the academia. Bearing in mind the context described above, we can consider irrigation as vital to the sustainable development of rural areas both as a tool to mitigate climate risks and to obtain high agricultural production for insuring food security of the European population. This paper used both bibliographical and statistical material. Methods that have been used are specific to economic research - analysis and synthesis. Analyzed statistical data covered the period 1961- 2013 and came from international databases (Eurostat and Faostat).

RESULTS AND DISCUSSIONS

Irrigation facilities play an important role in the development of agricultural activities. The use of irrigation to increase agricultural production is a real necessity, in the context of the deep changes of the climate regime, revealed in recent years in Europe. Between Member States of the EU, there are wide variations in terms of irrigation need and implicitly the irrigable agricultural areas. Thus, there are several groups with different needs of irrigation: (i) the first group is comprised of countries in which the acquisition of high yields is dependent on irrigation. They are located in arid and semi-arid areas of southern Europe (e.g. Greece, Spain, Italy, Cyprus, and Portugal); (ii) countries where irrigation is necessary to complete the moisture deficit, which varies annually and is insufficient for productive agriculture (e.g. France, Romania, England, Germany, Holland, Belgium, Austria, Hungary). In these countries, the development of irrigation sector is trending upward aiming to reduce risk and increase yields in certain crops sensitive to drought; iii) countries where irrigation is considered a marginal factor of production, used only in certain areas and for special crops (e.g. Sweden, Finland, Ireland) [4]. Country groups can note this variation in the evolution of irrigable agricultural areas, in the period 1961 - 2011 (Figure 1).

The enlargement of irrigated areas in several European countries group, at least in the first part of the analyzed period, was influenced by agricultural policies that supported construction of irrigation infrastructure and subsidies for farmers to purchase equipment and to ensure low water prices for agriculture. The importance of socio-economic development of irrigated agriculture is considerable in southern Europe. Here are found the largest areas equipped for irrigation associated with a large number of very small farms. In this case, the availability of irrigation is critical for the viability of these farms. Regarding the countries of Eastern

Europe, since 1961 we can notice an increasing trend of irrigable agricultural areas that nearly overlaps with that of western European countries until the 1990s.

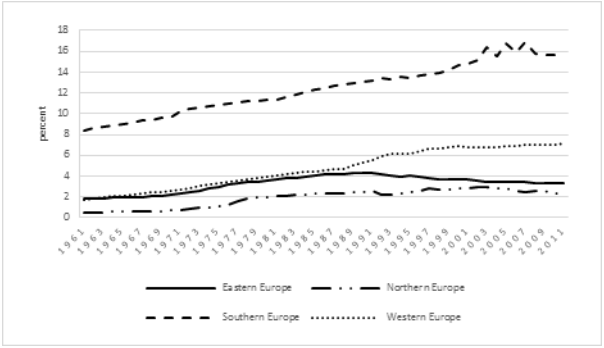

Fig. 1. Evolution of irrigable agricultural areas by European countries groups, 1961 to 2011
Source: authors' processing by Faostat; data extracted June 2015

For example, in Romania, starting with the 1960s, the trend was to fit larger and larger surfaces, so that in 1990 the irrigable area had 3.1 millions hectares (third place in Europe after Spain and Italy) [9]. After the collapse of communist economies their trend downward while the Western Europe maintained its upward trend.

In 2010, the total irrigable area in EU-28 was about 14.6 million hectares (8.4% of utilized agricultural area) of which about 10 million hectares (68.5%) were irrigated. The irrigable and irrigated agricultural area varies greatly within the EU Member States (Table 1).

In terms of area, the importance of irrigation is relatively insignificant in Ireland and Finland, modest in Sweden, Luxembourg and Denmark, growing regional importance in the UK, Belgium, Netherlands, Germany, Austria and France, and nationally significant in Portugal, Spain, Italy and Greece. Therefore, the southern European countries hold the largest irrigable areas both in absolute terms (3.7 million hectares in Italy, 3.6 million hectares in Spain) and as a share of total utilized agricultural area (UAA) (37.3% in Greece, 34.0% in Cyprus, 29.1% in Italy and 27.5% in Malta). The share of irrigated area in the UAA in 2010 also recorded significant values: 29.5% in Greece, 24.7% in Malta, 23.9% in Cyprus, 18.7% in Italy and 12.7% in Portugal.

The main purpose of agricultural irrigation in the wet climate areas is to compensate precipitation deficits during the vegetation period with artificial water supplies [10]. Groups of Central and Western countries, which use irrigation in complementarity to increase crop production in unfavorable weather conditions, recorded low values of irrigable and irrigated areas. The exceptions are Denmark and the Netherlands, which although holding 26.0% and 18.2% of irrigable area and 7.3% and 12.1% of irrigated areas (from UAA).

Irrigable area, considered the area equipped for irrigation, does not vary widely from year to year because the improvement of the new areas claim high costs. The exceptions are the Netherlands, Cyprus and Malta whose irrigated area increased in 2003-2010 by more than 4%, Romania, and Slovakia that have recorded in the same period a decrease of more than 4%. Irrigated area, considered area irrigated at least once a year, has however significant variations from year to year because for example of weather conditions or crop structure.

In Europe, the traditional method of irrigation is gravity - feed systems (surface water is transported through channels). In the EU-28, 37% of all farms apply this method of irrigation (Figure 2). Above the EU' average stands Bulgaria 93.7%, Portugal 62.5%, Slovakia 41.5%, Romania 39.3%, Spain 37.6% and Lithuania 37.6%. Drip irrigation holds second place in the EU - 28 with a percentage of 33.2%. Farms located in Southern part of EU practice this method, on top being Cyprus and Malta (above 50%). Drip irrigation systems are more efficient in water use, but they are often too expensive to be used by small farmers. Sprinkler irrigation is practiced by 29.8% of all EU-28 farms. The highest number of farms practicing this method of irrigation (75% of total) is located in Denmark, Netherlands, Germany, Finland, Sweden and England. Sprinkler and drip irrigation consume less water than surface irrigation.

Table 1. Evolution of irrigable and irrigated areas in the Member States of EU, 2003-2010

Country	2003				2010			
	Total irrigable area		Area irrigated at least once a year		Total irrigable area		Area irrigated at least once a year	
	(ha)	(% of UAA)	(ha)	(% of UAA)	(ha)	(% of UAA)	(ha)	(% of UAA)
EU-28	:	:	:	:	14, 635, 330	8.4%	9,998,810	5.8%
EU-27	16,443,280	9.5%	11,067,910	6.4%	14,612,060	8.5%	9,984,330	5.8%
BE	21,810	1.6%	1,850	0.1%	13,560	1.0%	4,260	0.3%
BG	124,480	4.3%	79,370	2.7%	137,510	3.8%	90,400	2.5%
CZ	49,090	1.4%	16,860	0.5%	32,230	0.9%	19,200	0.6%
DK	448,820	16.9%	201,480	7.6%	480,440	18.2%	320,180	12.1%
DE (1)	:	:	:	:	639,030	3.8%	372,750	2.2%
EE (1)	:	:	:	:	460	0.0%	330	0.0%
IE	0	0.0%	0	0.0%	0	0.0%	0	0.0%
EL	1,521,600	38.3%	1,294,400	32.6%	1,297,260	37.3%	1,025,210	29.5%
ES	3,828,110	15.2%	3,437,370	13.7%	3,587,770	15.1%	3,044,710	12.8%
FR	2,723,700	9.8%	1,938,730	7.0%	2,341,200	8.4%	1,583,610	5.7%
HR					23,270	1.8%	14,480	1.1%
IT	3,977,210	30.3%	2,732,730	20.8%	3,734,850	29.1%	2,408,350	18.7%
CY	44,930	28.7%	35,410	22.6%	40,310	34.0%	28,290	23.9%
LV	1,150	0.1%	0	0.0%	1,140	0.1%	710	0.0%
LT	740	0.0%	:	:	2,520	0.1%	1,530	0.1%
LU	0	0.0%	0	0.0%	:	:	:	:
HU	242,170	5.6%	148,690	3.4%	235,750	5.0%	114,550	2.4%
MT	2,300	21.3%	2,130	19.7%	3,150	27.5%	2,830	24.7%
NL	350,570	17.5%	62,190	3.1%	486,010	26.0%	137,310	7.3%
AT	90,420	2.8%	34,230	1.1%	91,970	3.2%	26,480	0.9%
PL	98,420	0.7%	46,910	0.3%	85,200	0.6%	45,530	0.3%
PT	674,800	18.1%	248,040	6.7%	540,880	14.7%	466,330	12.7%
RO	1,510,820	10.8%	400,520	2.9%	418,720	3.1%	133,460	1.0%
SI	1,880	0.4%	1,880	0.4%	5,210	1.1%	1,260	0.3%
SK	209,070	9.8%	104,560	4.9%	108,990	5.7%	14,840	0.8%
FI	103,800	4.6%	0	0.0%	68,560	3.0%	12,610	0.6%
SE	188,460	6.0%	53,440	1.7%	164,230	5.4%	63,250	2.1%
UK	228,930	1.4%	227,120	1.4%	95,110	0.6%	66,350	0.4%

Source: own calculations based on NIS data
Note: [1] – variable calculated with the formula: X=100*(xi/Xi)/(pi/Pi); [2] – variable calculated with the formula: X=xi/Xi*100

For drip irrigation, equipment is more expensive than other irrigation methods and therefore, this system tends to be concentrated in areas of high economic value crops.

The drop irrigation is one of the newest methods of irrigation. It has the advantage of administration of strict water in the root system in this way it avoid the degradation of the soil structure. Thereby, the maintenance works are not disturbed and the soil can be maintained at a constant level of optimal humidity [11].

Therefore, adopting the most efficient methods of using water tend to focus regions where farms are relatively large and cultivate crops of high economic value. The Institute for European Environmental Policy distinguishes four categories of crops by level of intensity, namely: extensive, semi-intensive, intensive and saturated [4].

Southern countries - Cyprus, Greece, Malta, Italy, Portugal, and Spain irrigate particularly intensive crops with high economic value, such as potato and sugar beet. Moreover, both grain corn areas and green corn areas are irrigated (over 75%) in all countries located in southern Europe - Greece, Portugal and Spain. Cereals (without maize and rice) are irrigated to a lesser extent: only Denmark and Spain have just over 10% occupied areas with irrigated cereals (Figure 3).

Crops with high economic value offer farmers the opportunity to achieve both revenue growth and an increase in stability farm. It is believed that expanding areas under this group of crops would represent a development opportunity for poor rural communities [5].

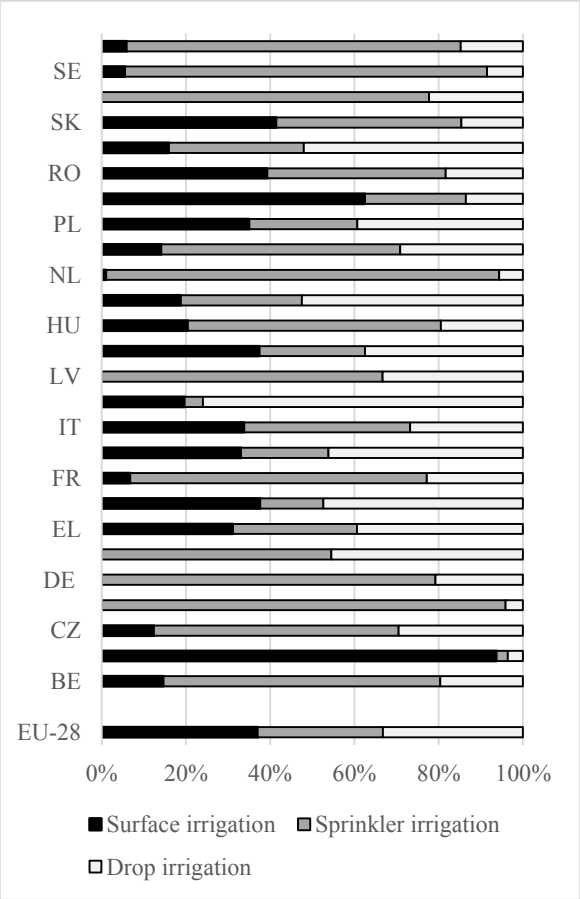

Fig. 2.Share of holdings applying different irrigation methods, EU-28, 2010, (%)
Source: Eurostat; data extracted May 2015

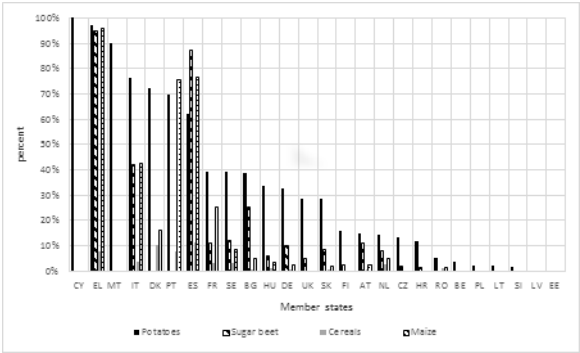

Fig.3. Share of irrigated area with intensive (potatoes and sugar beet) and semi-intensive crops (cereals and maize) in total crop area, in EU-28, 2010, (%)
Source: Eurostat; data extracted May 2015

These crops could help small farms to reduce their dependence, in particular by cereals, and facilitate their transition from subsistence to market-oriented agriculture [13].

CONCLUSIONS

The analysis of the EU' irrigation sector shows a clear trend of increasing the irrigated area in the southern and western Europe in the past 50 years, In Eastern countries, there are an increasing trend up to 1990 followed by a downward trend that has as main cause the collapse of communist regimes with associated social and economic transformations. Between 1961 -2011, in the EU the irrigated area increased significantly. In arid and semi-arid regions of the EU' irrigation allows agricultural production in areas where water is a limiting factor. In many wet and temperate zones, irrigation provides water for adjusting the local amount and seasonal availability to suit agricultural needs. Therefore, it reduces the risks that can arise unexpectedly and damage crops. Agricultural policy should support European agriculture adapting to climate change by encouraging flexible crop irrigation. In this regard, it is necessary to consider the multifunctional role of agriculture in establishing a balance between economic, social and environmental variables in different European regions and countries.

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NEW IMPROVEMENTS IN PLANT QUALITY OF *ANGELICA ARCHANGELICA L.* AS A CROP SPECIES OF FOOD AND PHARMACEUTICAL INTEREST

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Abstract

Angelica archangelica L. is a medicinal plant species with a real continuously developing potential for its use in homeopathy and food industry for future. The species is known and cultivated since ancient times for treating certain diseases. In the last century active chemical compounds of pharmaceutical importance have been described and lately more and more European countries are using this plant in the food industry as such or as food ingredient. The scope of this article is to evaluate agricultural practices for improving canopy production in angelica 'De Cristian' population, originating from the wild and collected in Brasov area during 1990. A distance between rows of 80 cm is ideal for this species cultivation as a crop plant in similar agro-ecosystems in South East Transylvania.

Key words**:** *Angelica archangelica, crops, field cultivation, morphometry, Romania*

INTRODUCTION

Angelica archangelica L. is a protected plant species with a high cultural value all over the world that it is used today in the pharmaceutical industry as well as in food industry and adding homeopathy and cosmetics uses [15]. In Romania the species is not allowed to be harvested from the wild as it is protected by law since 1977 when it was declared as a nature monument species [1]. Still the species may be cultivated and may be introduced into the crops species group easily, in riparian agro-ecosystems, positioned at lower altitudes (500-600 m) and sheltered but sunny places [4, 5].

Roots, petiole leaves and fruits possess proved pharmaceutical effects such as the following: carminative, stimulant, diaphoretic, stomachic, tonic and expectorant which are stronger in fruits, although the entire plant has such virtues. Pure volatile oils from angelica (i.e. 'Aetheroleum Angelicae'), which initially is colourless, in time turn in green colour, as well as composite oils proved to be an excellent treatment externally of rheumatic diseases [6]. Composite oils of angelica (i.e. 'Spiritus Angelicae' also a volatile oil composed from angelica extract, camphor and alcohol) in low dosage are cerebral exciting and in high-dose become narcotic and induce depression [11].

The extract from the upper part of the plant (i.e. 'Herba Angelica') supports toxin elimination, have anti-inflammatory activity for rheumatic diseases and cure diseases related to these proved activities (i.e. colds, colic and urinary diseases) [13]. Although angelica should not be administered to patients who have favourable predisposition for diabetes as it induces blood sugar rise and the sugar excretion into urine. Among other beneficial effects angelica extracts may be used in the cure for alcoholic dependency due to nausea effects when it is associated with alcohol. Also it may be used as a good vehicle for nauseous drugs. The extracts from aerial parts of the plant may have also slight effects in stomach and gut diseases – reducing malfunctioning of fermentation and nutrients absorption [9], as well as in cancer therapy [14].

Rhizome extracts of angelica are used in stomach and gut disease supporting the guts secretory function and regulating guts fermentation processes [12].

Food industry applications for *Angelica archangelica* L. Aroma is much appreciated and used since ancient times when sugar products were extremely rare. Today it is widely used in trade with delicacies, producing a flavour much appreciated for the manufacture of confectionery and liqueurs. The food processing of this species is small but important as industry in the Southern and Western parts of France where the cultivation area more concentrated is Clermont-Ferrant. Angelica flavour is similar with that of juniper and fruit is much used in combination with juniper leaves or partially substituting them for gin distillers. The stem is much used in the preparation of canned fruit jams and generally being used by some confectioners as an aromatic garnish [6].

In terms of food industry angelica comprises one of the ingredients included in the composition of anise essence. Angelica was one of the ingredients aromatic based used also since ancient times on both banks of the Rhine in Europe where it was cultivated and used in French and German cuisine. Thus, seeds extracts and essential oils of plants are largely used for flavouring ice cream, candy, grocery items, puddings, syrups and alcohol. Volatile oil from the seed is used to flavour toothpastes and perfumes industry [7].

The scope of this article is to discuss a different cultivation technology for increasing the production of volatile oils in *Angelica archangelica*, a Romanian population 'De Cristian', for further supporting the use of this technology for food production.

MATERIALS AND METHODS

Plant material *Angelica archangelica* L. is a protected wild species in Romania which is blooming during June and July in the last years due to climate change. In these experiments were used 10 kg seeds per ha that have been sowed in 15 of September 2012 and are originating from 'De Cristian' population native from Brașov area (North: 45.673698 and East: 25.541689). We are mentioning that the experimentation area expresses similar climatic conditions with that of Brașov [8, 10].

Field experiment. Two plots of 1,000 m^2 each have been tested in this experiment that are positioned in the experimental field of Lucian Blaga University of Sibiu (North: 45°48′54″ and East: 24°1′40″) with appropriate conditions for supporting the cultivation of the species (river bank, moisture and sunny place) under the meteorological conditions of the year 2013.

Crop Technology. Two types of distance between plants rows such as 60 (variant V1) and 80 cm (variant V2) that are imposed by used agricultural equipment. The culture was bio and therefore no soil amendments or fertilizers have been used.

Oil extraction and analysis follows the methods described by Bergonzi and collaborators [3].

Plant Morphometry was performed for measuring the height of the plants, no of leaves into the rosette, no of branching per plant, no of inflorescence per plant, the diameter of basal part of the stem and observations related to the roots and rhizomes in order to evaluate the general development process of the crop plant.

RESULTS AND DISCUSSIONS

In 2013 were realized measurements regarding plant morphometry after blooming period during July and all results will be discussed accordingly bellow.

Plant development

According to results analysis of over 500 individuals for plants cultivated with 60 cm between rows (V1) there have been registered the following measurements: the mean height of the whole plant 175.23 cm a bit slight bellow for those plants harvested from the V2 variant (i.e. 80 cm between rows and about 400 individuals) and measuring a mean height of 181.09 cm (Photo 1).

Rosette development

In V1 the mean was of 11.85 leaves per rosette as a mean regarding all measured individuals which was low compared to that of plants obtained on the V2 and presenting a mean of 14.36 leaves per rosette. It is obviously that the larger distance between plants is stimulating the leaves development

for each plant rosette and sun has definitively a positive influence in this developing process.

Photo 1. Variant V2 for the cultivation in the field of Angelica archangelica ‚De Cristian'

Branching development

It appears that the branching process should be also supported by the sun in the wild for the species and in this experiment maintaining a distance of 80 cm may positively influence the process. Thus, in this case a mean value of 8.26 branching have been observed compared to the first variant (V1) where we identified around 7.05 branches. The volume of the aerial part of the plant is much depending on the space encountered into the natural habitat and therefore the second variant V2 is providing the best conditions for branching stimulating (Photo 2).

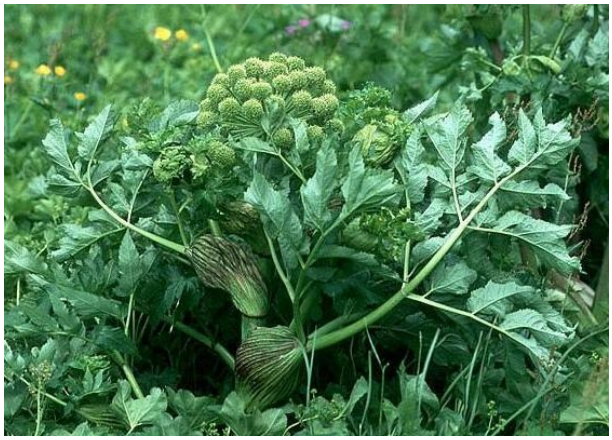

Photo 2. *Angelica archangelica* 'De Cristian' population during the blooming period

Inflorescence development

Plants cultivated in the first variant are producing a mean of 65.48 inflorescence per plant which is approximately similar with those of the second variant (V2): 67,21 inflorescence. Still, in the second variant the number of inflorescences is slightly increased compared to the first supporting the idea that plants needs more space for ensuring the complete development like in the wildness in their natural habitats.

Stem vigour

The vigour of the plant is also estimated base on the diameter of the stem and in V1 case plants presented a mean diameter of 15.6 cm slightly small compared to the plants obtained on V2: 17.4 cm supporting again the idea that the vigour of the plant is largely influenced by the space between plant rows. No influence is for the rest of the stem in diameter of all studied plants.

The content in volatile oil

In the same period samples from leaves, petioles and part of the plants have been taken for analysing the volatile oil content (ml %) for both variants V1 and V2. This procedure was realized during the morning between 8 and 10 o'clock to be consistent with the method applied. In this regard it was obtained slight low levels of volatile oils for plants obtained in V1 (0.042 ml % for leaves; 0.032 ml % for petioles and 0.03 8ml % for herba) compared to V2 (0.047 ml % for leaves; 0.033 ml % for petioles and 0.04 8ml% for herba) considering triplicates samples and which are consistent with the idea that this species as a crop needs more space than 60 cm to maturate the production of volatile oils. Leaves comprise more volatile oils compared to herba and compared to petiole presenting no difference compared to wild individuals.

Roots harvesting

As a general observation, the root system in case of plants cultivated on variant V1 is realized from tinny roots compared to that of V2 which stimulates in turn the overproduction of volatile oils. This observation is important for roots harvesting in autumn (i.e. October) when rhizomes will be short, juicy presenting roots according to the requirements for volatile oil extraction [2]. The roots may be harvested in the first year (i.e. autumn) as well as in the second year of vegetation (spring time before vegetation starting). Roots from primary year are much

juicy compared to that of the second year also reflected on the oil composition differences.

Petiole harvesting

Before root harvesting, mowing aerial parts of the plants is imposed and this also may be further used for pharmaceutical or food purposes. Before mowing, separately harvesting fresh petioles may become more important if the interest is to used them for food preparing such as flavouring ice cream, candy, grocery items, puddings, syrups and alcohol based patisserie products.

Fruits harvesting

According to a series of authors the period of time between harvesting and oil extraction should be as short as possible, but this is essential for all medicinal plants. The optimum period for fruit harvesting is in September and October depending on the forecasting conditions. The harvested fruits may also be dried out and maintained in drain bags. The total production was around 950 kg/ha per variant V1 (95.25 kg/plot) and 102 Kg /ha per variant V2 (i.e. 10.2 kg/ plot) also supporting the technique of using 80 cm between plants rows. For food industry volatile oil as well as hydro-alcoholic extract of root origin as well as fruit volatile oil becomes important raw materials. They may be used as natural aromatic ingredients for liquor and beverages (e.g. Benedictine, Chartreuse, etc.) and patisserie.

CONCLUSIONS

The agricultural potential of *Angelica archangelica* 'De Cristian' population as a crop species is already proved and cultivation technology is influencing the productivity of the species. The best results in terms of plant volume are given by the large volume plants need to develop under similar conditions like in the place of origin. The species may have all attributes to enter the market place for food and pharmaceuticals industries**.**

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ASSESSMENT OF NATURAL AND ANTHROPIC POTENTIAL OF THE RURAL TOURISM IN DOBRUDGEA

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Abstract

The objective of this paper is to highlight the tourism potential in Dobrudgea's rural area. The study starts from the premise that the specific resources of Dobrudgea's rural area are not fully and appropriately put into value. The research methods used are the inventory-type analysis of the usable resources in the rural tourism and the cause-effect explanation of the investigated phenomenon. The analysis of the agro-tourism potential of Dobrudgea's rural area is based on data and information obtained by bibliographic documentation. The investigation of relations that exist between the environmental and social factors, at local level, makes it possible to define the necessary mechanisms for the sustainable development of tourism activities that should contribute to the increase of the number of jobs and of alternative incomes, as well as to the increase of rural space attractiveness.

Key words**:** *Dobrudgea, natural and anthropic potential, rural development, rural tourism*

INTRODUCTION

It is obvious that tourism is an activity that dates back from old times, but in recent years it "is the most dynamic branch of the world economy with a deep impact on the development of other economic branches". [7]
The global tourism industry is growing, yet at a different rate, for a certain period of time, generating economic growth in the countries in which it has developed. [9]
In many countries, tourism is one of the three leading industries of the country, developing at quite a fast rate and it is of a great social and economic importance. Tourism has a huge impact on key the sectors of the economy such as transport and communications, trade, constructions, agriculture, consumption of goods and many others, acting as a catalyst for the social and economic development. Experts predict that the 21st century will be the century of the tourism. As promising forms of tourism, we can list the rural, environmental and cultural tourism. [2]
Three objectives are essential for the sustainable tourism development: control of tourist traffic; layout of appropriate tourist settlements in various areas that are tourist destinations; diversification of tourism products by introducing new environment-friendly forms of tourism. [3]
For Romania, tourism remains the economic sector that has a most valuable potential for development but, unfortunately, still untapped enough, always remaining a source of attraction for investors as well as foreign tourists. A huge advantage of Romania is also represented by the natural and cultural potential of great diversity and harmoniously distributed in the territory, which also allows the practice of all forms of tourism. [9]
The rural tourism is organized and takes place in close relation with the basic occupations of rural people – agriculture, animal husbandry, crafts and other specific activities, the tourism activity being secondary to agriculture. Most rural localities have a complex tourism potential and the differences between these stem from the main attractive elements. The isolated settlements have a strictly tourism function and put into value the natural potential in their proximity.
In this paper we want to illustrate that tourism is not only a vacation for the soul, but also an excellent opportunity to develop the rural area of Dobrudgea.
The rural tourism potential, by association

with the other resources, can contribute to the concrete actions of implementing the proposed strategic objectives for shaping the community future as integrating part of the rural development policy of Dobrudgea's space.

MATERIALS AND METHODS

The objective of this paper is to highlight the tourism potential and the tourism market development in Dobrudgea's rural area. The motivation for selecting this area is that for most of us Dobrudgea means the Black Sea shore with its resorts or the Danube Delta with its priceless biodiversity. But between the Danube and the Black Sea there is also a territory that represents a true reason for a travel in space, time and spirituality, where nature, history, creed and traditions are intermingled, forming a unique picture.

The methodological approach includes the identification of the "territorial tourism capital" of the rural settlements from Dobrudgea located outside the influence zone of the Black Sea shore. The research methods used are the inventory-type analysis of the usable resources in the rural tourism and the cause – effect explanation of the investigated phenomenon. The analysis of the tourism potential of Dobrudgea's rural area is based on data and information obtained by bibliographic documentation and field visits.

Dobrudgea's tourism patrimony is evaluated according to the normative acts, which regulate tourism organization, coordination, promotion and development (field of strategic importance and priority branch of the national economy of Romania), as well as the management of tourism resources in conformity with the principles of equity, competitiveness, sustainability and sustainable development. *Dobrudgea's tourism is put into value and developed on the basis of and within the annual/multiannual programs for the development of tourism destinations and products,* elaborated by the Authority of the Public Local and Central Administration in charge of tourism and approved by Government's Decision. The tourism patrimony elements are inscribed in the *General Register of Tourism Patrimony*, owned and administered by the Authority of the Public Central Administration in charge of tourism. *The list of natural and anthropic resources is inscribed in the National Cultural Patrimony of Romania* and is maintained and periodically updated by the Ministry of Culture, Cults and National Patrimony in Romania. [10]

The natural framework and the way of "living in the countryside" are closest to the traditional image that could be preserved in the Western Europe. The patrimony of the Dobrudgea's rural tourism can be approached from the specialists' point of view: geographers and economists, researchers or analysts of the tourism phenomenon, who include the following in the patrimony concept: *the (natural and anthropic) tourism potential*, *the tourism's technical-material basis* (tourism endowments and tourist reception structures with accommodation functions), *the tourism services and the general technical infrastructure*.

RESULTS AND DISCUSSIONS

Dobrudgea is a Romanian historical region located between the Danube and the Black Sea, consisting of two counties: Tulcea and Constanţa (Figure 1).

Fig. 1. Dobrudgea's position on Romania's historical provinces map

Dobrudgea covers an area of 15,570 km² divided between the two counties: Constanţa and Tulcea, with slightly different shares of the province total area (45.41% and 54.58%

respectively), as it results from Table 1.

Table 1. Administrative-territorial characteristics of the Dobrudgea province

Territorial unit	Area km²	Population inhabitants	Density Inhab./km²
Tulcea	8,499	244,103	28.72
Constanţa	7,071	724,276	102.43
Dobrudgea	15,570	968,379	62.20

Source: Regional economic and social benchmarks: Territorial statistics, NIS, 2013

The network of human settlements has distinct characteristics in the two counties, due to natural particularities (Table 2).

Table 2. Number of administrative-territorial units of the Dobrudgea province

Territorial unit	Municipalities	Towns	Communes	Villages
Tulcea	1	4	46	133
Constanţa	3	9	58	189
Dobrudgea	4	13	104	322

Source: Regional economic and social benchmarks: Territorial statistics, NIS, 2013

Thus, in the county Tulcea, 40.54% of its area (i.e. 3446 km²) is occupied by the newest relief unit, represented by the Danube Delta and the lagoon complex Razim-Sinoe [11], with limited dwelling possibilities; in the county Constanta, the size of the rural area is marked by the presence of Constanta municipality and by the entire network of urban localities on the southern Black Sea shore.

Another important characteristic is represented by the harmonious blending of the old and new, of tradition and modernity. This complementarity makes Dobrudgea more attractive to tourists and gives them the possibility to know and understand the history and tradition of the places they are visiting.

In Dobrudgea, **the natural tourism resource** is determined by:

- The *Romanian Black Sea Coast*, with its specific tourism potential and with its towns and resorts, representing one of the most important tourism and balneo-climatic zones in the country;
- The *Danube Delta and the lagoon complex Razim-Sinoe*, the "water domain", with a prevailing piscicultural economy and tourism economy to a certain extent;
- The *Măcin Mountains National Park*, situated in the North-West of the county Tulcea, evidence of the hercynian orogenesis which took place in the second half of the Paleozoic era, when they exceeded 3,000 m altitude; now they have maximum 467 m (the peak Greci – Ţuţuiatul) and they are quite fascinating through their unique geo-morphology and bio-geography;
- *Dobrudgea's Plateau* (divided into 3 big units: The Northern Dobrudgean Plateau, The Central Dobrudgean Plateau, the Southern Dobrudgean Plateau); this, although having significant resources of construction materials and not only, has a preponderantly agricultural economy. [1]

The Romanian Black Sea shore comprises two sectors, namely:

- A sector consisting of fragile seashore areas, with the largest natural beach in the country (between Sulina and Sf. Gheorghe) and with the largest lakes from the country (area of the former bay Halmyris): lake Razim (415 km²), lakes Sinoie (171 km²), Goloviţa (118 km²) and Zmeica (55 km²);
- Another sector, which begins south of Cape Midia, comprises seashore areas, bays, capes and beaches, sometimes protected by stone dykes built up to diminish the sea abrasion.

From the morphological point of view, the second sector can be delimited into two subsectors:

- The former between Cape Midia and Constanţa with a transition area from the low coastline with accumulation of sediments from the Danube to the high coastline with Sarmatian chalkstone cliffs and
- The latter between Constanţa and Vama Veche, a high seashore with cliff (up to 40 m high), shaped into limestone and loess, fragmented into bays and promontories.

The wetland of the river and sea zone of Dobrudgea is one of Romania's most important tourism destinations, comprising 3 types of areas:

- Low areas (the Danube river plain and the Danube Delta),
- Lagoons (the Razim-Sinoie complex) and
- The coastline (south Dobrudgea seashore).

In Dobrudgea, ***the Danube*** course is about 409 km long, lying from the western part of the locality Ostrov to Sulina. The high banks

that neighbor the Dobrudgea Plateau (in the west and north) have steep slopes that are 70-100 m high, sculptured into hard rock formations (green crystalline schists, granite, limestone), which are most often buried into recently formed sediments. [4]

The ***Danube Delta and the lagoon complex Razim-Sinoie*** is the largest wetland area from Europe, with an original landscape of great tourism attraction and scientific importance.

Given the importance of this unique space, since 1991 the Romanian government started a comprehensive program to inventory the flora and fauna of the Danube Delta Biosphere Reserve.

The ***Danube Delta*** integrates: resources of reed (cane) for cellulose and paper manufacturing industries; areas for hunting and fishing; recreation places for tourists; areas of scientific interest. The conservation of the natural conditions and historical and cultural monuments is in line with the basic concerns of our state: "It is necessary to take rigorous measures to control the industrial hazards, to prevent water and air pollution, to protect the forests, rivers, mountains and lakes considered monuments of nature". According to the European Committee, the Danube Delta maintains its natural biotope and thus it has an exceptional significance taking into account the bird populations and the morphological and climate factors that have made from it an important reserve with many rare plant and animal species. These features have made the delta be considered absolutely unique compared to any first rank tourist area in our country. [8]

The morphological aspects of ***continental Dobrudgea*** define a contrasting environment, characterized by a rigid relief with different geological structures adapted to the continental climate, with strong dryness.

The old Hercinic Mountains, forming the highest area of Dobrudgea, provide a landscape with angular mountain ridges with ruiniform aspect and pyramid-like peaks, mainly in the sectors where the forest vegetation is absent.

South Dobrudgea is characterized by even flat areas connecting the valleys deepened into limestone and loess deposits, where sometimes they form miniature canyons.

The hydrographical components with landscaping, therapeutic and recreational value are represented by the sea water, maritime limans, temporary rivers, the Danube – Black Sea Canal.

A few littoral lakes (Taşaul, Siutghiol, Tăbăcărie, Techirghiol, Tatlageac, Mangalia) feature a landscape with steep banks sculpted into limestone, bays and promontories, being fed by permanent or temporary rivers and groundwaters, in certain cases being endowed with sapropelic muds used in thalassotherapy.

The bioclimate of Dobrudgea's wetland is characterized by comfortable cool temperatures influenced by the aquatic areas and it has two subtypes:

- The seashore subtype with therapeutic qualities in the period May-September;
- The river plain type.

The contrast between the areas with rich vegetation from the floodable areas or the compact forest massifs from north-east and rare floristic associations from the coastal areas and the steppe inside the plateau features a high attractiveness of natural resources.

In the plateau part, there is a great number of flower species (over 50% of Romania's flora), steppe and forest steppe species, decidous and decidous-resinous xerothermal forests, decidous and decidous-resinous mesophilous forests.

The bird populations from the Danube Delta, the lagoon spaces and the coastal areas of the Black Sea are represented by 325 species.

The ichthyological fauna (about 130 species) has an economic and tourism interest, with fish classes differentiated by the aquatic environment (fresh, brackish, saline).

Dobrudgea has 85 protected areas, including integral protection areas from the Danube Delta Biosphere Reserve and the Măcin Mountains National Park: 1 national park, 53 natural reserves, 19 scientific reserves, 12 natural monuments. The Danube Delta Biosphere Reserve accounts for 31.6% of the total surface of protected areas from Romania.

The anthropic resource of the Dobrudgean tourism patrimony is enriched with the multitude of *the monuments and*

archaelogical sites, of the ensembles and *architecture reservations*, of *the memorial monuments* and ensembles, of the technical and art monuments, of the museums and other elements of folk and popular art disposed within the urban and rural space.

Thus, analysing the Dobrudgean rural space we will find that this is the keeper and conserver of an inestimable thesaurus of art and architecture, with historical vestiges and monuments, as well as of a veritable ethno-folklore patrimony of unique value and purity.

The tourism patrimony reunites the material and spiritual culture of the past and present, which makes out of Dobrudgea a genuine *museum in open air,* with many monuments, archaelogical sites and architectural assemblies that are included in the protected areas. [6]

The ***archaeological relics*** of ancient times can be known by visiting the remains of human settlements established by the *pre-historical, Geto-Dacian, Greek and Roman civilizations* or the indoor or open-air museum collections. Among these, the remains of the ancient towns Histria, Tomis and Callatis have a particular importance, completed by the discoveries from Halmyris, Arrubium, Dinogeţia, Beroe, Aegyssus, Noviodunum, Tropaeum Traiani, Capidava, Carsium.

The main historical objectives from *the Byzantine period* are the mediaeval citadel Păcuiul lui Soare (dating back from the 10th – 11th century), Citadel Heracleea from Enisala (13th century), rebuilt by the Genovese, the rupestral complex from Basarabi (10th century).

The ***religious tourism*** objectives include worship places and cemeteries belonging to several religions and represent attractiveness elements by the significance of feasts (titular saints), age of settlements and architectural style, location.

New worship places were added to the old monasteries Cocoş (1833), Celic Dere (1835), Saon (1846), Techirghiol (1928) and Dervent (1936), namely (the Cave of Saint Apostle Andrew, Cave of Saint Ioan Casian, Halmyris-Saints Epictet and Astion, Monastery Saint Helen by the sea) with important religious significances.

In the southern part of Dobrudgea, where *Turkish and Tartar communities* are living, there is a large number of mosques and Muslim places of worship. [6]

The numerous ***ethnical communities*** created an original material and spiritual culture where we can notice the traditional houses from reed and earth from the Danube Delta. The archaeology museums (Adamclisi, Istria), art museums (Limanu, Topalu), ethnographic museums (Enisala), scientific and technical museums and the memorial houses (Panaghia-Babadag and Panait Cerna, in Tulcea county) are of great importance for cultural tourism. The hydrotech constructions (bridges, lighthouses, the Danube – Black Sea Canal and Sulina) stand out in the landscape of the areas where they are located.

Two areas for the rural tourism practice can be delimited in Dobrudgea:

- A compact area located in the wet regions of the river plain, delta, lagoon complex and seashore, with prevailing piscicultural specificity, which is used for the practice of mass summer tourism, balneary, recreational, sport, business, cruise and itinerary tourism;
- A hilly and plateau area with prevailing fruit-viticultural, apicultural and agro-pastoral specificity, which use the rural tourism potential for the gastronomic, ethnographic, historical, religious and scientific tourism practice.

Tourism developments are found in the perimeter of resorts, of the urban or rural localities or on isolated basis, depending on the potential resources that require their existence.

The rural settlements with tourism potential in Dobrudgea cover the largest part of Dobrudgea (72%).

In the case of Tulcea county, 83% of the territory is represented by natural areas of high scientific and lanscape value (the Danube Delta Biosphere Reserve, Măcin National Park, the Danube river plain) and the cultural-historical heritage (the relics alongside the Danube, Niculiţel, Adamclisi, Enisala, Baia centers).

Constanţa county, by the balneary and cultural potential from the southern part of the Romanian coastline and the historical, cultural

and religious resources from Oltina Plateau, account for 59% of the remarkable tourism potential.

Currently, owing to the favorable natural conditions, the tourism sector can develop in the rural area of Constanta and Tulcea counties and the farms can benefit from this potential, if the inhabitants of these areas get involved in tourism activities.

All these cannot be achieved in the absence of the involvement of the state, through the intervention of local authorities to implement a system of county development, creating the foundations for rural tourism development in Dobrudgea. This assistance should be primarily manifested through infrastructure planning, mainly through a tax and credit system that makes it easier to implement the necessary actions.

CONCLUSIONS

Dobrudgea is a historical region delimited by the Danube and the Black Sea. As a multifunctional space, Dobrudgea is endowed with an extremely various and diversified tourism potential, characterized by:

- A favorable climate throughout the year;
- Relief units that are harmoniously blended throughout the territory;
- Potentially rich fauna and flora;
-Historical and architectural heritage appreciated worldwide.

Investigating Dobrudgea's rural area, we shall find out that:

-It is the depository and preserver of an inestimable thesaurus of architecture and art with historical monuments and relics, as well as of a high value ethno-folkloric heritage;
- It has great rural tourism potential areas, yet insufficiently explored.

In this context, the rural tourism, as alternative to the seasonal seashore tourism, does not depend to the same extent on the seasonality that characterizes the classical tourism from Dobrudgea and can contribute to the socio-economic development of the rural area.

The rural people, the small entrepreneurs and the representatives of local councils from the rural localities with tourism objectives are interested in their utilization for tourism purposes and are willing to revive old customs and habits, which can attract tourists: wedding customs, local people's evening reunions with recreational purpose, vine and wine festival.

If the small entrepreneurs attended free of charge courses in local traditions that were offered to them, they would find sufficient resources, funding programs and maybe sponsors who should invest more for their village to enter the rural tourism circuit.

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IMPORTANCE OF SYSTEMATIC FERTILIZATION WITH MINERAL AND ORGANIC FERTILIZERS FOR PRESERVING AND INCREASING SOIL FERTILITY

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Abstract

The present paper makes an analysis of the results obtained on the long-term experience with chemical and organic fertilizers with regard to the chemical condition of soils (pH, total nitrogen content, soluble phosphorous and humus). After thirty years of experiments, we like to make known the importance of systematic fertilizer application for preserving and/or increasing soil fertility, as sustainable development measure. Through long-term experiments with chemical and organic fertilizers, located in representative pedo-climatic area of Romania, important information werefound. They covered crop fertilization with adequate fertilizer application rates for obtaining maximum and economically optimum yields, the best use of nutrients and gaining high quality harvests; at the same time, important information could be acquired on the complex interactions between crops x soil x weather, necessary data for conserving and/or increasing soil fertility and for environment protection. The use of nitrogen and phosphorous fertilizers, on large scale, in Romania determined us to investigate the results under the fertilization variants with these macro-elements. At the same time, we also took into consideration the results on the evolution of the soil chemical condition through the application of organic fertilizers (manure) every four years. The pH level in the variants chemically fertilized with nitrogen and/or phosphorous decreased.

Key words: *fertility, fertilizers consumption, humus, soil*

INTRODUCTION

Romania has significant agricultural land resources (14,612 thousand hectares, accounting for 61% of the country's total area) with advantageous structure for a diversified agriculture practice: out of total agricultural area, the arable land accounts for 64%, the pastures and hayfields 33% and the vineyards and orchards 3%. The high diversity of soils has also contributed to this. Thus, the soil taxonomy in Romania includes 12 soil classes, 29 soil types and 266 soil subtypes (without the mixed ones), mainly separated by genetic bases [5]. The production potential of agricultural land, established based on average soil scores, reveals that 61% of Romania's soils fall into the first three quality classes, with a medium to good fertility [9].

Yet, the soils are significantly affected by a variety of limiting factors of physical, chemical and biological nature. In most cases, these factors act simultaneously determining the drastic reduction of soil quality. Among the natural factors, the small and very small humus reserve in soil represents a great obstacle to the development of agricultural production on 51% of total agricultural land. Furthermore, a significant land area has a poor and very poor phosphorous, potassium and nitrogen supply in soil (Table 1)[8]. This negatively influences soil characteristics and functions, soil bio-productive capacity respectively[2].

Fertility is the most important soil property. Specialists consider that the use of chemical fertilizers in recommended amounts, depending on the soil type and crop, applied in the optimum vegetation stage is the safest

and fastest method to increase farm production and to preserve soil fertility[3][7].

Table 1. Agricultural land area affected by restrictive factors of productive capacity*, in the year 2013 (selection)

Name of factor	Affected area	
	Thousand hectares	Share of total agricultural land (%)
Small and very small humus reserve in soil	7,485	51.23
Poor and very poor mobile phosphorous supply in soil	6,330	43.32
Poor and very poor mobile potassium supply in soil	787	5.39
Poor nitrogen supply in soil	5,110	34.97
Microelements deficiencies (zinc)	1,500	10.27

*The same area can be affected by one or several restrictive factors.
Source: processing of NEPA data, 2014

In the last decades, mainly in the developed countries, remarkable results have been obtained in crop production largely due to chemical fertilizer application. Generally, it is difficult to assess the contribution of mineral fertilizers to agricultural production in view of the interaction of the many aspects involved in this biological process.
During 1961-2013, in Romania, the chemical fertilizer use evolution significantly reflects the socio-economic changes that took place (Figure 1).

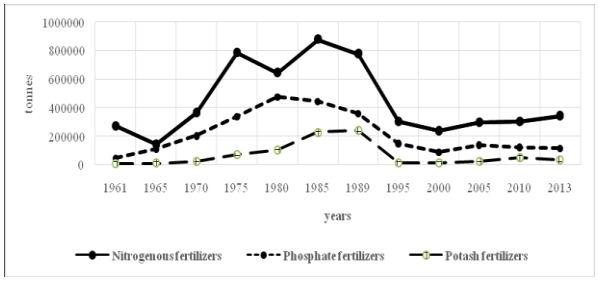

Fig.1. Consumption evolution by types of chemical fertilizers in Romania, in the period 1961-2013
Source:http://faostat.fao.org/site/422/DesktopDefault.aspx?PageID=422#ancorand National Institute of Statistics - NIS, TEMPO-ONLINE Database, 2015

In the communist period (1961-1989), the agricultural productions significantly increased under the background of agricultural land consolidation into large-sized state and cooperative farms and of the intensive use of agricultural inputs. In that time, the total fertilizer consumption increased 4.2 times, while the phosphate fertilizer consumption increased 7.8 times and nitrogen fertilizer consumption 2.8 times.
The shift towards market economy as a result of changes produced in the early 1990 was quite a long, costly and complex process.
The agricultural sector, like the entire economy, experienced a decline process. A very strong decline was also experienced in the case of chemical fertilizer consumption.
Thus, a strong negative trend was characteristic to the 1990-2000 decade. This situation overlapped other fundamental problems of the agricultural sector – land reform, poor agricultural markets, agricultural credit inadequacy to the new structures, etc.
During 1990-2013, the use of fertilizers had very low values, insufficient to replace the nutrients extracted from soil by agricultural production (Table 2). In 2013, fertilizer consumption represented only 44.59% of the fertilizer consumption in 1990: while in the year 1990 the fertilizer application rate was 146.52 kg active ingredient/ha, in 2013 only 79.40 kg active ingredient/ha were applied.
The most significant decline was found in the case of potash fertilizer. If we look at the economic effect of decreasing, the amount of fertilizer used is negative but positive effect on ecosystems could be.

Table 2. Chemical fertilizer consumption in agriculture in the period 1990-2013

Indicator	Chemical fertilizers			
	Total	Nitrogen	Phosphate	Potash
Total fertilizer consumption 1990 (tons)	1,103,075	656,094	313,108	133,873
Total fertilizer consumption 2013 (tons)	491,831	344,468	113,823	33,540
Evolution of total fertilizer consumption 1990-2013 (%)	44.59	52.50	36.35	25.05
Fertilizer consumption per hectare 1990 (kg/ha)	146.52	:	:	:
Fertilizer consumption per hectare 2013 (kg/ha)	79.40	:	:	:

Source: authors' processing of NIS data, TEMPO-ONLINE Database, 2015

The fertilizer amount applied per hectare, through its low values, generally had a low pressure upon soil throughout the transition

period.
However, in the investigated period, many cases of misuse of chemical fertilizers were signaled out, as a result of the lack of knowledge and skills in this field or of the small farmers' limited financial resources. In certain situations, this led to the emergence or aggravation of soil degradation phenomena [9]. This is because agricultural practices sustainability depends on its long-term effects on productivity and soil health[1].

MATERIALS AND METHODS

The purpose of the paper is to reveal the importance of fertilization with nitrogen, phosphorous and manure fertilizers, under different application rates, on a single or mixed basis, for maintaining and/or improving the chemical characteristics of soils.
At the Agricultural Development Research Station Valul lui Traian, Constanta County, in 1970, on the experimental field, bifactor and trifactor experiments were located with nitrogen, phosphorous, potassium fertilizers and manure. The experiments have taken place on a continuous basis for 45 years and continue at present.
The experiments were located according to the randomized block method, with sub-divided parcels, the area of an experimental variant being 60 ^{m2}.
The experimental factors were the following: phosphorous application rates (kg/ha P2O5) - P0, P50, P100, P150, P200, nitrogen application rates (kg/ha N) - N0, N50, N100, N150, N200, manure application rates (t/ha) - G.g.0, G.g.20, G.g.40, G.g.60 and mixes of these.
Six-year crop rotations were practiced with wheat, barley, maize, sunflower, linseed and beans The area and number of crops decreased in time.
The soil samples for tests were taken after harvesting the wheat crop, hence representing the values of parameters measured after a part of the applied fertilizers were used by crops and extracted with the harvest.
Multiannual average yields obtained under the non-fertilized variants and the multi-annual averages under the nitrogen and phosphorous fertilization variant were the following: 28.0 q/ha /58.9 q/ha in wheat; 69.12 q/ha /99.22 q/ha in maize; 46.3 q/ha / 60.6 q/ha in barley; 26.3 q/ha / 34.3 q/ha in sunflower; 13.3 q/ha /20.6 q/ha in linseed for oil; and 21 q/ha /25 q/ha in beans.
Among the chemical fertilizers the ammonium nitrate and superphosphate were used. The phosphorous fertilizers were applied each year before plowing. The nitrogen fertilizers were applied in early spring with soil preparation for sowing and in the straw elongation period in winter wheat and barley.
The manure, coming from cattle, was applied once in a four-year period.
The experiments took place under irrigation system, maintaining soil moisture at 50% of IUA.
The soil is of calcaric chernozem type, formed on loess, with the characteristic profile A-AA-Cc [4].
From the physical and chemical point of view, the soil can be characterized as follows:

- structure moderately developed, grain structure, medium, the soil from this horizon is friable, in wet state, moderately cohesive in dry state, moderately plastic, moderately cohesive, slightly compact, non-cemented, with small pores; it features frequent fine fissures, frequent thin roots, right shift to next horizon ; crust formed on soil surface; loamy – sandy texture; clay content 34.7% in Ap1 and 37.0% in Ap2h (25-30 cm);
- the humus content is relatively high to medium in A (3.5% - Ap1, 2.7% - Ap2h, and 2.6% - Amk; the sum of exchangeable bases (SB) has high values, (29.2 – 28.2 me/100 g soil) in A horizon; nitrogen index (NI) has the value 3.5 in Ap1; the base status (V) has very high values (93.9% - 100%); the reaction is neutral slightly alkaline (pH 7.8 – 8.4).

The main hydro physical indices have medium to high values: CH decreases from 8.8% - 9.0% in the main 30 cm (Ap1 – Ap2h). to 8.6% in Amk and to 6.2% in Cn2k; Co, from 10.2% – 13.5% in Ap1 and Ap2h; Cc has values of 26.8% - 25.1% in A.

RESULTS AND DISCUSSIONS

The analysis of the soil chemical condition, after 30 years of stationary experimentation with fertilizers, is made under the variants of fertilization with decreasing nitrogen and phosphorous application rates and of manure fertilization. We considered these variants for our analysis as in the agricultural practice crop fertilization is made with nitrogen and phosphorous and with manure, if available.
The phosphorous fertilizers, applied unilaterally, determine the pH value declining proportionally with the application rate (Fig.2.)

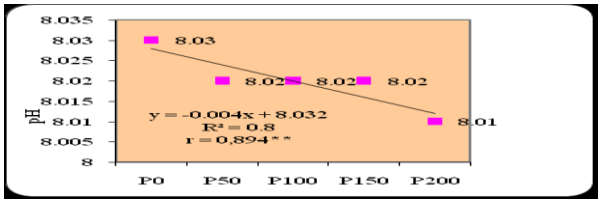

Fig.2. Soil pH after 30 years of application of phosphorus fertilizers.

The vermic-chernozem soil from Valul luiTraian, with a high calcium content and a high cation exchange capacity, the unilateral application of nitrogen fertilizers, under the form of ammonium nitrate have determined the decrease of pH values with the increase of the application rate. The irrigation water plays an important role in pH evolution by its content in mineral salts (Fig.3).

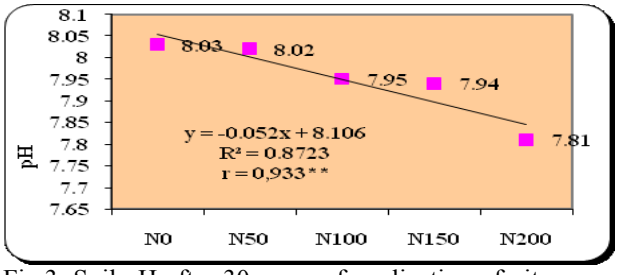

Fig.3. Soil pH after 30 years of application of nitrogen fertilization

Under the influence of mixed nitrogen phosphorous fertilization, the pH value mostly decreases with the maximum utilized application rates (P200N200).
By the nitrogen phosphorous fertilization, the yields increase and by this the nutrient consumption increases. The nitrogen fertilizers, with acidification power, act together with the natural soil debasification processes and increase of unsaturated soil acidity.
The mixed application of nitrogen and phosphorous fertilizers has determined pH decrease in time, from 8.04 to 7.12 (under the P200N200 variant), by 0.92% compared to the non-fertilized check variant (Figure 4).

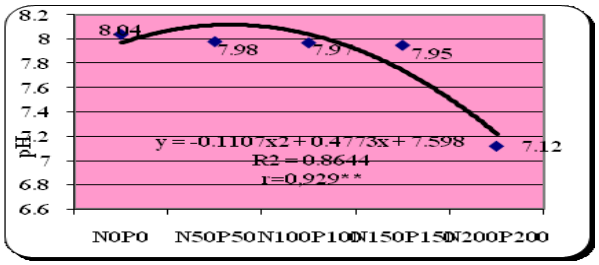

Fig. 4. Soil pH after 30 years of fertilization with nitrogen and phosphorus

The manure that has been applied periodically (every four years) has had as effect the slight pH increase from 8.04 under the non-fertilized variant to 8.25 under the fertilized variant with 60 tons of manure (Fig. 5).

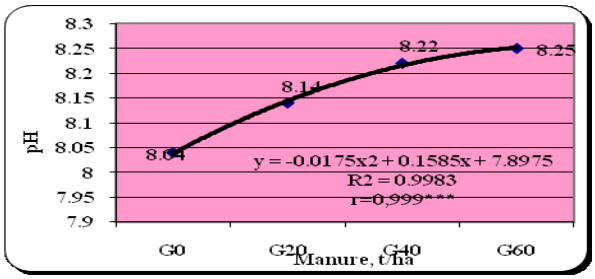

Fig.5. Soil pH after 30 years fertilizing with organic fertilizers

By its supply of basic mineral and organic substances, of organic salts and acids with soil reaction buffering functions, manure modifies the soil reaction towards slightly alkaline. The organic fertilizers applied together with the phosphorous and/or nitrogen have determined pH increase towards alkaline under all variants.
It has been noticed that by the unilateral use of nitrogen, the soluble phosphate content in soil decreases proportionally with the increase of nitrogen application rate, being in the low range of soil supply with this element.
Through the unilateral fertilization with phosphorous, the soluble phosphate content

increases with the increase of phosphorous application rate, from 25 ppm in the non-fertilized variant to over 150 ppm in the variant with P200.

The same evolution can be noticed in the variants fertilized with nitrogen and phosphorous applied together, reaching the content of 163.6 ppm in variant P200N200 (Figure 6).

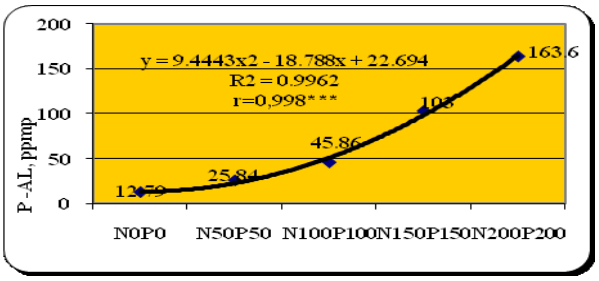

Fig. 6. Phosphorus content in soil after 30 years of phosphorus and nitrogen fertilization

The manure, whether applied alone or in different organic-mineral mixes, has determined the increase of soil content in mobile phosphates, from 12.79 ppm from the non-fertilized variant to over 33.73 ppm in the G60 variant (Figure7).

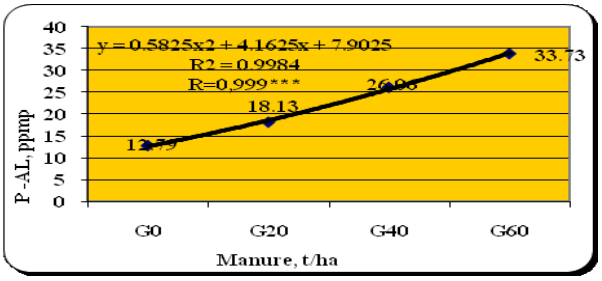

Fig.7. Phosphorus content in soil 30 years after fertilization with organic fertilizers

The mobile phosphate level in soil is an indicator of soil fertility as the efficiency of nitrogen and potassium fertilizers depends on the supply of mobile phosphate salts in soil. Ensuring an optimum level of mobile phosphates determines production stabilization under changing climate conditions. The total nitrogen content in soil has not suffered significant changes under the influence of chemical, organic or organic-mineral fertilization, being in the normal supply range (Figure 8, 9).

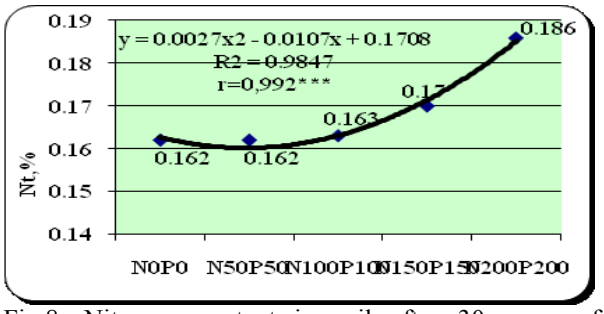

Fig.8. Nitrogen content in soil after 30 years of chemical fertilizers with phosphorus and nitrogen

It is recognized that the mineral fertilizers determine an acceleration of mineralization processes, mainly of the organic forms with easily degradable nitrogen, this contributing to the increase of total nitrogen content in soil.

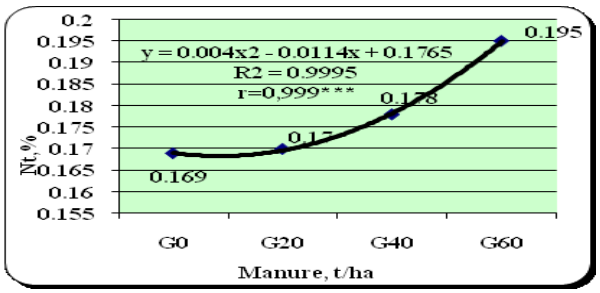

Fig. 9. Nitrogen content in soil 30 years after fertilization with organic fertilizers

As regards the humus content, it was noticed that the application of nitrogen and phosphorous fertilizers by increasing application rates determined the increase of humus content in soil under each variant (Figure 10).

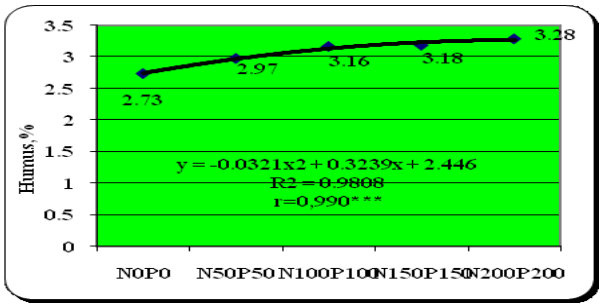

Fig.10. Humus content in the soil after 30 years of chemical fertilizers with phosphorus and nitrogen

The analysis (in other scientific research works) of the crop response to the same fertilization levels revealed that production proportionally increased with the fertilizer application rates. Thus, the applied fertilizers were well used by crops, and this could be

seen in the obtained yields.
The periodical application (every four years) of the organic fertilizers determined the increase of humus content with the increase of application rates (Figure 11).

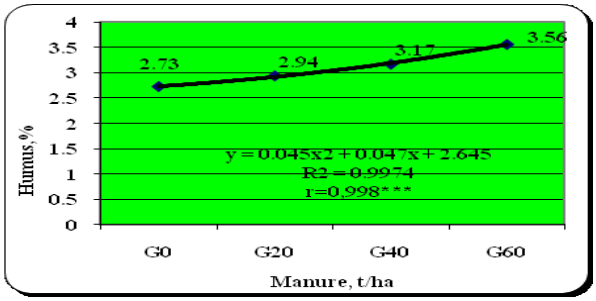

Fig. 11. Humus content in the soil after 30 years fertilizing with organic fertilizers

The effect of organic fertilization of soil has been occurred in time, this being linked to the accumulation of humic substances in soil and to the positive effect that this has developed on the physical and biological characteristics of soil [2].

CONCLUSIONS

The long-term experiments are patrimony goods that can make available concrete information on soil fertility evolution to experts and to the interested persons at any moment. They still offer multiple research directions.
From the above-presented facts, it results that in the absence of fertilization, soil loses some of its nutrients and humus, as even though the harvest level is not high, the nutrient export takes place.
The chemical fertilization with nitrogen and phosphorous used on unilateral basis produces disequilibria and soil becomes poor in humus, together with pH modification[10].
The systematic fertilization with moderate nitrogen and phosphorous application rates, applied in optimum timing for each crop in the field rotation, immediately leads to significant increase of harvests and to maintaining soil fertility in time.
Manure application contributes to maintaining and increasing soil fertility.

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SELF-FINANCING CAPACITY AND TAXATION INFLUENCE ON FIRM PROFITABILITY

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Abstract

The paper deals with the influence of taxes on the company's profitability and self-financing capacity, presenting a case study. Taxes are being defined as sampling of a part of the income or wealth of a person. Based on the data collected from the Balance Sheet and Profit and Loss Account, the self-financing capacity of the firm was determined by two methods: the deductive method and the additional method. The self-financing capacity of SC ALFA CONSTRUCT S.R.L. registered an increasing trend in the analyzed period. Thus, in 2015, it reached Lei 1,105,443, being by 33.76 times higher than in 2013. As a conclusion, considering the influence of taxation on certain economic and financial performances we get to the following reality: taxation can be a determining factor in decision-making at enterprise level.

Key words**:** *expenses, profitability, revenues, self-financing capacity, taxes*

INTRODUCTION

The purpose of a business is obtaining results; based on these the people who invest in its capital will be paid.

These results should not be achieved at any cost because the entity with its activity which is insufficiently controlled and not adapted fully to the surrounding natural realities threatens the ecological balance [4].

The influence of taxation on company business results, determines decisions regarding the economical and financial policies of the company.

Self-financing capacity (CAF) expressed in monetary terms represents a firm's ability to ensure its development through own financial means.

This indicator calculated based on the results account expresses the difference between the company's collectible revenues and its payable expenses.

What must be emphasized is that the indicator for self-financing capacity can not highlight the effective returns and payments with the same accuracy as evidenced by the treasury. [2]

This is due to the fact that the determination of the self-financing capacity is based on the assumption that revenues taken into count as collected revenues will be paid 100% and also payable expenses will be entirely performed.

Making traditional and environmentally friendly products is an important way to achieve self-financing of various areas where farming plays an important role in preserving natural and cultural heritage. [6]

A traditional product maintains the cultural heritage of the rural area and helps preserve cultural identity by preserving local traditions and customs: local holidays and festivals in which the local costumes, customs and products are promoted. [7]

The interim management balances represent value indicators which are determined based on the data contained in the income statement. These show us information about the company's profitability on different levels.

Specific to the interim management balances is their determination in cascade; a certain indicator is calculated based on a previously calculated indicator.

In this context, this paper aimed to show a case study regarding self-financing capacity and taxation influence on firm profitability

MATERIALS AND METHODS

The case study is based on the interim management balances in the Anglo-Saxon way for three consecutive years for S.C. ALFA CONSTRUCT SRL.
the self-financing capacity was determined by two methods: the deductive method and the additional method.
The data were used to determine the self-financing capacity **through the deductive method** is based on the relationship:
CAF=collected revenues - payable expenses
This formula was detailed as:
CAF = EBE + other exploitation revenues - other exploitation expenses + financial revenues (excluding revenues from commissions) - financial expenses (except financial expenses with amortization and provisions) + extraordinary revenues (excluding exceptional revenues from the sale of assets, share parts of subsidies for investments transferred to revenues and for exceptional provisions) - extraordinary expenses (excluding the net accounting value of the transferred assets and the exceptional expenses with amortization and provisions.) – profit tax.
The formula for calculating the self-financing capacity through **the additional method** is:
CAF = year result (net result) + depreciation expenses + provision expenses (from exploitation, financial and extraordinary) - revenues from provisions (from exploitation, financial and extraordinary) + the net accounting value of the disposed assets - exceptional revenues from the sale of assets - the share of subsidies for investments transferred to revenues

RESULTS AND DISCUSSIONS

The deductive method of determining the self-financing capacity takes into account all receipts and payments generated by the company's revenues and expenses, less the extraordinary ones coming from the disposal of the company's assets or from grants received for investments.
The argument for eliminating these elements is the fact that in order to properly and competitive analyze a company's position in terms of self-financing we needed to make abstraction of those incomes or expenses which may have an adverse effect on determining the indicator.
These elements are taken into account when determining the financing picture of the company, their increase or decrease (depending on the concrete situation of each company) influences the resources available at company's level.
Thus, if in a given financial year the self-financing capacity of a firm would, for example, equal to 0, the incomes from the assets sale would be 100 and the net accounting value of the transferred assets would be 50, might create a false impression that the company is capable of self-financing, while this available surplus would be only the result of performing an operation which has very low chances of repeatability in the future.
There are also opinions that neither the other extraordinary revenue and expenses items should not be included in calculating the self-financing capacity with the deductive method, because they by having an exceptional character, do not represent elements that lead to an outcome that can be a benchmark for predicting the self-financing capacity [2].
In this study CAF was determined, firstly, using the deductive method.
In this case, CAF was determined using the formula: EBE + other exploitation revenues - other exploitation expenses + financial revenues (excluding revenues from commissions) - financial expenses (except financial expenses with amortization and provisions) + extraordinary revenues (excluding exceptional revenues from the sale of assets, share parts of subsidies for investments transferred to revenues and for exceptional provisions) - extraordinary expenses (excluding the net accounting value of the transferred assets and the exceptional expenses with amortization and provisions.) – profit tax.
EBE represents the collected revenues from exploitation- - payable expenses from exploitation.
The primary data colected from the Balance

sheet and Profit and Loss Account of S.C. ALFA CONSTRUCT SRL, concluded at the end of the years 2013, 2014 and 2015 are presented in Table 1.

The company turnover increased by 81 % from Lei 1,293,343 in 2013 to Lei 2,348,213 reflecting a positive trend.

The total revenues also increased by 81 % from Lei 1,298,466 in 2013 to Lei 2,352,034 in 2015.

Table 1.The primary data taken from the Balance sheet and Profit and Loss Account of S.C. ALFA CONSTRUCT SRL, 2013-2015

	2013	2014	2015
Revenues from executed works and done services		18,494,732	2,348,213
Works and services in progress		-26,497	
Turnover - (adjusted with #711)	**1,293,343**	**18,468,235**	**2,348,213**
Other operational revenues	5,123	143,022	3,821
Total revenues	**1,298,466**	**18,611,256**	**2,352,034**
Raw materials and supply expenses	448,878	11,452,162	790,155
Utilities expenses	0	0	
Rent expenses	43,202	208,968	23,036
Wage expenses and taxes	667,759	4,236,539	410,246
Other operational expenses	105,925	763,664	22,783
Total expenses	**1,265,765**	**16,661,334**	**1,246,221**
EBITDA (Earning Before Interest, Taxes, Depreciation&Amortization	**32,701**	**1,949,923**	**1,105,814**
Amortization	3,949	22,147	2,728
EBIT (Earning Before Interests and Taxes)	**28,752**	**1,927,776**	**1,103,086**
Financial revenues	42	39,331	1,153
Financial expenses	0	11,253	1,524
EBT (Earning Before Taxes)	**28,795**	**1,955,855**	**1,102,715**
Tax profit	0	330,258	0
Profit/(loss) net	**28,795**	**1,625,597**	**1,102,715**

Source: Balance sheet and Profit and Loss Account of S.C. ALFA CONSTRUCT SRL, 2013-2015

Total expenses declined by 1.55 % from Lei 1,265,765 in 2013 to Lei 1,246,221 in 2015.

As a result, EBT (Earning before taxes) accounted for Lei 1,102,715 in 2015, being by 38.29 times higher than in 2013.

Net profit was equal to EBT as shown in Table 1.

The results obtained using the deductive method regarding the self-financing capacity at S.C. ALFA CONSTRUCT SRL. are presented in Table 2.

Table 2.Self financing capacity determined using the deductive method, S.C. ALFA CONSTRUCT SRL, 2013-2015

		2013	2014	2015
EBE		**32,701**	**1,949,923**	**1,105,814**
Fin. revenues	+	42	39,331	1,153
Fin. expenses	-	0	11,253	1,524
Tax profit	-	0	330,258	0
CAF		**32,743**	**1,647,743**	**1,105,443**

Source: Own calculations**.**

One can see that the self-financing capacity of the company registered an increasing trend in the analyzed period. Thus, in 2015, it reached Lei 1,105,443, being by 33.76 times higher than in 2013.

The additional method used in calculating the self-financing capacity has the net profit as a starting point, following that from this the calculated revenues will be deducted and the calculated costs will be added.

Decreasing the calculated revenues and adding the calculated costs is being done because the calculated revenues do not generate actual revenues for the company, and the calculated costs are not expenses involving cash flow payments.

Also from the net profit the extraordinary revenues from the disposal of assets or investment subsidies are being deducted, even if they generate cash incomes, which are not revenues, but are found constantly in the company's activity.

Also to the net profit the expenses representing the net accounting value of the transferred assets are being added, because even these as well as the revenues mentioned above, can not be found consistently in the financial activity of the enterprise, they can produce distortion in the analysis and forecast based on the self-financing capacity.

The results regarding the self-financing

capacity of the company in the study, determined using the additional method, are presented in Table 3.

Table 3. Self-financing capacity determined using the additional method, S.C. ALFA CONSTRUCT SRL, 2013-2015

		2013	2014	2015
Net profit/ (loss)		28,795	1,625,597	1,102,715
Depreciation	+	3,948	22,146	2,728
CAF		**32,743**	**1,647,743**	**1,105,443**

Source: Own calculations

The self-financing capacity is used for self-financing the company, as well as to pay dividends, the participation of the manager to the profit (manager share) and the participation of the employees to the profit. Self-financing represents a real interest to the company; it represents that part of the self-financing capacity which will be used to finance the business activity.

Its calculation formula is:

Self-financing = CAF - dividends - manager share - employee participation to profits

As seen in the calculating formula for self-financing, its level is influenced by the self-financing capacity of the company (therefore a result of it), but a major importance in determining its size has the policy for distributing the net profit. Thus, the self-financing size is indirect proportional to the size of the share distribution of dividends and share participation of employees and manager to the profit.

Taxation affects the company's profitability. Profitability analysis [2] is based on the profit and loss account (income statement). The income statement shows us how it reached a certain patrimonial final state; which were the income and expenditure streams [3]. Structuring revenues and expenses in the income statement is based on the delimitation of activities performed by the company in the exploitation activity, financial and extraordinary activity. Thus, we find in its structure revenues and expenses from exploitation, financial revenues and expenses, extraordinary revenues and expenses.

Analysis based on the income statement is made through intermediate management balances. Along with the analysis of intermediate management balances, it calls also for the analysis of the self-financing capacity, as well as the analysis of the profitability benchmark.

Regarding heritage accounting, it describes interactions between man and environment both in monetary terms, but also in specific physical terms. [1]

The analysis of intermediate management balances according to the continental model is not the only way to analyze the results account, worldwide other approaches are also known, practiced mainly by Anglo-Saxon countries (England, USA, Canada etc.):

- Functional analysis of the income statement - highlights the results according to the functions of the company: production, trade, research and development, treasury;
- Analysis through direct product costs involves establishing product costs directly related to the manufacture of a product, afterwards, based on distribution keys, indirect costs will be distributed;
- Analysis through variable costs related to the turnover - is an analysis that starts from dividing expenses into variable ones depending on the turnover and fixed expenses.

Taxation intervenes for the first time in determining intermediate management balances when calculating gross exploitation surplus, as tax spending, taxes and similar duties and taxes intervening on wages (included in staff costs). Within these tax expenses there are also included: tax expenses related to the wages, costs with taxes on buildings, land tax and other local taxes, value added tax that goes to expenses and other taxes. Except tax expense related to salaries, taxes owed by the enterprise level is generally fixed for a certain scale of production activity, with no possibilities fiscal management in the interest of the company.

If we further analyze the way the results achieved by the company are being determined we see that a major importance has the size of the profit tax. In this case a series of analysis can be made regarding how to establish a fiscal strategy so that, based on the possibilities of applying the tax legislation, its impact level on firm

performance will be as low as possible. Thus, in determining the size of the profit tax payment a major importance has chosen the tax amortization, the possibility to deduct expenses in order to determine taxable profit and, at least in the present, the option for micro enterprises' income tax, if the entity may fall into this category.

We believe that taxation should also take into account the quality of the income, because man can suffer directly from pollution for e.g. the action of smog produced by the industry or indirect for e.g. the toxic action of oil spilled in the oceans over fish. [5]

CONCLUSIONS

Accounting depreciation is acting on the profitability of the company, in the sense of diminishing the result of exploitation and indirectly decreasing the net value income and fiscal depreciation, by decreasing the profit tax payment. Analyzing the impact of depreciation on the self-financing capacity, only fiscal depreciation has any influence, because it lowers the profit tax payment. Accounting depreciation has no influence on the self-financing capacity, because if we start from the deductive method we do not take into account the amortization, and if we start from the additional method, even if at the net result we add the accounting depreciation, it was initially deducted from the gross exploitation surplus, and therefore the net result was diminished by its value.

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USING TAXES AS ECONOMIC – FINANCIAL INSTRUMENTS

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Abstract

The paper aimed to analyze the use of taxes as an economic-financial instrument in Romania, comparatively with other EU states. The main aspects approached have been: total taxes, direct and indirect taxes, contributions to social insurance, profit tax, wage expense efficiency due to fiscal taxes. Romania has a more relaxed tax system compared to the EU average and other member states. Taxes are used as a financial tool to enrich the state and local budgets. State intervenes through legal regulations in the tax area that have the effect of positively influencing certain sides of the economic activity and gaining economic leverage character.

Key words**:** *financial instruments, profitability, profit tax, results, taxes*

INTRODUCTION

By establishing taxes, the state seeks to collect financial resources to the budget. When referring to the economic players, taxes, representing a sampling of financial resources available to them at the disposal of the state, have the effect of reducing economic and financial performance achieved.
Levying taxes is therefore a reality of contemporary economies. Starting from this idea how is it still possible that taxes act as a factor of dynamics [2] growth of the companies' performances?
An answer to this question can be given in the light of economic and financial levers.
These are measures taken by the state aimed to the fulfillment of economic functions, helping to solve certain problems on economic bases other than appealing to administrative methods.
By establishing legislative regulations in the tax area, that have the effect of positively influencing certain sides of the economic activity, gains economic leverage character.
In this context, the paper analyzed the use of taxes as an economic-financial instrument in Romania, comparatively with other EU states.

MATERIALS AND METHODS

The paper makes a critical overview on the main aspects regarding tax system in Romania and in other EU countries.
The data were collected from Ministry of Finance and also from EU sites and other various information sources.
The comparisons and affirmations belong exclusively to the author of this paper.
The main aspects approached have been: total taxes, direct and indirect taxes, contributions to social insurance, profit tax, wage expense efficiency due to fiscal taxes.
The results were tabled and commented.

RESULTS AND DISCUSSIONS

For the desired incomes growth of the State budget, companies must be stimulated also through fiscal measures: it is a well known fact that the economy can destroy its own systems of support by consuming the fix means of the natural capital. [2]
In the following a series of fiscal measures will be presented that had in Romania a leverage role economically and financially speaking.
Profit tax is part of the profit of an enterprise that is transferred to the disposal of the State.
Through a series of regulations that have been

adopted over time, profit tax played a leverage role economically and financially speaking.

Discounts or exemptions from tax on profits followed a double benefit for both the state and for economic agents, as follows:

- Granting an exemption from tax on profit for a certain period of time from the foundation (starting with the year 1991 until 2006) followed, from the state, the development of a private economic sector which can develop its own activity, following that the tax was recovered indirectly as a result of higher taxation of future profits. The benefit to the companies was that all of the profit remained at their disposal, thus ensuring additional funding without costs.
- 50% reduction of the amounts spent from profit in order to finance investments, which aim to realize investments in development and modernization of production technologies or to protect the surrounding environment (in the period 1995-2001), had as a purpose from the state to influence in a positive way the investment behavior of economic agents and the realization of investments in the protection of the surrounding environment. The aim was to increase competitiveness of the economic agents, increase investments nationwide, and protect the surrounding environment. Any state tax losses could be compensated on account of indirect taxes due to increasing consumption (through acquisitions), due to the taxation of future profits (increased due to the profitability growth of the economic agents), reducing environmental surrounding costs. Economic agents benefited by reducing the tax payment from an additional financing source, without involving any new training costs. Also, encouraging investments, rehabilitation had as a purpose the increase of economic and financial performances of the economic agents.
- Exemption from tax profits invested in technological equipment, computers and peripheral equipment, machines and cash, control and billing registers, as well as software programs, produced and/or purchased, including under financial leasing contracts, and put into service until the 31st of December 2016 inclusive, used for business purposes. [6]
- The reduction of corporation tax for economic agents that have created jobs for people with disabilities represent for the state an economic and financial leverage that aimed to integrate in the professional environment people with disabilities (with benefits in terms of reducing state costs with social protection for them). Following these jobs, the companies benefited from an additional source of funding and by reducing the profit tax payment the company reached an increase in profitability. [1]
- practicing a reduced rate of taxation for profits obtained as a result of the receipt of revenue in foreign currency from exports represented an economic and financial leverage, through which the state increased exports, following the introduction of foreign currency in the country. Economic agents that made exports could benefit from this facility, either as additional funding resources (the difference between the normal taxation rate and the reduced taxation rate) or as a possibility of setting lower delivery prices.
- granting exemptions from tax on profits for economic agents that made significant investments in the economy and aimed from the State an increase in the capital invested in Romania, especially from foreign resources, following that tax should be recovered indirectly from taxes on wages for new created job places, from future taxation of developed business etc.
- Another form of incentives manifested in low taxation rates (reduced rates that have acted until 2004 for exports, reduced rate used for free zones, the reduced rate of taxation for securities transactions and real estates) and by allowing the deduction of additional expenses in establishing taxable profit.

The historical story of Europe is not only about the many kingdoms and wars, [3] but also of its economy and the financial instruments used.

Direct and indirect taxes and contributions to social insurance

In the EU-27, the share of direct taxes in the total taxes was 30.4, ranging between 17.4 %, the lowest level registered in Lithuania and 62.7 %, the highest level, registered in

Denmark. In Romania, the direct taxes represent about 22.6 % of the total taxes.
In the EU, the share of indirect taxes accounts for 38.6 % in the total taxes.
The lowest level is in Germany, 29.8 %, while the highest one is in Bulgaria, 55.4 %. In Romania, the indirect taxes represent 45.2 % of the total taxes.
The share of the contribution of social insurance in the total taxes is in average 31.1 % in the EU-27.
In Romania is a little higher compared to the EU average, that is 32.2%.
The lowest share was recorded in Denmark, 2.1 %, while the highest one was registered in Czech Rep., 45.2 %. (Table 1).

Table 1. The share of direct and indirect taxes and of the contributions to the social insurance in the total taxes in the EU, Romania and the minimum and maximum level in 2010(%)

	Share of Direct taxes	**Share of Indirect taxes**	**Share of contributions to social insurance**
EU-27	30.4	38.6	31.1
Romania	22.6	45.2	32.2
The lowest share	Lithuania 17.4	Germany 29.8	Denmark 2.1
The highest share	Denmark 62.7	Bulgaria 55.4	Czech Rep. 45.2
Hungary	22.6	45.5	31.9
Denmark	62.7	35.3	2.1
United Kingdom	44.4	36.9	18.7
France	25.6	35.3	39.1
Germany	29.4	29.8	40.8

Source: Tax systems in the EU, [5]

Profit tax. Compared to the existing level in the European Union, profit tax in Romania is less oppressive than in the EU.
But we must keep in mind that the EU countries have a system of reduced rates for the development of certain activities and the fact that their economies are more developed.(Table 2)
Granting a reduced rate of taxation to agriculture aimed to develop the agricultural sector in Romania, increasing investments in this field, economic agents benefiting from a tax reduction.
The reform of the agricultural policy is a key element of the sustainable socio-economical development in our country and in the whole world. [1]

Table 2. Profit tax quotas in some UE countries

Country	Period	Profit tax quotas
Romania	Before 2005	25%
	From 2005	16%
Hungary	Starting with 2011	16%
Great Britain	Starting with 2013	45%
Denmark	2005	30%
	2007	25%

Source: Tax systems in the EU, [5]

Romania is below the regional average regarding the profit tax (16%), while VAT had the highest level in the Central and Eastern EU countries (24%).
However, in the period 2013-2014, in the CEECs it was noticed a change of a slight reduction of the direct taxation and also a relaxation of VAT.
A reduction of the profit tax was decided in Slovakia and Ukraine, and in United Kingdom as well.
Romania has still a low profit tax in the EU, compared to 23.1 % in the EU and 17.2 in the CEECs in 2014. [11]
The decision of the Government to reduce VAT from 24 % to 9 % for food products and to 20 % for the other goods is benefic for a relaxation of the indirect tax system and also for the economic agents and for the economy as a whole resulting in the reduction of prices, increased consumption and a growth of budget incomes.
The situation of the tax level for VAT, profit, income and contributions in the CEECs in 2014 is presented in Table 3.
In the EU, the lowest income tax is in Bulgaria (10%), while over 55 % is applied in Sweden and Denmark
With 16 % profit tax, Romania is considered among the EU countries with the lowest income tax, besides Bulgaria, Lithuania and Hungary.
The taxation level in the CEECs in 2014 is presented in Table 3.

Table 3.Taxation level in the CEECs in 2014 (%)

	VAT	Profit tax	Income tax	Contributions
Austria	10	25	0-50	21.83
Bosnia & Herzegovina	17	10	10	10.50
Bulgaria	20	10	10	17.90
Croatia	5	20	12;25;40	15.20
Czech Rep.	15	19	15	34.00
Greece	6.5	26	22;32;42;	27.46
Hungary	5	10;19	16	27.00
Macedonia	5	10	10	No
Montenegro	7	9	9	9.80
Poland	5	19	18;32	21.00
Romania	9;20	16	16	28.00
Russia	10	20	13;30	30.00
Serbia	10	15	10;15;20	17.90
Slovakia	10	22	19;25	35.20
Slovenia	9.5	15	16;27; 41;50	16
Ukraine	7	18	15;17	36.76

Source: [11]

Other economic levers which have acted on profit tax referred to the choice for either one of the depreciation methods, especially in the case of investments for profit or the possibility of opting between profit taxation, income taxation (income taxation of micro-agents), establishing of free zones or disadvantaged zones.

By resorting to profit tax as an economical and financial lever, the state has sought to ensure a viable economic environment, increasing investments, [3] creating new jobs, developing exports, developing certain activity sectors, developing certain geographical areas, which remained behind in terms of economic development.

Wage tax is another important economic and financial instrument that increases the performance of economic agents by influencing the efficiency of wage costs.

Separately from the wage expenses, the company registers expenses related to the wage taxes.

In Romania, over time, companies owed as a result of hiring staff a number of contributions, the most important are:

- Social insurance contribution; [7]
- Unemployment insurance contribution; [8]
- Social health insurance contribution; [9]
- Insurance contribution for work accidents and occupational diseases. [10]

In the following we will analyze the influence of change of the tax degree related to the gross wages on the salary expenditure efficiency, while constantly maintaining the production value and gross wages.

The efficiency of wage costs under the mentioned conditions will be calculated using the formula:

$$\Delta E_{CS} = - G_i / 1 + C_{CS+} C_{CS} \times 100$$

- E_{CS} – the efficiency of wage expenses,
- C_{CS} – the share of social contributions,
- G_i – the change of the imposing degree of the wages (percentage points).

Table 4. Wage expense efficiency due to fiscal taxes, Romania

Year	Employer contributions % (CAS + CASS + Unemployment fund + Risk fund)	Contributions difference in the current year (%) ECS1-ECS2	The efficiency of wage expenses due to fiscal changes (%)
1991	19	1	-0.83
1992	20	10	-7.69
1993	30	0	0.00
1994	30	0	0.00
1995	30	0	0.00
1996	30	0	0.00
1997	30	0	0.00
1998	30	7	-5.11
1999	37	5	-3.52
2000	42	0	0.00
2001	42	-6.67	4.93
2002	35.33	0.5	-0.37
2003	35.83	-0.33	0.24
2004	35.5	-3	2.26
2005	32.5	-1.6	1.22
2006	30.9	-2.41	1.88
2007	28.49	-1.8	1.42
2008	26.69	-2.21	1.78
2009	24.48	2.3	-1.81
2010	26.78	0.22	-0.17
2011	27	0	0.00
2012	27	0	0.00
2013	27	-5	4.10
2014	22	0	0.00
2015	22	0	0.00
2016	22	0	0.00

The formulas presented above allow to conclude the following:

- Increasing the tax degree related to the gross wages leads to diminishing the efficiency of wage costs;
- Decreasing the tax degree related to the gross wages leads to the increase of the efficiency of wage costs;
- The size change of the wage costs efficiency is directly proportional to the size change of the tax degree and inversely proportional to the size degree of taxation.

The percentage influence over the efficiency of wage costs given by the changes occurred on the level of tax rates (in Romania) of contributions related to the gross wages, given that the production (by value) and gross wages have remained constant (Table 4).

The data from Table 4 allowed to conclude that:

- The influence of taxation related to the gross wages on the efficiency of wage expenses appears when changes occur in the level of tax rates;
- An increase in the tax burden on wages leads to diminishing the efficiency of wage costs;
- Fiscal loosening leads to an increase in the efficiency of wage costs.

The advantages of economic agents were manifested especially in the opportunity to benefit from additional self-financing resources, profitability increase, both due to the reduction of the tax on paid profit, as well as creating prerequisites for development following the acquisition of new technologies and means of production etc.

Also other categories of taxes were used as financial and economic levers. Thus, establishing taxes on certain categories of products aims, besides the collection of budget revenues also the influence of consumer behavior. Engaging in raised import duties aims to protect some branches of the national economy as a result of an increase of the price at which the products subject to those duties can be sold internally (after the 1990's pressures at government level were made, especially from food manufacturers in order to increase customs for the imports of some products, because they were sold on the domestic market at lower prices than domestic products, which could have lead to the bankruptcy of domestic agents).

CONCLUSIONS

Profit is one of the most synthetic indexes of the economic activity of enterprises. It summarizes almost all of its economic activity: supply, production, marketing and results from other activities.

Reflecting the company's efforts to increase economic efficiency, profit is a useful indicator in assessing the economic activity and establishing the budgetary indicators. [6]

Fiscal instruments through which it is being acted in order to increase economic and financial performances of the companies, do not have a mandatory character for all businesses, but neither make it difficult for economic agents to benefit from them. In order to benefit from them, companies must meet certain conditions or carry out certain activities.

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STUDY ON SHEEP AND GOAT MEAT MARKET IN ROMANIA

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Abstract

This study is an overview on sheep and goat market evolution in Romania, since 2009 until present. In order to achieve a more illustrative picture of this market, there were analyzed several indicators, as following: sheep and goat livestock; realized meat production; average weight at slaughter; average purchase prices for sheep meat; sheep and goats value exports. Sheep and goat market in Romania had a positive evolution during the analyzed period. Within this scientific paper there have been used statistical data from the specialized institutions in Romania and from FAOSTAT. For 2009 – 2014 period of time, one aimed to realize a mainly quantitative analysis. As a conclusion the sheep and goats livestock is continuously increasing, as well as meat production and export.

Key words**:** *goats, market, production, Romania, sheep*

INTRODUCTION

In Romania, sheep and goat farming is a traditional activity. Due to livestock size and realized productions, Romania occupies an important level within the European Union regarding sheep and goat growing and exploitation. Romania has certain advantages which directly contribute to the sustainability of this activity sector, such as: the large area of meadows; genetic background that is well adapted and preserved to local and regional conditions; realized productions diversity; reduced energy consumption; existence of some traditional regions of farming and obtaining productions and so on [1,4]. This activity sector can be analyzed from three points of view: economical, ecological and social. Under the circumstances of market economy and competitive pressure, the profitability of this sector is particularly emphasized. The profitability is influenced by: size of production costs; the existence of specialized breeds; the number of slaughterhouses and their endowment; efficient organization of marketing; the existence and growth of infrastructure; domestic consumption of sheep and goat meat and so on [6,11]. This activity sector could bring substantial incomes for farmers in Romania in terms of exports orientation and intensification to non- EU countries.

MATERIALS AND METHODS

In order to realize this scientific study there have been used, processed and analyzed data related to: sheep and goat livestock; realized meat production; average weight at slaughter; average purchase prices for sheep meat; sheep and goats value exports. The data were used to describe in a more realistic way the evolution of sheep and goat market in Romania and they were taken from the official websites of the National Institute of Statistics, the Ministry of Agriculture and Rural Development and FAOSTAT.

RESULTS AND DISCUSSIONS

In Table 1 one could observe the evolution of sheep and goat livestock in Romania and at regional level. During 2009-2014, sheep and goat livestock had an oscillatory evolution a period to another. In accordance with statistical data regarding the sheep number, our country occupied the fourth place (in 2009) within the European Union after the United Kingdom of Great Britain and Northern Ireland, Spain and Greece [7].

About 198,729 farmers are raising sheep and goats and the average farm size is about 16 heads.

In Romania sheep livestock increased in 2014 (+4.11%) in comparison with 2009. In

Romania's development regions, sheep livestock recorded different evolutions. In 2014, in the Centre Region there was recorded the largest sheep livestock (2,095,670 animals). On the opposite side, the smallest sheep livestock registered in 2014 too, was in Bucharest-Ilfov Region (30,707 animals). Goat livestock recorded a significant growth during the analyzed period of time [5]. In 2014, these increased at national level with 54.4% in comparison with 2009. Analyzing the development regions, one could observe increases through all the regions in 2014 compared to 2009.

Table 1. The evolution of sheep and goat livestock at national level and by development regions, 2009-2014 (number)

Specification	2009	2010	2011	2012	2013	2014	2014/2009 (%)
Sheep							
Romania	9,141,482	8,417,437	8,533,434	8,833,830	9,135,678	9,518,225	104.1
North-West Region	1,393,323	1,335,270	1,330,825	1,372,997	1,406,954	1,610,376	115.5
Center Region	1,785,165	1,856,568	1,931,589	1,991,095	2,047,133	2,095,670	117.3
North-East Region	1,585,477	1,240,359	1,258,352	1,296,866	1,326,483	1,369,698	86.3
South -East Region	1,503,386	1,296,159	1,302,978	1,357,539	1,401,181	1,439,291	95.7
South Muntenia Region	927,757	788,836	812,676	832,858	864,870	884,112	95.2
Bucharest –Ilfov Region	26,751	29,445	25,352	27,869	29,043	30,707	114.7
South-West Oltenia Region	715,798	600,861	610,385	61,8740	633,858	657,169	91.8
West Region	1,203,825	1,269,939	1,261,277	1,335,866	1,426,156	1,431,202	118.8
Goat							
Romania	917,304	1,240,786	1,236,143	1,265,676	1,312,967	1,417,176	154.4
North-West Region	79,685	92,603	90,643	90,714	95,074	105,040	131.8
Center Region	86,645	109,379	105,768	113,241	117,484	125,069	144.3
North-East Region	128,906	193,379	198,332	202,680	208,919	222,704	172.7
South -East Region	225,096	307,922	317,218	320,685	328,476	361,683	160.6
South Muntenia Region	155,493	231,500	224,370	224,604	237,298	251,816	161.9
Bucharest –Ilfov Region	8,261	7,911	8,935	10,854	11,428	12,877	155.8
South-West Oltenia Region	182,734	244,965	235,949	246,666	251,563	270,713	148.1
West Region	50,484	53,127	54,928	56,232	62,725	67,274	133,2

Source: [9]; own calculations

In Table 2 there is presented the evolution of sheep and goat livestock per 100 ha. This evolution is presented both at country level and by development regions. At national level there is ascertained an increase of sheep and goats number per 100 ha in 2014 (81.0 animals) in comparison with 2009 (76.4 animals). At development regions level, in most cases, it is observed a growth of sheep and goat livestock per 100 ha, in 2014 than in 2009. The North-East Region is the only one where there was registered a decrease in 2014 (82.8 animals) in comparison with 2009 (89.1 animals). The highest density per 100 ha could be observed in Centre Region, during 2009 – 2014 where it is reached a maximum in 2014 (120.2 animals) [2]. At the opposite, the lowest density is related to South-Muntenia Region. According to official data at the end of 2012, Romania was ranked on the seventh place concerning the number of sheep and goats per 100 ha. The first positions of this classification were occupied by: Greece, The United Kingdom of Great Britain and Northern Ireland, Spain, Portugal, Netherlands and Italy [8].

Table 2. Evolution of sheep and goats per 100 ha at national level and by development regions, 2009-2014 (number)

Specification	2009	2010	2011	2012	2013	2014	2014/2009 (%)
ROMANIA	76.4	70.5	72.2	74.6	77.4	81.0	106.0
North-West Region	81.1	75.9	75.5	77.7	81.9	93.6	115.4
Center Region	106.6	109	112.5	116.1	117.2	120.2	112.7
North-East Region	89.1	71.8	76.9	79.2	79.8	82.8	92.9
South -East Region	79.1	71.4	72.4	75	76.8	79.9	101.0
South Muntenia Region	46.7	44.7	44.9	45.8	47.9	49.4	105.7
Bucharest –Ilfov Region	34.7	32.4	36	40.7	55.6	59.8	172.3
South-West Oltenia Region	57.3	51.9	51.7	52.9	56.1	58.8	102.6
West Region	84.3	75.7	78.8	83.3	87.5	88.1	104.5

Source: [9] ; own calculations

Table 3 presents the dynamics of sheep and goat meat live production, as well as average weight at slaughter at national level, during 2009-2013. It may be observed a fluctuant evolution for meat live production obtained in the analyzed period. In 2013, meat live production increased with 64.4% than in 2009. The lowest production was realized in 2010 (100 thousand tonnes), while the highest one was recorded in 2013 (171 thousand tonnes). Average weight at slaughter increased from 17kg/animal (2009) to 24 kg/animal (2013). The lowest average weight at slaughter was registered in 2010 (16 kg/ animal).

Table 3**.** Evolution of meat live production and average weight at slaughter for sheep and goats in Romania

SPECIFICATION	2009	2010	2011	2012	2013	2013/2009 (%)
Total meat live production (thousand tonnes)	104.0	100.0	150.0	107.0	171.0	164.4
Average weight at slaughter (kg/animal)	17.0	16.0	21.0	18.0	24.0	141.1

Source: [11]; own calculations

In Table 4 is presented the goat meat production per total of sectors in Romania's counties. According to data presented in Technical-Operative Report at 31st of July, 2015, the realized production of goat meat was 13,542 tonnes. Bacău county is on the first position in goat meat production top (2,067 tonnes). The following places in this ranking are occupied by the next counties: Galaţi (1,003 tonnes); Ialomiţa (891 tonnes); Caraş-Severin (619 tonnes); Vaslui (594 tonnes); Vrancea (491 tonnes). Teleorman (490 tonnes); Mureş (459 tonnes).

About 23 % mutton and sheep meat is produced in the South-Eastern Romania,18 % in the Central part and 14 % in North-East.[3]

Table 4. Goat meat production per total sectors in Romania's counties at 31st of July, 2015 (tonnes)

County	**Production**	**County**	**Production**	**County**	**Production**	**County**	**Production**
ALBA	111.0	CLUJ	399.0	ILFOV	58.0	TIMIS	55.0
ARAD	106.0	CONSTANTA	47.0	MARAMURES	95.0	TULCEA	0.0
ARGES	203.0	COVASNA	87.0	MEHEDINTI	211.0	VASLUI	594.0
BACAU	2,067.0	DAMBOVITA	273.0	MURES	459.0	VALCEA	280.0
BIHOR	109.0	DOLJ	0.0	NEAMT	192.0	VRANCEA	491.0
BISTRITA N.	395.0	GALATI	1,003.0	OLT	221.0	M.BUCURESTI	16.0
BOTOSANI	19.0	GIURGIU	163.0	PRAHOVA	426.0		
BRASOV	248.0	GORJ	44.0	SATU MARE	96.0		
BRAILA	417.0	HARGHITA	206.0	SALAJ	46.0		
BUZAU	36.0	HUNEDOARA	130.0	SIBIU	225.0		
CARAS S.	619.0	IALOMITA	891.0	SUCEAVA	331.0		
CALARASI	131.0	IASI	335.0	TELEORMAN	490.0	*Total -17,216*	

Source: [11]

Realized sheep meat production in Romania's counties at 31st of July, 2015 is being presented in table no. 5 in accordance with data published by the Ministry of Agriculture and Rural Development, sheep meat production per total sectors was 100,868 tonnes. Concerning the obtained production, Tulcea county is placed on the first position (5,825 tonnes). The following positions in the biggest sheep meat producers counties are occupied by: Bistrita-Năsăud (5,668 tonnes); Cluj (5,452 tonnes); Constanţa (5,405 tonnes); Călaraşi (5,003 tonnes); Mureş (4,950 tonnes); Bacău (4,657 tonnes); Sălaj (4,655 tonnes); Prahova (4,397 tonnes). A significant part of farmers that are specialized in farming sheep and goats sign contracts with profile companies. These enterprises take rams and lambs over in order to slaughter in conditions stipulated by law, afterwards the selling being ensured both by supermarkets and shops that sell meat and meat products [8].

Table 5. Sheep meat production per total sectors in Romania's counties at 31st of July, 2015 (tonnes)

County	Production	County	Production	County	Production	County	Production
ALBA	2,909	CLUJ	5,452	ILFOV	35	TIMIS	3,557
ARAD	3,285	CONSTANTA	5,405	MARAMURES	879	TULCEA	5,825
ARGES	2,417	COVASNA	1,035	MEHEDINTI	657	VASLUI	2,210
BACAU	4,657	DAMBOVITA	294	MURES	4,950	VALCEA	1,344
BIHOR	645	DOLJ	103	NEAMT	2,930	VRANCEA	1,589
BISTRITA NASAUD.	5,668	GALATI	3,978	OLT	937	M. BUCURESTI	52
BOTOSANI	828	GIURGIU	377	PRAHOVA	4,394		
BRASOV	3,286	GORJ	402	SATU MARE	3,007		
BRAILA	1,924	HARGHITA	1,405	SALAJ	4,655		
BUZAU	397	HUNEDOARA	757	SIBIU	1,995		
CARAS S.	3,933	IALOMITA	2,243	SUCEAVA	1,961		
CALARASI	5,003	IASI	2,571	TELEORMAN	917	*Total -140,541*	

Source: [10]

In Table 6, there are presented average purchase prices for live sheep meat weight both at national level and by development regions, during 2009-2014. In this period the average purchase prices followed an ascending trend from 2009 to 2011. In 2012 there was recorded a decrease, while since 2013 they started to grow. The lowest price was recorded at national level in 2009 (5.33 Ron/kg live) and the highest one was registered in 2014 (8.98 Ron/kg live). Concerning the average purchase price by development regions, one could observe a differential evolution. In South-East Region, in 2012 there was registered the highest average purchase price (13.0 Ron/kg live). The lowest price was associated with the year 2009, in the same area (4.25 Ron/kg live).

Table 6. Average purchase prices for live sheep meat weight both at national level and by development regions (Ron/kg live)

Specification	2009	2010	2011	2012	2013	2014
ROMANIA	5.33	5.38	7.07	6.81	8.5	8.98
North-West Region	4.63	5.65	6.26	6.49	8.45	9.01
Center Region	5.36	5.7	7.9	8.15	9.75	9.64
North-East Region	6.04	-	-	3.45	-	-
South -East Region	4.25	5.16	10	13	-	11.33
South Muntenia Region	4.85	-	8.72	5.74	8.99	9.44
South-West Oltenia Region	5	4.4	5.17	4.63	10.24	8.58
South-West Oltenia Region	5.33	5.81	12.79	7.27	8.23	8.35

Source : [8]

The situation of economic accounts in agriculture for sheep and goats is being presented in Table 7. The value at producer's price for sheep and goats recorded fluctuations during the period 2009-2013. The lack of subsidies from 2011 to 2013 did not contribute to accelerating the development of this activity sector.

In our country there is registered an average annual consumption per capita of 3.0 kg sheep and goat meat, during 2009-2011. Talking about the consumption of sheep meat

processed products in Romania, it mainly has a seasonally character, in Easter Holidays and autumn period. On domestic market, but also on the European one, consumers require certain parts (haunch and chops). Because producers are not able to ensure those required parts, they import from New Zealand and Australia. These imports are realized in relatively favourable conditions. In Romania, sheep and goat imports are net inferior to exports [10].

Table 7. Economic accounts in agriculture at national level during 2009-2013

Specification	2009	2010	2011	2012	2013
Sheep and goats	Economic Accounts for Agriculture (current prices – millions Ron)				
Value to producer's price	559.64	615.26	892.29	866.68	864.82
Subventions for products	280.4	-	-	-	-
Value to base price	840.04	615.26	892.29	866.68	864.82
Sheep and goats	Economic Accounts for Agriculture (prices of previous year-millions Ron				
Value to producer's price	441	609.54	679	899.77	692.87
Subventions for products	89.65	305.4	-	-	-
Value to base price	530.65	914.94	679	899.77	692.87

Source: [9]

According to data given by FAOSTAT, Romania exported 3,126 sheep in 2009, but in 2011, the export was reduced to 1,764 animals. Sheep export is significant in comparison with the goat one. In 2009 there were exported 1,590,511 sheep, while in 2011 only 1,791,595 heads.

The value of goat exports decreased from USD Thousand 168 in 2009 to USD Thousand 126 in 2011.

The value of sheep exports increased from USD Thousand 114,484 (2009) to USD Thousand 166,269 (2011). In 2015, sheep exports accounted for Euro Million 150. Nowadays, Romania is on the first place in the ranking of sheep exporting countries within the European Union [12]. Romania has 50% market share.

The most significant exports are realized in: Libya, Jordan, Bulgaria, Greece and Lebanon. For sheep breeders, exports bring profit, which provides safety for business. One could notice that local sheep market registered increases since joining the European Union.

In order to increase the competitiveness of sheep and goat sector are being imposed the following aspects [6, 11]:

-raising sheep and goat livestock;

-giving benefits to those who organize themselves in associations whose main aim is to raise young sheep;

-improving sheep and goat livestock, mainly for meat production;

-developing some high throughput technologies specific both to growing areas and to each breed;

-using carcase classification grid established in accordance with European Union's standards;

-alignment to European Community standards regarding the manner of granting subsidies;

-stimulating the growth of average sheep meat consumption per capita in Romania;

-increasing incomes of sheep and goat farmers by stimulating sales both domestically and externally;

-exploitation of domestic production on European Union market, but also in Arab countries;

-stimulating the sheep and goat meat exports.

CONCLUSIONS

Following the analysis of sheep and goat market in Romania, there can be observed:

-an increase of sheep and goat livestock in 2014 in comparison with 2009;

-an increase of sheep and goat number per 100 ha in 2014 in comparison with the reference year;

-in 2013, sheep and goat meat live production increased with 64.4% compared to 2009;

-average weight at slaughter grew with 41.1% in 2013 than in 2009;

-average purchase price for live sheep meat increased from 5.33 Ron/ kg in live (2009) to 8.98 Ron/ kg in live (2014) ;
the exports value is significant higher in comparison with imports value;
sheep and goat export is mainly realized towards countries that are not part of the European Union.

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CHANGES AND TRENDS OF CORN PRODUCTION IN ROMANIA

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Abstract

The aim of this paper is to emphasis the main trends on the Romanian corn market. Corn market has a particular importance because of its contribution to feed people and livestock, on the one hand, and, on the other hand, ensure the income for the farmers from export. Using quantitative statistical methods, the paper proposes an economic analysis of corn market in the period 2010-2014. This analysis shows that Romania cultivates large areas with corn, ranking on the first place among European Union countries. Also, in Romania the corn has the highest average production comparatively with the other cereals. The corn remains a key element in Romanian agriculture structure, given that is more increasingly required for export in order to produce biofuels.

Key words**:** *average production, corn, market, Romanian trade*

INTRODUCTION

The corn is a cereal used in human nutrition, animal feed and as raw material in various industries. It must also mention a number of features which demonstrate the importance of maize crop. Literature review presents essential features for corn such as: ecological plasticity, cultivating on surfaces and in different climatic conditions; it is resistant to drought and high temperatures; shows a small number of diseases and pests; capitalize on a high percentage of mineral fertilizers and organic ones; total mechanization of culture; shows a high coefficient of multiplication, achieving increased production (with 50% higher than other cereals); is a good plant for most crops. [10]
Because of its high yields, corn is cultivated for ensuring food security of growing population world wide. [5, 6]
Currently, corn holds first place worldwide among cultivated crops. According to official data published in 2014 were 178 million hectares cultivated with maize, while production achieved was 991 million tons. Approximately 60% of production is destined for feed sector. Also, more than half of the corn surfaces are in China; U.S., Brazil and the EU-28. A significant amount of corn, namely 144 million tons is used for the production of bioethanol, which is a source of renewable energy and 100% bio. It is derived entirely from biological products and has a neutral impact on the environment. In 2014, in countries of European Union were cultivated with corn 9.5 million hectares. In Europe, the main producing countries in 2014 were: Ukraine (4.4 million ha); Russia (2.5 million hectares); Serbia (1.0 million hectares). Romania is a country with a tradition of producing maize both for the domestic market but also for export. Through the share on which it owns in land use, as well as the influence it has in relation to other agricultural or economic branches, corn is the basic crop of Romanian agriculture.[3, 15,16]

MATERIALS AND METHODS

In order to analyze the corn market in Romania it was started from the evolution of corn in the Romanian agriculture. The analysis was made at the national level and at

the development regions from the period 2010-2014. It was into consideration relevant indicators such as surface, average and total production, average price, export and import. The statistical data used in this study were taken from the Ministry of Agriculture and Rural Development and National Institute of Statistics. To get an overview of the corn in Romanian agriculture were consulted more specialized materials.

RESULTS AND DISCUSSIONS

In the period 2010-2014, the surface cultivated in Romania with corn was variable what getting to different production. At the national level and on development regions the evolution of corn surface is presented in Table 1. In 2014, the surface with corn represented 45.9% from total surface. At the national level, corn surface increased by 19.7% in 2014 compared with 2010. The lowest surface was recorded in 2010 (2,098,394 ha) and the largest one was in 2012 (2,730,157 ha). [2, 4]

Also, on the regions remains generally rising trend for the same area in 2014 compared to 2010. It finds one exception for Bucharest-Ilfov Region. In this region in 2014, corn cultivated recorded a decrease of 21.6% compared to 2010. The largest areas cultivated with corn are in: South East; South-Muntenia and North-East Region. In these regions the area cultivated with corn varies from 335,873 to 544,146 ha. In 2012, South - Muntenia, held a 19.9% from all area. The small areas are in in Bucharest-Ilfov Region, when the areas have from 7,305 to 12,501 ha. In 2012, this region has held a share of 0.26% of the total area cultivated at the national level. In 2014, Romania took first place in terms of area with maize. This advantage is not found in the production realized due to a lower yield. In 2014, European Union countries stood out as great cultivators of corn: France (1,771.7 ha); Hungary (1,185.0 ha); Italy (678.2 ha); Germany (481.3 ha). [12]

able 1. Corn surface in Romania and by Region (ha)

Specification	2010	2011	2012	2013	2014	2014/2010 (%)
Romania	2,098,394	2,589,667	2,730,157	2,518,268	2,512,809	119.7
NORTH-WEST Region	256,454	239,673	237,459	256,501	265,360	103.4
CENTER Region	131,575	144,772	160,100	149,846	153,338	116.5
NORTH-EAST Region	428,878	463,941	494,583	453,051	455,280	106.1
SOUTH-EAST Region	335,873	515,777	500,112	481,659	469,681	139.8
SOUTH-MUNTENIA Region	391,651	479,875	544,146	484,636	462,541	118.1
BUCURESTI - ILFOV Region	12,501	8,663	7,305	10,387	9,804	78.4
SOUTH-WEST OLTENIA Region	276,396	386,455	414,269	346,643	349,284	126.3
WEST Region	265,066	350,511	372,183	335,545	347,521	131.1

Source: [11]; own calculations

Corn production is very important in order to ensure demand for animal feed, but also for people consumption. Table 2 shows the total production of corn made at the national level and by region in 2010-2014. National production of corn increased from 9,042,032 tons (2010) to 11,988,553 tons (2014). In 2014 corn production in Romania increased by 32.5% compared to 2010. It finds that, in the analyzed period was achieved maximum production in 2014. The lowest production was recorded in 2012 (5,953,352 tons). Low productions was obtained in 2012 were due to prolonged drought and also the lack of efficient irrigation. [7]

Significant productions are obtained in South Muntenia; North-East Region and in South East. At region level was increased corn production in 2014 comparatively with 2010. The largest corn production was 2,519,407

tons (2013) conducted in South Muntenia. Production in this region represents 22.2% of total corn production nationwide. In Bucharest-Ilfov Region is the lowest recorded production which varies between 12,555 tons (2012) and 52,475 tons (2014). Production of corn in the Bucuresti-Ilfov region represents 0.43% of the output nationwide in 2014. With regard to the position held by Romania, the top corn producing countries, it is necessary to highlight that in 2014 was ranked second after France and on the following positions are Hungary (9,168.8 thousand tons), Italy (8,332.7 thousand tons); Germany (5,142.1 thousand tons); Spain (4,692.0 thousand tons); Poland (4,468.4 thousand tons).

Table 2. Corn production in Romania and by Regions (tone)

Specification	2010	2011	2012	2013	2014	2014/2010 (%)
Romania	9,042,032	11,717,591	5,953,352	11,305,095	11,988,553	132.5
NORTH-WEST Region	1,096,326	1,060,818	648,234	1,094,982	1,226,272	111.8
CENTER Region	582,564	675,837	406,965	644,116	789,254	135.4
NORTH-EAST Region	1,664,395	1,966,518	977,220	2,057,116	2,261,309	135.8
SOUTH-EAST Region	1,456,742	2,454,524	839,806	2,055,168	2,127,758	146.0
SOUTH-MUNTENIA Region	1,794,856	2,381,534	1,388,692	2,519,407	2,449,250	136.4
BUCURESTI - ILFOV Region	49,754	38,721	12,555	48,989	52,475	105.4
SOUTH-WEST OLTENIA Region	1,189,394	1,569,294	604,181	1,475,745	1,444,982	121.4
WEST Region	1,208,001	1,570,345	1,075,699	1,409,572	1,637,253	135.5

Source: [12]; own calculations

The average production is an important indicator for the farmer, because it leads directly to determining the profitability of crops. In order to increase profitability it is desirable that average production will be larger. Table 3 presents the evolution of yields for corn, at country level, but also in the regions development. In 2012, the average production was 2,180 kg / ha, approximately by three times lower than the average achieved at EU level of 6,150 kg / ha. [8, 13] In 2014, it recorded a growth of average production for corn by 10.6% compared to 2010, actually the best performance was achieved by Romania in 2014 (4,770 kg / hectare). For seven of the eight regions was an increase in yield for corn in 2014 compared to 2010, the only region not included in the previously enunciated trend is South-West Oltenia. In this region the yield fell by 3.9% in 2014 compared to 2010. The best performance was recorded in Bucharest-Ilfov Region, in 2014 (5,352 kg / ha). This represents 87.0% of the average yield achieved at EU level in 2012. It is remarkable that in 2014 it recorded the best production of corn and best efficiency of the national level. These results could have been greater if farmers had access to an inflexibility of irrigation and appropriate technologies. According to the trade, the increase would have been even 30%. In European Union the best average production was in Spania (11,238 kg/hectar); Austria (10,792 kg/ha); Germania (10,684 kg/ha); Franta (10,383 kg/hectar); Italia (9,712 kg/hectar); Slovacia (7,931kg/hectar); Ungaria(7,737kg/hectar). [12]

Table 3. Corn average production in Romania and by region (kg/hectar)

Specification	2010	2011	2012	2013	2014	2014/2010 (%)
Romania	4,309	4,525	2,180	4,488	4,770	110.6
NORTH-WEST Region	4,275	4,425	2,730	4,269	4,621	108.0
CENTER Region	4,428	4,668	2,542	4,299	5,147	116.2
NORTH-EST Region	3,881	4,239	1,976	4,541	4,967	127.9
SOUTH-EAST Region	4,337	4,759	1,677	4,261	4,526	104.3
SOUTH MUNTENIA Region	4,583	4,963	2,552	5,199	5,294	115.5
BUCURESTI – ILFOV Region	3,980	4,470	1,719	4,716	5,352	134.4
SOUTH-WEST OLTENIA Region	4,303	4,061	1,458	4,257	4,137	96.1
WEST Region	4,557	4,480	2,890	4,201	4,711	103.3

Source: [11]; own calculations

According to official data published in Romania corn product benefit by various forms of support, such as direct payment schemes; national transitional and aid for the fuel consumed in agriculture. Table 4 presents the evolution of average purchase prices for corn in Romania, but also by region for 2010-2014. Nationally, in 2014, the price slightly compared to 2010. The highest price was recorded in 2012 (0.87 Euro / kg), while the lowest price was in 2010 (0.57 Euro / kg). The high prices in 2012 is explained by the fact that this year was achieved the lowest production, given strong demand domestically. The development regions are found: a price increase in 2014 compared to 2010, for six regions and for the North-West and West region falling prices. This decrease in average purchase prices for grain maize is between 5.1%-6.8%. The price decline is mainly due to increasing production and declining consumer demand. Due to the low prices farmers from Romania made small profits, which reflect directly on investments.

Table 4. Corn average purchasing prices in Romania and by regions (lei/kg)

Specification	2010	2011	2012	2013	2014	2014/2010 (%)
Romania	0.57	0.79	0.87	0.74	0.61	107.0
NORTH-WEST	0.59	0.85	0.84	0.73	0.56	94.9
CENTER Region	0.59	0.94	0.95	0.93	0.62	105.0
NORTH-EAST Region	0.57	0.79	0.83	0.78	0.58	101.7
SOUTH-EAST Region	0.52	0.77	0.89	0.73	0.60	115.3
SOUTH-MUNTENIA Region	0.64	0.82	0.98	0.85	0.67	104.6
BUCURESTI – ILFOV Region	0.54	0.78	0.85	0.68	0.67	124.0
SOUTH-WEST OLTENIA Region	0.57	0.74	0.89	0.73	0.60	105.2
WEST Region	0.59	0.69	0.85	0.74	0.55	93.2

Source: [12]; own calculation

Production of corn in Romanian is directed to the domestic consumers and foreign markets. A positive aspect for the Romanian economy is the exports of corn are significantly higher than imports. Evolution of foreign trade, in the period 2010-2014, is presented in Table 5. In 2014, the amount of corn exported from Romania increased by 80.5% compared to 2010. This was made possible thanks to increased production and increased demand on the foreign market. The quantity imported increased from 430,548.7 tons (2010) to 471,204.1 tons (2014). In 2014, imports increased by 9.4% compared to 2010.

Table 5. Foreign trade of corn in the period 2010-2014 (tons)

Specification	2010	2011	2012	2013	2014	2014/2010 (%)
Export	2,054,488.2	2,310,665.1	2,272,649.4	3,233,350.7	3,708,953.0	180.5
Import	430,548.7	373,881.2	698,581.3	284,155.7	471,204.1	109.4

Source: [14] ; own calculation

Table 6 presents exports and imports value for corn in Romania, in the period 2010-2014. Analysis of value of exports highlights a growing trend. It finds an increase of exports from 388,317.9 thousand Euro (2010) to 755,147.2 thousand Euro (2014). This increase in the value of exports is placed primarily on account of the considerable quantities of corn exported.

Table 6. Trade balance of corn, period 2010-2014 (thousands Euro)

Specification	2010	2011	2012	2013	2014	2014/2010 (%)
Export	388.317,9	578.710,3	596.517,6	730.995,2	755.147,2	194.4
Import	89.426,9	113.221,6	191.133,1	121.343,3	123.510,5	138.1

Source: [15]; own calculation

The value of imports increased from 89426.9 thousand Euro (2010) to 123,510.5 thousand Euro (2014). One can easily see that for the corn trade balance is positive for the entire analyzed period. According to official data, in 2011 Romania was ranked on the eighth place in the ranking of world exporters. Romania share, in the year 2011, world exports of corn was 2.44. Romania has exported the largest quantities of corn in Hungary; Spain; Egypt; Syria and Turkey. To exports Romania occupied a position 41 in 2011, with a 0.46% share in world imports of corn. [9]

CONCLUSIONS

In conclusion, corn market in Romania is dynamic. The economic analysis of corn showed positive trends of all indicators. Hence, surface with corn increased in the period 2010-2014, with 19, 7%. This increasing leads to higher total production on nationally, but also on development Regions. Increased average production per hectare, as a result of management and technologies, what means a increasing of efficiency, but not equally with efficiency at EU level, because of differences between levels of average production. Also, noticed higher exports than import the entire period, a quantitative significant increase in exports, with 80.5% in 2014 compared to 2010 and increasing of imports in a small measure of just 9.4% in 2014 compared to the base year. Furthermore, noticed that increased exports value with 94.4% in 2014 compared to 2010. A positive balance of trade balance was registered for the period 2010-2014 by 56.3%. The great importance of corn production to ensure rational nutrition can be noticed, especially the product contain in proteins, between 9.07%-13.64%. [1]

Future direction of corn markets should be directed towards encouraging the consumption and export, for which large quantities of domestic production are needed. In order to increase competitiveness of corn production are necessary investments in irrigation systems; application of new technologies; appropriate fertilization; reducing costs per hectare; a higher corn processing.

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THE ESTIMATION OF SELF-INSURANCE LEVEL WITH FOOD IN THE REPUBLIC OF MOLDOVA

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Abstract

The purpose of this work consists in estimation of self-insurance level with food of the Republic of Moldova. There would have been Used methodological instruments the analysis and synthesis of conclusive information for the topic approached. The Republic of Moldova is supplied with cereals, except the year 2012, when the level of self-insurance was less than 80 %. The level of self-insurance with sunflower production increased in 2014 compared to 2009 and 2010 years respectively by 116.0 and 80.8 p.p., and compared to 2011 and 2012 it increased by 41.5 and 93.6 p.p. The level of self-insurance with vegetables and melons has been reduced in 2014 compared to 2009 and 2010 by 3.9 and 9.5 p.p. and compared to the years 2011 and 2013 it has reduced respectively by 5.8 and 7.7 p.p. Over-insurance with fruits allows us to increase the volume of export. In the years 2013 and 2014 the Republic of Moldova was not insured with meat production. The Republic of Moldova was insured with eggs, milk and dairy products. In 2014 the degree of covering the necessary of fruits determined on the basis of normatives of average balanced basket is higher than in the years 2010, 2011, 2012 and 2013.

Key words**:** *average balanced basket, food balanced sheets, food security, self-insurance level*

INTRODUCTION

Food Security (as defined by FAO) represents a well organized functional system that insures all categories of the population with food in accordance with the physiological norms based on own production and on the rationing of the import that is necessary for those products, the production of which is impossible due to the lack of internal conditions [11].

To achieve food security at individual level the following measures are needed:

-insuring food availability (production, reserve stocks);

-redistribution of food availabilities within the country or abroad through international exchanges;

-effective access of the population to purchase of food products, by insuring solvent demand according to its requirements.

Food security occupies a special place among other types of security, because nutrition is the basic indicator of vital human activity, the lack of which causes hunger or death [1].

The level, at which the food security of people is assessed, may be the world (global), regional, national, family and individual.

MATERIALS AND METHODS

The informative material on which this paper is based includes scientific and reference studies from national and international literature. As methodological instruments there have been used the analysis and synthesis of conclusive information for the approached topic.

In order to determine food balanced sheets the following formula is applied:

$$Vs + P + I = E + UI \quad (1)$$

where: Vs - Variation of stocks;
P – Production;
I – Import;
E – Export;
IU–Internal Use.

The algorithm for calculating the ratio of self-insurance can be shown by the following formula:

$$SIR = (P/IC)^{*}100 \quad (2)$$

where: IC- internal consumption;
SIR - Self-Insurance Ratio.

Internal Consumption includes [5].

- production consumption in agriculture;
- personal consumption (consumption fund);
- production losses;
- uses in nonfood purposes.

RESULTS AND DISCUSSIONS

The performance of the agrifood sector is reflected in the degree of food security insurance of the population and in its participation at the structuring and harmonization of the national economy development [9].

NBS elaborated the food balanced sheets and determined the self-insurance level with food that represents an important indicator to assess the food security of the country.

The following table presents the self-insurance level with food determined by NBS.

Table 1. The self-insurance level with food in the Republic of Moldova, %

Specification	Years					
	2009	2010	2011	2012	2013	2014
Cereal crops	105.0	117.8	115.6	60.8	150.3	173.9
Leguminous crops	82.9	121.6	95.8	76.2	123.5	101.0
Sunflower	121.4	156.6	195.9	143.8	326.3	237.4
Potatoes	89.4	100.4	116.2	66.6	89.8	95.8
Vegetables and melons	98.6	104.2	100.5	93.3	102.4	94.7
Fruits	213.9	207.7	237.7	245.2	264.2	205.0
Grapes	104.3	104.6	102.8	104.0	103.7	106.4
Meat	86.7	86.0	86.1	81.5	69.8	65.4
Milk	95.0	94.1	92.0	84.7	86.8	90.3
Eggs	100.3	98.8	95.4	102.2	98.0	98.8

Source: Own calculations based on the data from [10]

The data of the table note that the Republic of Moldova is supplied with cereals, except 2012, when the level of self-insurance is less than 80%, due to the drought of this year that has considerably diminished the volume of the agricultural production.

The level of self-insurance determined for cereal crops increased in 2014 compared to 2009 and 2010 respectively by 68.9 and 56.1 p.p., and compared to 2011, 2012 and 2013 it increased by 58.3; 113.1 and 23.6 p.p. Our country was insured with leguminous crops, except 2012, when the self-insurance level was below the allowable limit of 80%.

The level of self-insurance with leguminous crops increased in 2014 compared to the years 2009, 2011 and 2012 respectively by 18.1 %, 5.2 % and 24.8 %. and compared to the years 2010 and 2013 it decreased by 20.6 % , and 22.5 %.

The Republic of Moldova was over-insured with sunflower production. The level of self-insurance with sunflower production increased in 2014 compared to 2009 and 2010 respectively by 116.0 and 80.8 p.p, and compared to 2011 and 2012 it increased by 41.5 and 93.6 p.p.

Due to the reduction of the potatoes area in 2014 the level of self-insurance decreased compared to the years 2010 and 2011 respectively by 4.6 and 20.4 p.p., and compared to the years 2009, 2012 and 2013 it increased by 6.4 %, 29.2 % and 6.0 %.

The level of self-insurance with vegetables and melons reduced in 2014 compared to 2009 and 2010 by 3.9 % and 9.5 %, and compared to the years 2011 and 2013 it decreased respectively by 5.8 % and 7.7 %.

The level of self-insurance with fruits reduced in 2014 compared to 2009 and 2010 respectively by 8.9 and 2.7 p.p., and compared to the years 2011, 2012 and 2013 it reduced by 32.7 %, 40.2 % and 59.2 %. Over-insurance with fruits allows us to increase the export volume.

Our country was over-insured with grapes production. The droughts of recent years have seriously affected the livestock sector. The data of the table show that we weren't insured with meat production in the years 2013 and 2014, and the level of self-insurance reduced in 2014 compared to the years 2009; 2010 and 2011 respectively by 21.3 %, 20.6 % and 20.7 %, and compared to 2012 and 2013 it decreased by 16.1 and 4.4 p.p. due to the reduction of the livestock of cattle and cows, while the livestock of pigs, sheep and goats increased.

The Republic of Moldova was insured with milk and dairy products. However the level of self-insurance with milk reduced in 2014 compared to the years 2009, 2010 and 2011 respectively by 4.7 %, 3.8 % and 1.7 %, due to the reduction of the cow livestock, and compared to 2012 and 2013 it increased by 5.6 and 3.5 p.p. Also our country was insured with eggs production during the analized period. Self-insurance level determined for 2014 reduced compared to the years 2009 and

2012 by 1.5 and 3.4 p.p.
The degree of covering the necessary of fruits, berries and nuts is determined in the following table.

Table 2. The degree of covering the necessary consumption of fruits, berries and nuts determined on the basis of domestic production,%

Indicators	Years				
	2010	2011	2012	2013	2014
The annual minimum (balanced) food basket thousand tons	293	293	293	292	292
Produced quantity, thousand tons	322	378	380	419	497
The degree of covering the necessary of fruits, berries and nuts,%	110.1	129.2	129.9	143.3	170.1

Source: Developed by the author based on the sources [6, 7, 12].

The Republic of Moldova is over-insured with fruits, berries and nuts. The degree of covering the necessary of fruits determined on the basis of the normatives of the average balanced basket [12] in 2014 was by 60.0 and 40.9 p.p. higher than in 2010 and 2011 and by 40.2 and 26.8 p.p. more than in 2012 and 2013 years. This raise is due to increasing the achieved production volume during the analized period.
The degree of covering the necessary of potatoes is presented in Table 3.

Table 3. The degree of covering the necessary consumption of potatoes determined on the basis of domestic production, %

Indicators	Years				
	2010	2011	2012	2013	2014
The annual minimum (balanced) food basket thousand tons	337	337	337	338	338
Produced quantity, thousand tons	280	351	182	240	268
The degree of covering the necessary of potatoes%	83.09	104.1	53.93	71.06	79.35

Source: Elaborated by the de author on the basis of the sources [6, 7, 12].

Analyzing the data of the table we can observe that the degree of covering the necessary of potatoes decreased in 2014 compared to 2010 and 2011 respectively by 3.74 and 24.74 p.p., due to the decrease of the produced amount in this period, and compared with the years 2012 and 2013 the value of this indicator increased by 25.42 and 8.29 p.p.
The following table presents the degree of covering the necessary of vegetables on the basis of domestic production.
The degree of covering the necessary of vegetables with domestic production determined by the normatives of the average balanced basket [12] decreased in 2014 compared to 2010 and 2011 respectively by 3.4 and 8.62 p.p. because of the reduction of the production volume achieved in this period.

Table 4. The degree of covering the necessary consumption of vegetables determined on the basis of domestic production,%

Indicators	Years				
	2010	2011	2012	2013	2014
The annual minimum (balanced) food basket thousand tons	401	401	401	401	401
Produced quantity, thousand tons	341	362	231	292	327
The degree of covering the necessary of vegetables	84.97	90.19	57.55	72.76	81.57

Source: Developed by the author based on the sources [6, 7, 12].

In 2014 compared to 2012 and 2013 the degree of covering the necessary of vegetables went up by 24.02 and 8.81 p.p., the reason beeing the increase of vegetable production in this period compared to 2012 when the drought happened.

Table 5. The degree of covering the necessary consumption of sugar with domestic production,%

Indicators	Years				
	2010	2011	2012	2013	2014
The annual minimum (balanced) food basket thousand tons	48.3	48.3	48.2	48.2	48.1
Produced quantity, thousand tons	103.2	88.4	83.4	140.3	177.7
The degree of covering the necessary of sugar, %	213.7	183.0	172.9	291.1	369.3

Source: Developed by the author based on the sources [2, 6, 12].

The Republic of Moldova was over-insured with granulated sugar, so the degree of covering the necessary of this product increased in 2014 compared to 2010 and 2011 respectively by 155.6 and 186.24 p.p., and compared with 2012 and 2013 the value of this indicator increased by 196.4 and 78.19 p.p.
Table 6 presents the degree of insurance with eggs.
Analyzing the data from Table 6, we can conclude that the degree of insurance with eggs, determined on the basis of the normatives of the average balanced basket [12], decreased in 2014 compared to 2010 and 2011 respectively by 8.53 and 7.09 p.p., the reason being the droughts from 2010 and 2011 that affected the livestock sector.

Table 6. The degree of covering the necessary consumption of eggs determined on the basis of domestic production,%

Indicators	Years				
	2010	2011	2012	2013	2014
The annual minimum food basket million pieces	787	785	783	781	779
Produced quantity, million pieces	718.5	705.2	621.9	623.7	645.0
The degree of covering the necessary of eggs, %	91.28	89.84	79.43	79.82	82.75

Source: Elaborated by the author based on the sources [6, 7, 8 12].

The degree of covering the necessary of eggs on the basis of domestic production increased in 2014 compared to 2012 and 2013 by 3.32 and 2.93 p.p.

CONCLUSIONS

The Republic of Moldova has been supplied with cereals, except 2012, when the level of self-insurance was less than 80%, due to the drought of this year which reduced considerably the agricultural volume. Our country has been insured with leguminous crops, except the year 2012, when the self-insurance level was below the allowable limit of 80%.

The Republic of Moldova has been over-insured with sunflower, fruits and grapes production.

The droughts of recent years have seriously affected the livestock sector. Thus in the years 2013 and 2014 the Republic of Moldova was not insured with meat production.

The Republic of Moldova has been insured with milk and dairy products. Also our country has been insured with eggs production during the analized period.

Thanks to the increase of the obtained fruits production volume in the analyzed period, the degree of covering the necessary of fruits determined on the basis of the normatives of the average balanced basket was higher in 2014 than in the years 2010, 2011, 2012 and 2013.

In 2014 compared to 2010 and 2011 the degree of covering the necessary of vegetables with domestic production reduced .

The degree of covering the necessary of granulated sugar increased in 2014 compared to the years 2010, 2011, 2012 and 2013. Thus we can conclude that the Republic of Moldova is over-insured with granulated sugar. In 2014 compared to the years 2012 and 2013 the degree of covering the necessary of eggs on the basis of domestic production registered an insignificant rise.

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SOME PROBLEMATIC POINTS RELATING TO MINERAL RESOURCES ASSESSMENT

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Abstract

Value is a fundamental economic concept for which there is no unequivocal definition accepted. The emergence and existence of value is determined by multiple factors. In the Republic of Moldova, as in many other states, mineral resources (including land, basements with deposits of minerals and forests) perform an important role in creating new consumption values and ensuring ecological balance. It may be confirmed by artificial separation of lands from other mineral resources with their reflection in a synthetic homonym account, as well as by highlighting purchase operations of mineral resources as a priority for their entries in the business's heritage. Therefore the assessment of mineral resources requires a complex revision that should be based primarily on the inherent properties of these goods and on the legislation in force.

Key words**:** *consumption, mineral resources, value*

INTRODUCTION

One of the essential problems of accounting is objective assessment of assets, which may have a major impact on the profit of the company. The emergence and existence of value is determined by multiple factors. In terms of contribution to gross domestic product lands are the most significant and the most vulnerable type of mineral resources [6]. Of their total area of 3.4 Mil. ha 59.5% (or about 2 Mil. ha) [9] are agricultural lands, forests occupy about 400,000 ha [3] and the number of operated quarries and mines equals to 153 [10]. But, despite their undoubted significance for the national economy and society, methodological aspects of mineral resources evidence are not developed enough and focus mostly on some wrong reasoning. It may be confirmed by artificial separation of lands from other mineral resources with their reflection in a synthetic homonym account [4], as well as by highlighting purchase operations of mineral resources as a priority for their entries in the business's heritage [8]. Therefore the assessment of mineral resources requires a complex revision that should be based primarily on the inherent properties of these goods and the legislation in force.

MATERIALS AND METHODS

As a methodological guide specific to the research there were the fundamental conventions and principles of accounting, all the rules, procedures, methods exposed in N. A. S "Tangible and intangible assets" [7]. The investigations on the topic focused in particular on the provisions of the law on mineral resources [5], the European professional standards for assessing real estate [11] and Plan of accounts [4]. There were also taken into account the specific properties of mineral resources (natural origin, controversial utility, long-term recovery, etc.), legal regulations and experience in the field of accounting for these goods in over 20 enterprises from the Northern region. When generalizing the facts and drawing conclusions preference was given to monographic method (descriptive) with selective application of processes for mass observation and comparison.

RESULTS AND DISCUSSIONS

Local mineral resources (public property) belong to administrative-territorial units. Private mineral resources belong to private or

legal individuals with the right of possession, use and disposition under the law. The right of private ownership of mineral resources is limited. It prohibits sublease, redemption or mortgaging mineral resources (public property) leased or given in concession.

The investigations related to the recognition and evaluation of mineral resources in the Republic of Moldova allow us to examine purchasing the right to extract mineral resources:

1. without recording them;
2.non-systematic recording of mineral resources (elucidation of economic operations, without being reflected in the composition of property items);
3.with their systematic registration (elucidation of economic operations with their reflection in the composition of property items);

Variant I. When buying the right to mineral resources extraction in the license of the legal person the volume is not indicated. It's natural, economic and legal that the company will not recognize mineral resources. It will only reflect intangible asset (the right to extract mineral resources). Mineral resources are not reflected in any off-balance sheet account and in any balance sheet.

Variant II. For example, the company "X" buys the right to withdraw a volume of 2 Mil. m^3 of rock, without indicating the cost of this volume, the value of the license being Lei 2,500 lei. In this case, the enterprise shall recognize the right to mineral resources extraction as intangible asset with value of Lei 2,500 because it is identifiable, it s controlled by the company, it is the result of economic fact - action - sale - purchase of that right.

It is impossible to treat like that worthless mineral resources. The more, these resources are not paid to the State.

The evaluation of mineral resources does not occur at the enterprise under the created conditions because they do not become an element of its heritage. The mineral resources in the amount of 2 Mil. m^3, according to their economic nature are a share determined by the State and can be recognized as assets not belonging to the company. From these considerations they will be reflected in an account of an off-balance sheet, for example 919 "The share of mineral resources established by the State."

The situation elucidated in variant II is similar to the existing situation in the Republic of Moldova. That is, when the mineral resources belong to the State, the company, that intends to extract them, according to the license of carrying out basic work, buys the right to exploit them and not the mineral resources. Therefore, the economic unit cannot recognize these resources (cannot record in the composition of its assets anything that does not belong to it). They will be recognized by the State, representing elements of its heritage. Therefore the economic entity should recognize legally the right to extract mineral resources in the composition of intangible assets, without registering these resources into the composition of patrimonial elements.

Variant III. Let us assume that a natural or legal person purchases from the state the license (right to extract mineral resources) and mineral resources in the volume of 2 Mil. m^3, at the amount of Lei 30 million. In this case it is obvious that the company will recognize: a) the right to extract as an intangible asset;
b) mineral resources - as a heritage element.

Thus, in the third variant the requirements for the criteria of recognizing assets are realized for mineral resources too:

a) the value is reliably determined;
b) they are controlled by the company,
c) they are identified;
d) they are the result of the past economic fact - sale - purchase;
e) they will contribute to economic benefits.

Article 29 (2) of the Tax Code [12] provides that the costs of exploration of mineral resources deposits, incurred before exploitation, as well as the relevant interest payments (loan expenses) should be reflected in the value increase of mineral resources. Thus, in our opinion, two alternatives will be possible:

1) the determination of mineral resources value estimated by specialists at the size of consumptions for land uncovering recognizing these resources in the composition of long-term tangible assets and

the rights to extraction as intangible assets;
2) the recognition of the right to extraction of mineral resources in the composition of intangible assets without recording these resources, consumptions of land uncovering being reflected as prepaid expenses. Thus, mineral resources will be assessed due to their recognition as assets.
The first option is not justified legally because the economic unit cannot record in the composition of its assets the asset which it does not possess; it results from the Tax Code. The second variant corresponds to the economic content of the transaction. Consumptions for land uncovering will not be the value of mineral resources as the right to their exploitation will be recognized as intangible asset.
For example, if the consumptions of land uncovering for the exploitation of rough stone is 6 million lei and the amount of stone resources - 850,000 m^3, the license value - Lei 2,500 with extraction term - 5 years, these consumptions will be evaluated as long- term prepaid expenses and not as part of mineral resources value.
The suggestion outlined in the Tax Code can be viewed skeptically, because it contradicts to the Moldovan Constitution and the Civil Code, and namely:
1.Mineral resources are not transmitted to the enterprise by the State (according to the Civil Code and the Constitution of the Republic of Moldova). In this case the enterprise procures the right to extracting the mineral resource. Therefore, the costs of exploration and exploitation will be included in the extracted production cost and not in the actual value of mineral resources. For example: uncovering a sector of land, from which the rough stone will be extracted, can last 4 years. After this period the extraction of the mineral resource will begin. Let us assume that in the first month there were extracted 14 167 m3 of rock, costs for land uncovering for stone exploration are Lei 99,990 [(6,000,000: 850,000) x 14,167]. As a result these costs will not be passed to the increase of the unrecognizable mineral resource, but to the cost of the product obtained from the extraction of this resource. Thus, mineral resources will be reflected neither in the accounting reports nor in the financial reports and consequently their value won't be reflected too.
2.If we specify the volume of mineral resources as a share for extraction, the costs of land uncovering for the exploration of mineral resources will be included in the value of the product obtained from the extraction of these resources. Therefore the amount of resources will not be affected.
But the problem in question, in our opinion, can have two solutions:
a) the attachment of costs of land uncovering directly to the increase of the entry value of the procured mineral resources;
b) the attachment of costs of land uncovering to the cost of mineral resources in progress (under the preparation period for use according to their destination). From technical point of view the first variant is acceptable. But it creates contradictory situation of national and international accounting standards and it will increase the value of the assets which could occur only in cases of reassessment, capitalization of expenditures, capital repair, modernization, reconstruction, etc. In our version there is none of these cases. Therefore, the first solution cannot be accepted because it is economically groundless.
We consider the second variant to be more successful. Since the value of the asset on initial recognition cannot be increased by costs of land uncovering we propose the following solution of the matter. Mineral resources procured and legally recorded by the respective documents are to be recognized as mineral resources in progress (under the preparation period for extraction). This is a new category (term) in accounting language. It corresponds to the economic nature expressing its role and functions in the production process - before uncovering works are not finished, mineral resources cannot be considered in operation; - if we admit the recognition of purchased inputs in the composition of the operational ones, the need for depletion calculation arises. But the object, to which the exhaustion amount should be attached, is missing as the process of

extraction has not started yet; - scraping works usually last for a long time (they may exceed 3 years), that's why it is reasonable to include the preparation for the extraction of mineral resources in the composition of long-term tangible assets, the same way as it is done with the equipment that requires assembly.

After uncovering process expires, it is rational to transfer the mineral resources in preparation for extraction to the category of mineral resources in exploitation. We specify this moment as the moment of recognition of mineral resources for exploitation.

It is obvious that in the case of purchasing the rights to extract mineral resources from the state and simultaneously mineral resources themselves, mineral resources are recognized as long-term assets.

The capitalization of resources is not an inherent result of their existence; it depends on the mineral conditions (climate, relief, hydrography, etc.). They are defined in the literature as constituting elements of the environment that, at the current level of the development of work tools, are absolutely necessary for the development of the society, but do not serve as basic raw material for economic development.

So, as we have mentioned above, according to the regeneration ability in a reasonable period of time from the economic point of view, mineral resources are divided into renewable resources and non-renewable resources. As non-renewable resources are extracted, their quantity decreases each year and creates problems for future generations, because they cannot restore. Therefore, extracting those resources should be strictly monitored while improving their efficiency and gradually replacing them with alternative materials that are cheaper and more ecological.

The issue of the composition of mineral resources is approached tangentially by Buzu, and Matcovici [2]. For authentic records of the transactions relating to mineral resources it is still important to respect several provisions of the law, as follows:

•national resources are in state public ownership;

•local resources are public property of the administrative-territorial units;

•the resources that constitute public property can only be given in use (rent, lease) for a fee. Their sale, redemption or perfecting as a pledge is prohibited;

•private ownership of mineral resources is not excluded, but it has a limited nature and is permitted in some concrete circumstances provided by the corresponding laws with a more limited field of application.

We can conclude the following:

•mineral resources are a totality of goods and organisms whose appearance and evolution is not linked to human activity. Therefore in their original state they have no cost and no input value;

• in the Republic of Moldova the main and most valuable mineral resources are land (soil, terrains) which constitutes the basic work for agricultural enterprises and indispensable source of existence for the rural population;

• each of the other types of mineral resources (water, forests, underground, etc.) also plays an important role for the national economy and for the maintenance of ecological balance; they cannot be replaced by another one, they are exclusively in public ownership and can be given to beneficial owners only in use;

• the level of readiness for use of mineral resources varies depending on their type, location, technical equipment of beneficiaries etc. Some mineral resources (e.g. land and surface water) can be used in their original condition without undertaking preparatory work and without incurring consumptions of one-time nature. Other mineral resources, on the contrary, cannot be used in original condition (for example, deposits of minerals). In this case businesses are forced to carry out certain beforehand works (geological research, building access roads, uncovering, removal and storage of fertile topsoil, etc.) and bear significant consumptions respectively;

• durable objects created by labor are not considered mineral resources, i.e. objects created during the economic activity of businesses or citizens (e.g., ponds, botanical gardens, forest lines to protect fields, forests established on own land, etc.). These objects have authentic cost (input value) and are

usually classified as fixed assets.

The made conclusions allow us to assess how far the current accounting treatment of mineral resources corresponds to their economic essence, what shortcomings are committed and how they can be removed.

In specialty literature some experts in the field like Bulearca [1] often indicate that mineral resources are the natural part of tangible assets which have a specific natural form as reserves of oil, gas, stone, wood etc., extracted (explored) over a long period. But in our opinion, that definition is not successful, which can be easily proved by the following reasons:

a) terrains were absolutely illegally excluded from the composition of mineral resources, i.e. their most important and valuable part for the Republic of Moldova. The separation of the terrains and the real estate, terrains being stated as a particular type, with their reflection in a distinct synthetic account (it is account 122 "Terrains") is artificial; it is completely unrealistic and it is not based on professional judgments. In addition, neither the definition of land in this normative act is complete, because the normative act does not indicate (intentionally or unintentionally) that they (as all other natural resources) have a natural origin, i.e. do not originate from work;

b)the enumeration of concrete forms (existence) of mineral resources is not appropriate either because, first of all, this procedure is missing in many other adjacent definitions (e.g. the definition of fixed assets, long- term material assets), secondly, some of the brought examples are not typical (characteristic) for our country (e.g. oil and gas), and thirdly, the attribution of the wood to the category of reserves through which forests manifest in physical appearance is incorrect and neglects the fact that in reality (and according to the forest Code) native forests are a community predominantly of trees and shrubs that are destined exclusively to environmental protection, and not to mass (industrial) production of wood for work or fire (as it occurs, for example, in the Russian Federation, Brazil, Canada and other countries with vast forest areas). The phrase "over a long period" that ends the definition of mineral resources is not necessary. Only the initial part of this definition clearly stipulates that the resources in question are some long-term tangible assets, and the last ones have a useful lifetime of more than one year;

c) the word "extracted", which goes before the definition of the examples reserves, shows that those reserves can be categorized as mineral resources only when they are in the process of extraction (recovery). But in practice (and according to the law on mineral resources) there are also mineral resources that were identified and evaluated quantitatively and qualitatively by geological researchers, but for various reasons have not yet been included in the economic cycle. As we know, in the forest management wood is not extracted but is harvested by regeneration cuttings, conservation cuttings, trees care, hygiene etc. Therefore, the word "extracted" from the definition of mineral resources should be substituted with another word (e.g. "recovered") with a broader meaning able to correlate with all the addressed nouns, or it should be supplemented by an alternative verb to refer to the noun "timber".

CONCLUSIONS

As a result of the made researches we can report the following conclusions:

1.Exploration and exploitation costs of mineral resources incurred before exploitation as well as interest payments (loan expenses) should be reflected at the increase of the value of mineral resources. There will be two possible alternatives:

• to determine the amount of mineral resources estimated by specialists in the size of consumptions of land uncovering recognizing these resources in the composition of long-term tangible assets and the right to extraction in the composition of the intangible assets;

• to recognize the right to mineral resources extraction in the composition of intangible assets without recording these resources, consumption of land uncovering being reflected as prepaid expenses.

2.Forest areas established on private terrains and water bodies established by oneself or

under contract are not to be qualified as mineral resources but as assets as they represent the goods derived from labour.

3.Since the land in the Republic of Moldova is the most important and valuable mineral resource, the decision to reflect them in a synthetic account is not successful. They are to be registered in some distinct sub-account opened in the assets account 125 "Mineral resources".

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CONTRIBUTION OF THE ROMANIAN AGRICULTURE TO THE ECONOMIC RESILIENCE – EVIDENCE DURING THE RECENT CRISIS

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Abstract

In a country in which about one third of employed population working in agriculture, this paper aim was to evaluate the place and role of the primary sector in Romania's economy resistance in the face of major economic crisis. The economic resilience was investigated in territorial perspective, at NUTS 3 level – the 42 counties of Romania. During the last financial crisis, agriculture was operating as a system with high economic stability and has helped the speed up of recovery process of economic losses generated by crisis. Romania's agriculture is a system with relatively high resilience to shocks and at the same time a supplier of economic and social resilience for the entire economy.

Key words**:** *agriculture, economic resilience, Romania*

INTRODUCTION

Given the importance of the primary sector (agriculture) in the Romanian economy and for the rural life, an analysis of this branch is developed in this paper, from the perspective of its contribution to Romania's economic resilience.

The *resilience* concept has its origins in the Latin language, where "resiliere" means *bounce back* or *rebound*. In this context, the economic resilience can be understood as the ability of an economic activity to fast recover from a shock, resistance to the shock effects, the capacity to avoid shocks in general (*firewall* or *shock-absorption*) [6]. In the Briguglio vision, the economic resilience means identifying the ways and manners of solving the issues related to increasing the capacity of averting or recovering the negative effects of external shocks [2].

The objective of this study has in view the analysis of agriculture capacity to actively contribute to the diminution of vulnerabilities and of Romania's economy exposure to the shocks induced by major economic crises, such as the last global financial crisis (from the period 2008-2012) which also affected our country. Agriculture's role as economic resilience factor in Romania is analysed from the perspective of primary sector contribution to shock attenuation and to the recovery from the last financial crisis that began in 2008.

MATERIALS AND METHODS

For a better interpretation of the place and role of the primary sector in Romania's economy resistance in the face of major economic crises, the economic resilience is investigated in territorial perspective, at NUTS 3 level – the 42 counties of Romania. This approach has in view to reveal the territorial disparities with regard to the amplitude of the economic crisis effects, persistence of these effects and the primary sector contribution to the general economic crisis attenuation and to a faster recovery from the crisis. The analysis across countries provides a better orientation of the intervention needs through public economic restructuring policies in these areas that feature a higher economic vulnerability to crises and a lower capacity to recover from shock [1]. The analytical approach of an economic sector in the territory – agriculture – has in view to identify those areas from Romania in which the primary sector represented a stability factor throughout the

economic crisis, while supplying the resources for economic growth relaunching after the recession period. Thus, agriculture in these areas has proved its capacity to be a territorial economic resilience factor.

The present study was developed having in view the following parameters:

- *recovery time of the gross domestic product (GDP) decline at county level*, which expresses the capacity to recover after the external shocks of the economies of the counties from Romania, hence the economic resilience of the county economic systems (dependent variable);
- *turnover variation in the primary sector*, on one hand, and the *secondary and tertiary sectors*, on the other hand, so as to capture whether and to what extent agriculture has contributed to shock attenuation and recovery from the crisis, in the territory (independent variables). *The turnover of active enterprises* is an important predictor of the development level of a given economy, regardless of the territorial aggregation level – national, regional, at county level, etc. Turnover evolution in time decisively conditions the trajectory of the economy on the economic curb cycle;
- *variation of the employed population volume during the stages of the recent economic-financial crisis* (strong decline: 2008-2010; recovery from the crisis: since 2010-2014*),* investigated on a comparative basis between the primary sector and the remaining national economy. This indicator reflects agriculture importance as supplier of social security and stability as well as agriculture role in the diminution of the impact of shocks generated by the economic contraction in the rest of the economy.

In order to test the research hypothesis previously mentioned, we appreciate that the analysis of the turnover structure by activity sectors and mainly of its evolution in time allow us to test the primary sector contribution to Romania's economic relaunching after the economic crisis. The disaggregation of these indicators at territorial level can provide significant information on the relation between the economic relaunching and agriculture.

The method used was the multiple linear regression. We shall next consider the counties as functionally integrated sub-systems from the economic and social point of view. The statistical data used in the analysis cover the period from the beginning of the crisis up to the recovery of economic performance gaps caused by the crisis and are collected at the level of administrative-territorial units at county level.

RESULTS AND DISCUSSIONS

Recent financial crisis in Romania

The recent financial crisis produced its effects on the Romanian economy, mainly after the year 2008, its implications being revealed by the gross domestic product contraction by 6.6% in 2009 compared to 2008. The economic decline continued throughout the next year, GDP value in the year 2010 reaching 92.4% of its value in the year when the crisis began (Fig. 1).

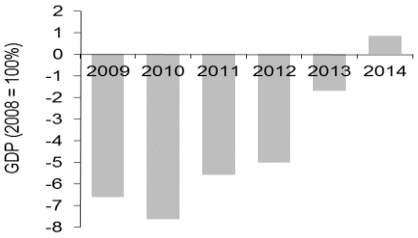


Fig. 1. GDP evolution in Romania in the period 2009-2014
Source: NIS data – TEMPO database. [5]

The statistical data reveal that since 2011, Romania's economy has followed a slightly ascending trend, 2014 being the moment of the full recovery of losses generated by the economic crisis. In the territory, both the incidence of the economic depression and the recovery of the GDP level of 2008 features significant disparities, certain counties being more affected by the crisis than others, while their capacity to surmount the crisis has been significantly different (Fig. 2). Ordering the 42 counties by the average annual GDP rate in the period 2008-2014 reveals that 23 of the economies of counties placed on the left side of the figure below have low resilience, being unable to recover the GDP losses from the crisis period. Furthermore, some of these

counties (Vâlcea, Cluj, Mehedinți, Brăila) had even a stronger economic decline in 2014 compared to 2010, considered as the peak of the crisis period.

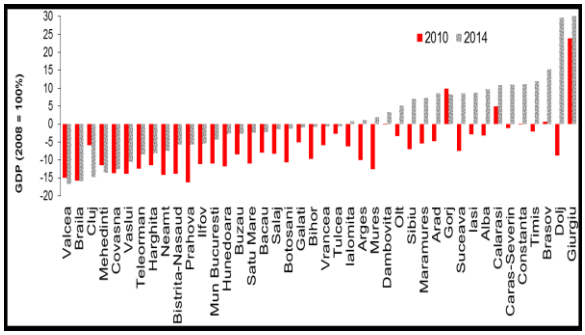


Fig. 2. GDP variation across counties during the financial crisis

Source: own calculations based on NIS and NCP data. [4, 5]

In the same period, the other 19 counties (placed on the right side into the figure 2) are recovered already from the decline caused by the crisis, hence being considered systems with relatively high economic resilience [6].

The analysis of statistical data by counties reveals the existence of a statistically significant correlation between the intensity of the economic decline induced by the financial crisis (county GDP variation in 2010 compared to 2008) and the capacity to return to the GDP level of 2008. Thus, at the level of counties where the crisis had lower effects, and hence they proved to be more resistant to external shocks, GDP contraction was recovered faster.

Both in newspapers and at academic level is has been acknowledged that agriculture represented a national economic branch with lever effect, significantly contributing to counterbalancing the economic crisis effects upon the entire Romanian economy. We shall next try to test the trustworthiness of these statements that we consider as hypotheses for this part of our study.

Romanian agriculture - an overview

Farm structure in Romania is dominated by the small farms (Fig. 3). According to the data from the last Agricultural census, in the year 2010, the Romanian holdings with a standard output under 8000 euro counts for 97% of total number of holdings and operates 42% from Romanian Utilised Agricultural Area (UAA).

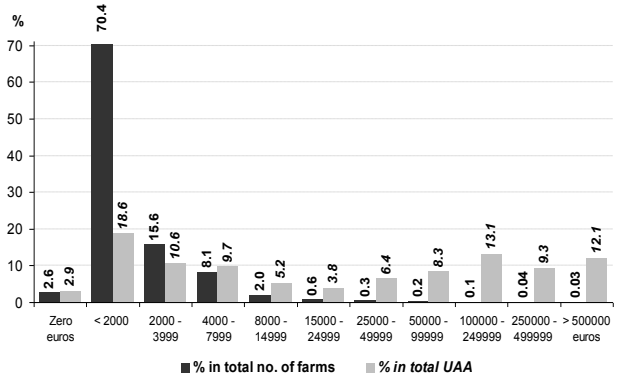


Fig. 3. Farm structure in Romania according to the Standard Output (SO)

Source: own determination based on EUROSTAT data. [3]

Despite of this unbalanced structure of holdings, the *economic performance* seems to be *higher for the subsistence and semi-subsistence Romanian farms than that obtained on the large-sized farms* on the basis of their production diversification. The statistical data of the last agricultural census 2010 and the Structural survey from 2013 reveals that the small-sized farms in Romania have the highest economic performance.

Thus, at the level of farms whose standard value of annual economic output is lower than 2000 euro, the Standard Output per one-hectare Utilised Agricultural Area (SO/1 ha UAA) value is getting closer to the national average. The Romanian farms whose value of annual standard output ranges from 2,000 to 8,000 euro (considered semi-subsistence farms) obtain the highest performance levels per unit of utilised area compared to the farms from the other size categories (Fig. 4).

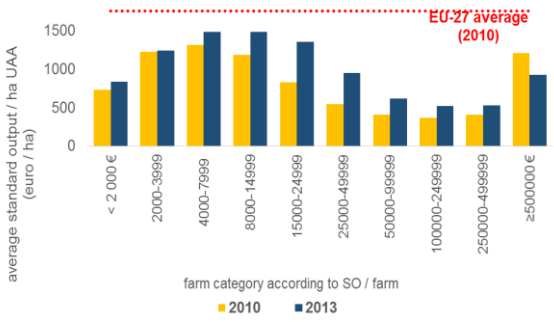


Fig. 4. Disparities in farm performance in Romania according to their economic dimension

Source: own determination based on EUROSTAT data. [3]

For the large farms (with agricultural productions whose standard economic value

exceeds 500000 euro annually), the economic efficiency of land use decreased in 2013 compared to 2010; it is, in fact, the only category of farms that recorded such a trend between 2010 and 2013. Therefore, we believe that the large farms have achieved the maximum in the economy of scale paradigm and their economic performance is likely to decrease in the coming period.

Agriculture as resilience factor in Romania

The analysis of the statistical data on the turnover structure of local active units at national level reveals that throughout the last economic-financial crisis, the contribution of the primary sector of the Romanian economy to total revenues from sales of goods, execution of works and from services significantly increased. Thus, while in the first year of the economic crisis agriculture represented only 1.22% of the total turnover of enterprises from Romania, by the year 2012 this share increased to 2.55% (Table 1). The contribution of the secondary and tertiary sectors to total turnover simultaneously decreased.

Table 1. Turnover structure on local units, by national economy branches, 2008-2012 (%)

National economy branches	2008	2009	2010	2011	2012
Agriculture, hunting and related services	1.22	1.60	1.74	2.33	2.55
Sylviculture and forest operation	0.28	0.33	0.36	0.37	0.38
Fisheries and aquaculture	0.02	0.04	0.02	0.02	0.02
Total industry, constructions, trade and other services	98.47	98.02	97.89	97.29	97.06

Source: Own calculation based on NIS, TEMPO online database. [5]

In real terms, these data reveal that throughout the economic crisis, Romania's economic decline was mainly determined by turnover contraction in the secondary and tertiary sectors, while agriculture seems to have had a counterbalancing effect to the economic decline produced by industry, constructions and services.

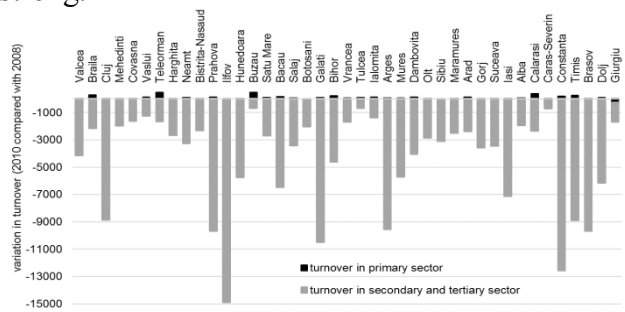
The analysis of available statistical data across counties, referring to turnover variation as against the moment of economic crisis beginning, reveals how the main economic sectors impact GDP evolution. The multiple linear regression model (Annex 1) reveals that GDP variation across counties (as dependent variable), throughout the economic crisis period, is directly linked to turnover evolution (independent variable) from the secondary and tertiary sectors, with agriculture having a partial compensation effect for the economic system contraction at county level.

Thus, while in the peak year of economic crisis, i.e. 2010 and throughout the decline recovery period (the last year for which there are available statistical data at county level – 2012), the turnover of active enterprises in agriculture, hunting and related services was net superior to that in 2008, for all the counties of Romania, except for Gorj county. The average yearly turnover growth rate in the primary sector reached 20.5% in the period 2008-2012; only one county had a negative growth rate (Gorj), while in only six counties the turnover in agriculture increased by less than 10%. For the remaining 35 counties, the average value of transactions with agricultural goods and services increased by 10 up to 50 %. Hence, the analysis across counties reconfirms that agriculture had a positive contribution to national economy, counteracting the negative effects of economic crisis.

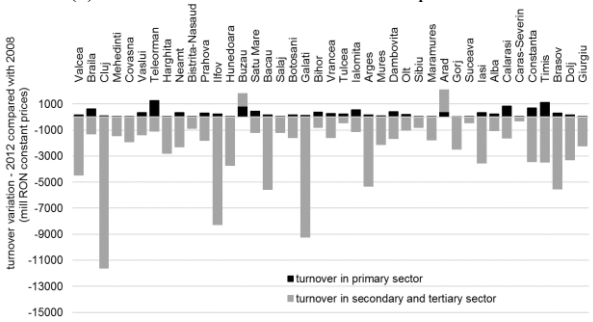
On the other hand, the secondary and tertiary sectors, which had the greatest contribution to the creation of turnover at national level, in the year 2013 (last year for which data are available) continued to have values of sales of goods and services lower than those in the year when the crisis began, for most counties. In the period 2008-2013, the average yearly turnover growth rate, cumulated for the secondary and tertiary sectors, was negative (-5%). Across counties, only one of the 42 counties of Romania had a positive average yearly turnover growth rate in industry, constructions and services (Arad); for half of the number of counties, the yearly decrease rates of turnover in the secondary and tertiary sectors ranged from -5% to - 15%.

The statistical data by counties reveal that in the peak year of the economic crisis (2010), while the active enterprises in the secondary and tertiary sectors restrained their activity in all counties, the turnover of active enterprises in the primary sector stagnated or slightly increased in all the administrative-territorial units of the country (Fig. 5a). Thus, the resilience to crisis of the active economic operators in agriculture proved to be quite

strong.



(a) turnover variation in 2010 compared to 2008



(b) turnover variation in 2012 compared to 2008

Fig. 5. Turnover variation of local active enterprises, by counties

Source: own determinations based on NIS data (TEMPO on-line and eDEMOS databases). [5]

While the active enterprises in industry, constructions and services are still recovering from the efficiency losses from the period 2009 – 2010, the primary sector continues to improve its capacity to produce economic value and its contribution to GDP recovery at county level. The graphic illustration of turnover variation on local active enterprises by economic sectors, for the year 2012, more clearly reveals the capacity of economic operators from the primary sector to follow a growth trajectory that can also mobilize the other economic sectors to which they provide raw materials.

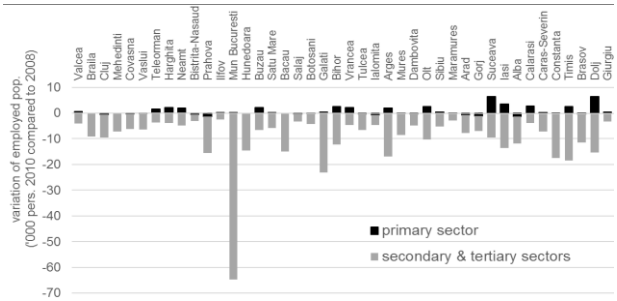
The primary sector followed a stronger ascending trend in the counties with greater economic resilience (the 19 counties that recovered the GDP losses before 2014, which resulted from the financial crisis, and are found on the right side of the graphic illustration from Fig. 5). It is worth mentioning that for the other counties, with lower economic resilience, agriculture represents the sector where turnover increased, compared to the remaining business segments whose turnover contracted. This reveals agriculture contribution to the improvement of macro-economic parameters of the economic systems at county level.

Turnover increase in the primary sector of the Romanian economy is associated with the increase of the agricultural production insertion on the market. Thus, the share of the value of marketed agricultural products and services in total production value of agriculture practically doubled in the economic crisis period, increasing from about 17% in 2008 to 38% in 2012 nationwide.

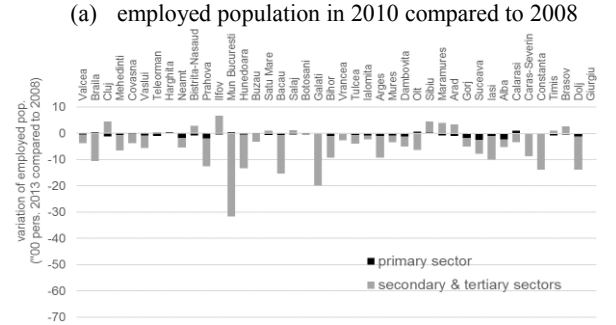
Completing the turnover evolution analysis with the analysis of employed population makes it possible to get an overall vision of the economic recession impact on Romania's counties and on their resilience to crisis. In this context, agriculture represented a high resilience system, not only from the perspective of its contribution to turnover, but also by the stability of jobs provided to active population. Thus, while per total economic sectors, the volume of employed population decreased by 6.1% in 2010 compared to 2008, the population employed in agriculture increased by 1.4%. The active population's return to the primary sector is associated to an economic regress by most analysts. Yet, from social resilience perspective, the capacity of the primary sector to absorb the labour force surplus released from other sectors is represented as a stabilization factor of the economic system, while contributing to the settling down of the potential conflicts emerging from the lack of occupational opportunities. The descending occupational mobility, from the secondary and tertiary sectors towards agriculture, continued until 2012, while in 2013, with the recovery signals from industry, the occupational mobility trend was reversed. However, the total volume of employed population in 2013 remained by 2.5% under its level in 2008, due to labour market contraction in the processing industry and constructions [6].

Under the economic crisis impact, in the period 2008-2010, in the counties with high economic resilience, from the right side of graph from Fig. 6a, one can find a more significant labour transfer from the secondary and tertiary sectors, towards the primary sector. At the same time, in these counties, the

faster economic recovery was due to labour rationalization from industry, constructions and the sector of services, which was more intense than in the counties with lower economic resilience, from the left side of graph. The adaptive response of the active population, materialized into the descending occupational mobility during the crisis, enabled a faster recovery of the economic systems at county level, which was followed, after 2010, by the labour force demand increase in the secondary and tertiary sectors.



(a) employed population in 2010 compared to 2008



(b) employed population in 2013 compared to 2008

Fig. 6. Evolution of employed population by activity sectors and counties
Source: own determinations based on NIS data, TEMPO on-line database. [5]

In the economic redressing period, 2011-2013, although the counties with economic resilience recovered the GDP loss generated by crisis, the increase of labour force supply in the secondary and tertiary sectors did not follow the same rate as GDP rate, the number of employed persons being lower than that in the year 2008 in 15 of the 19 counties (on the right side of Fig. 6b), which recovered from the decline produced by crisis.
Among the other 23 counties with low economic resilience, only three provided favourable conditions for the increase of the employed population volume, the labour transfer from the primary sector towards the other economic branches having a much lower incidence in these counties compared to the counties with high economic resilience.

Table 2. Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.496[a]	.246	.207	1.52840	.246	6.366	2	39	.004

a. Predictors: (Constant), average yearly growth rate of turnover for the active enterprises in primary sector (agriculture, hunting and related services) -TurnAgi; average yearly growth rate of turnover for the active enterprises in secondary and tertiary sectors (industry, constructions, trade and other services) – TurnOther
b. Dependent Variable: GDP's average yearly growth rate

ANOVA[b]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	29.743	2	14.872	6.366	.004[a]
	Residual	91.104	39	2.336		
	Total	120.847	41			

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	2.026	.598		3.389	.002	.817	3.236
	TurnAgri	.227	.072	.444	3.166	.003	.082	.372
	TurnOther	-.035	.017	-.290	-2.067	.045	-.070	-.001

a. Dependent Variable: GDP's average yearly growth rate

CONCLUSIONS

In Romania the primary sector contribution to counterbalancing the negative effects on GDP and labour employment generated by the recent economic crisis, by increasing the turnover value in agriculture and reasserting the role of occupational outlet in the conditions of scarcity on the labour market, represent a few arguments in favour of the statement that Romania's agriculture is a system with relatively high resilience to shocks and at the same time a supplier of economic and social resilience for the entire economy.

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THE TERRITORIAL ANALYSIS OF AGRICULTURAL PRODUCTION STRUCTURE. CASE STUDY: REGION SOUTH-WEST OLTENIA

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Abstract

The harmonious development of a region depends to a significant extent by the spatial distribution of natural and human resources, to ensure a balanced land use structures and adapted to the economic needs of each area, according to the principle of sustainable development. In order to calculate and interpret the many aspects of the relationship that forms objectively between efforts and results achieved in agricultural production using a system of technical and economic indicators with which to be able to address specific systemic agriculture activities. Thus, in the research that led to the paper were analyzed technical indicators such as land fund, material and technical basis, area and crop production for conventional agriculture or economic indicators such as agricultural production value structure. They used statistical data for the period 2004-2014 recorded in the South-West Oltenia region.

Key words: *agricultural production, crops, indicator, land resources, South-West Oltenia region*

INTRODUCTION

South-West Oltenia region is located in the south-west of Romania, covering 29,212 km^2, meaning 12.25% of Romania. It has a population of 2,330,792 inhabitants and about 40% of the employed population in the region's economy is represented by population occupied in agriculture. In 2014, this region contributed by about 10% to the regional GDP. From the administrative point of view, it includes 5 counties (Dolj, Gorj, Mehedinti, Olt, Valcea) structured into 40 towns, 408 communes and 2,066 villages.

Fig. 1. Region South-West Oltenia
Source: www.google.ro

In the Southern region, cereal crops occupy large areas, especially in Olt, Dolj and Mehedinti South. In the hilly areas of Gorj and Valcea counties, orchards occupy important areas. The most cultivated fruit tree species are plum, apple, walnut, peach, apricot and fig which are specific to the warmer south and west region. In mountain areas of the north (in the Northern part of Valcea and Gorj county and the Western part of Mehedinti county) instead of crops are replaced by forests and mountain meadows. In Drăgăşani areas, Drăgăneşti, Segarcea, Strehaia and Dăbuleni vineyards occupy large areas. In Olt meadow area vegetable farming is practiced and in the area of Dăbuleni watermelons are grown.[4]

MATERIALS AND METHODS

To characterize the evolution of a mass phenomenon in its complexity, in terms of a time series is calculated for a system of statistical, analytical and synthetic indicators.[6] Analysis of agricultural activity

is conditioned as area and depth of the system of indicators used and the information capacity of each indicator, the indicator being a numerical expression of a phenomenon or economic process, defined in space and time, which can be characterized by absolute sizes, relative sizes, medium sizes, indices and weightings.[7]

a. Indicators expressed in absolute sizes express the investigated phenomenon condition in a time period or the changes that occurred successively in time.

1)*the individual values of the characteristic* corresponding to the specific conditions of production and reproduction of the watched phenomenon.

$$\{y_t\}t = \overline{1,T}$$

2)*the aggregate volume of the characteristic*: it must be calculated with caution since not all of the characteristics have values that can be summed.

3)*the absolute change*: express with how many units of measure changed the individual value from one period to another period chosen as a basis of comparison. Depending on the basis of comparison can be used:

- absolute changes fixed base:

$$\Delta y_{t/0} = y_t - y_0, t = \overline{1,T}$$

- absolute changes based chain:

$$\Delta y_{t/t-1} = y_t - y_{t-1}, t = \overline{1,T}$$

b. Indicators expressed in relative sizes

Unlike the absolute indicators, they can be used in the comparative analysis of the evolution of several phenomena. They play proportion or gap made of various levels of features in different periods.

Therefore, relative indicators express how many times the value of a variable is greater or smaller than the one chosen as the basis of comparison.

1) *the dynamic index*: it is expressed as a ratio or percentage and means how many times (as percent) feature value has changed compared to the comparison period basis (fixed or mobile). It is calculated based on fixed base or chain:

$$Iy_{t/0} = \frac{y_t}{y_0}, t = \overline{1,T} \qquad Ir_{t/t-1} = \frac{y_t}{y_{t-1}}, t = \overline{1,T}$$

;

2) *the changeing rythm* (increase rate) expresses whith what percent has changed its level of feature analyzed at a certain period compared to the level of the comparison period basis. Is calculated :

- as the ratio between the absolute change (based fixed or mobile) and the size of the term during basis of comparison;

-or as the difference between the dynamics index and 1 (if expressed as a coefficient) or 100 (if expressed in percentages).

- with fixed base:

$$R_{t/1} = \frac{y_t - y_1}{y_1} \cdot 100$$

- based chain:

$$R_{t/t-1} = \frac{y_t - y_{t-1}}{y_{t-1}} \cdot 100$$

A particular issue for calculation of relative and absolute indicators is the selection of the comparison basis term. This must be subordinated to the requirement for more comparable terms of chronological series, to be requested better regularity of movement while the phenomenon analyzed.

c. Indicators expressed by the average sizes

To characterize the central tendency in the time series of absolute and relative terms is necessary to calculate specific indicators: the average level, median absolute change, the average index average rate of change dynamics and relative.

1) *the average level of terms of time series*: calculation of this indicator is justified only if the terms are homogeneous, and the horizon time series shows not very large oscillations. For the time series of intervals, the terms are summed so that average is calculated using the simple arithmetic average:

$$\bar{y} = \frac{\sum_{t=1}^{T} y_t}{T}$$

2) *the average index* is obtained as a geometric mean of indices based chain.

$$\bar{I} = T - 1\sqrt{\prod_{t=1}^{T} Iy_{t/t-1}}$$

The condition of minimum variation of absolute changes with mobile base should be more respected with absolute average change how it calculates on the basis of the relationship between the first and last term time series, without taking into account the

intermediary terms.[3],[9]

RESULTS AND DISCUSSIONS

Situation land fund.

Land fund represents all lands no matter of destination, of the title based on which they are owned or of public or private sector to which they belong.

Agricultural area includes, by use, the lands with agricultural destination, owned by natural or legal persons, classified as follows: arable land, natural pastures and hayfields, vineyards and vine nurseries, orchards and tree nurseries.

Table 1. The evolution of land use categories

Use category	Property form	2004*		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
		Absolute values	%										
Total	Total	2,921,169	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Private	1,807,794	0.0	0.3	0.7	1.0	1.6	2.0	1.6	-0.8	-0.2	0.2	0.4
Agricultural area	Total	1,741,356	0.0	-0.1	-0.2	-0.3	-0.3	-0.3	-0.5	-0.6	-0.7	-0.7	-0.6
	Private	1,256,067	0.0	-0.1	-0.6	-0.4	-0.4	-0.7	-0.7	-3.6	-3.8	-3.8	-3.7
Arable land	Total	1,221,744	0.0	-0.1	-0.1	-0.3	-0.3	-0.3	-0.4	-0.9	-0.5	-0.4	-0.3
	Private	376,931	0.0	-0.1	-0.6	-0.3	-0.4	-0.7	-0.5	-1.7	-1.4	-1.4	-1.3
Pastures	Total	354,688	0.0	0.2	0.1	0.9	0.8	0.6	0.6	0.1	0.3	0.4	0.3
	Private	87,392	0.0	0.1	-0.3	0.4	0.3	0.3	-0.1	-10.1	-9.9	-9.9	-9.7
Hayfields	Total	86,001	0.0	0.7	0.3	0.7	0.7	0.7	0.1	10.8	1.9	2.1	2.0
	Private	40,286	0.0	0.7	0.1	0.5	0.6	0.6	-0.2	0.6	-8.4	-7.8	-7.8
Vineyards and nurseries	Total	37,615	0.0	-1.6	-2.4	-3.8	-2.8	-2.5	-2.1	-5.0	-5.8	-5.6	-5.7
	Private	47,118	0.0	-1.8	-2.8	-3.8	-2.7	-2.9	-2.0	-5.3	-5.4	-5.3	-5.5
Orchards and tree nurseries	Total	41,308	0.0	-1.6	-4.6	-9.2	-8.4	-8.6	-10.8	-14.2	-15.3	-15.6	-15.7
	Private	1,113,375	0.0	-1.8	-5.0	-9.2	-8.3	-8.5	-10.9	-12.7	-13.6	-13.7	-13.7
Total non-agricultural land	Total	372,935	0.0	0.1	0.3	0.5	0.4	0.5	0.8	0.9	1.2	1.1	1.0
	Private	858,458	0.0	2.2	6.6	7.5	11.2	14.3	12.4	12.6	17.0	18.9	19.5
Forests and other forest vegetation lands	Total	265,526	0.0	0.0	0.2	0.2	0.2	0.3	0.4	1.6	0.6	0.4	0.2
	Private	72,696	0.0	2.9	8.8	9.4	14.0	18.0	15.1	15.1	20.0	21.8	22.2
Waters and ponds	Total	8,485	0.0	0.4	0.4	0.9	0.8	0.4	2.8	-13.6	2.9	1.3	2.3
	Private	86,987	0.0	2.1	2.4	5.3	5.6	6.3	6.3	6.3	20.2	18.8	28.3
Construction	Total	64,747	0.0	0.5	0.4	1.1	1.0	1.5	1.3	1.8	1.7	2.2	1.1
	Private	47,304	0.0	0.9	0.9	2.1	4.1	5.2	5.2	4.2	5.3	6.8	6.4
Roads and railways	Total	6,838	0.0	0.3	0.2	0.9	1.0	0.2	-0.2	-0.1	-0.5	-1.3	-0.4
	Private	47,930	0.0	-7.2	-5.2	-1.8	-0.1	3.0	-0.2	-1.0	14.2	13.3	10.7
Degraded and unproductive lands	Total	27,339	0.0	0.1	0.7	2.1	1.6	3.3	5.2	9.4	9.7	12.6	13.8
	Private	2,921,169	0.0	1.4	2.5	4.8	5.4	4.8	8.0	14.0	15.7	20.0	23.6

Source*:* Calculations based on data series TEMPO-ONLINE, years 2004-2014, INS * 2004 = 100

Analyzing the structure of land fund by use was found that both agricultural area and the arable had a negative trend (in that order, of (-0.6%) respectively (0.3%)), both the total and in the private sector (table 1).

Significant changes occurred in terms of surface area occupied by pastures and meadows (which increased by around 0.3% and 2% respectively in 2014 compared to 2004). Reductions of surfaces in 2014 compared to 2004, vines and vine nurseries were registered (-5.7%) and orchards and nurseries (-15.7%). This decrease can be attributed to several factors, including the aging of existing plantations and lack of financial resources in the establishment of new plantations. Noted the increase in private sector non-agricultural areas (from + 2.2% in 2005 to + 19.5% in 2014) and land degraded and unproductive (from + 1.4% in 2005 compared to 2004 to + 23.6% in 2014 compared to 2004), as shown in figure 2.

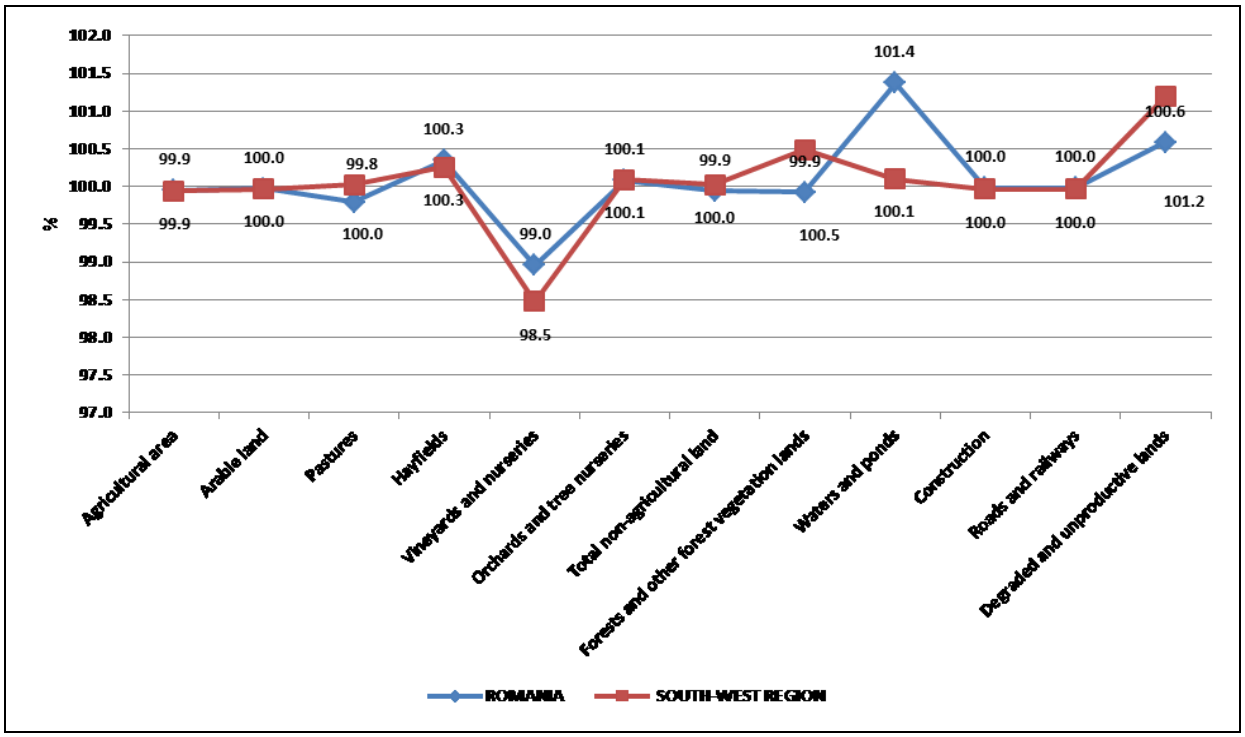

Fig. 2. Total land fund - the average rate of growth, 2004- 2014 (%)

The categories of land that have negative annual rates of growth are: agricultural area (-0.06%/ year), arable land (-0.03%/year), vineyards and vine nurseries (1.69%/year). Rhythms pastures register positive growth (+0.03%/year), meadows (+0.2%/ year), areas occupied by ponds (+1.11%/year), degraded and unproductive (+1.3%/year), etc.

Moreover, the South-West Oltenia region ranks 2 as the area occupied by vineyards and vine nurseries, with 18.10% (38,261 ha) in total national vineyard surfaces and the area covered with trees and nurseries with 20.60% (40,410 ha) of the total national surface of fruit. In addition, 872,08 ha (12.83%) of the total 6,800,872 hectares of forests, with how much Romania has, are located in the Oltenia region, occupying the 5th place among regions.[10]

Table 2. Park of tractors and agricultural machinery

Categories of equipment	2004*		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
	Absolute values	%										
Physical agricultural tractors	21,777	0.0	1.7	2.6	1.3	0.8	3.8	7.0	8.5	8.1	14.2	16.2
Tractor-drawn ploughs	18,932	0.0	-1.9	0.5	-0.4	-0.6	-1.0	0.8	5.8	9.6	7.7	8.0
Mechanical cultivators	3,582	0.0	0.9	0.7	0.6	0.2	-2.8	-2.9	-2.8	-9.9	-8.5	-9.7
Mechanical seeders	10,930	0.0	2.0	4.5	2.7	2.3	2.7	4.3	6.5	8.1	10.4	17.0
Mechanical sprayers and dusters	421	0.0	-34.2	-36.6	-51.5	-58.0	-24.9	-30.9	-28.0	-46.1	-41.3	-49.9
Self-propelled combines for cereals harvesting	4,335	0.0	3.9	5.5	0.4	-0.8	-0.1	-0.8	2.2	-2.6	3.0	-12.8
Self-propelled combines for fodder harvesting	46	0.0	-4.3	-2.2	-2.2	-8.7	-28.3	-30.4	-23.9	-54.3	-45.7	-28.3
Combines and machines for potatoes harvesting	14	0.0	-85.7	-85.7	-85.7	-78.6	-57.1	-57.1	-57.1	-71.4	-64.3	-35.7
Straw and hay packing presses	315	0.0	-2.9	-23.8	-8.3	-7.6	35.2	55.2	95.9	62.9	88.9	121.0
Vindrovers for fodder harvesting	118	0.0	20.3	11.9	9.3	5.1	-3.4	-3.4	0.0	6.8	7.6	0.8

Source: Calculations based on data series TEMPO-ONLINE, years 2004-2014, INS * 2004 = 100

Material and technical basis of agriculture. Between 2004-2014 an increase was registered in farm tractors (from 1.7% in 2005 to 16.2%), in mechanical seeders (from 2% to 17%), while starting from 2009 the bale presses occupy a significant percentage in the farming machinery endowment structure at the South West region level (from 35.2% to 121%). Rise in purchase of bale presses is due to the growing areas for grazing and hay.

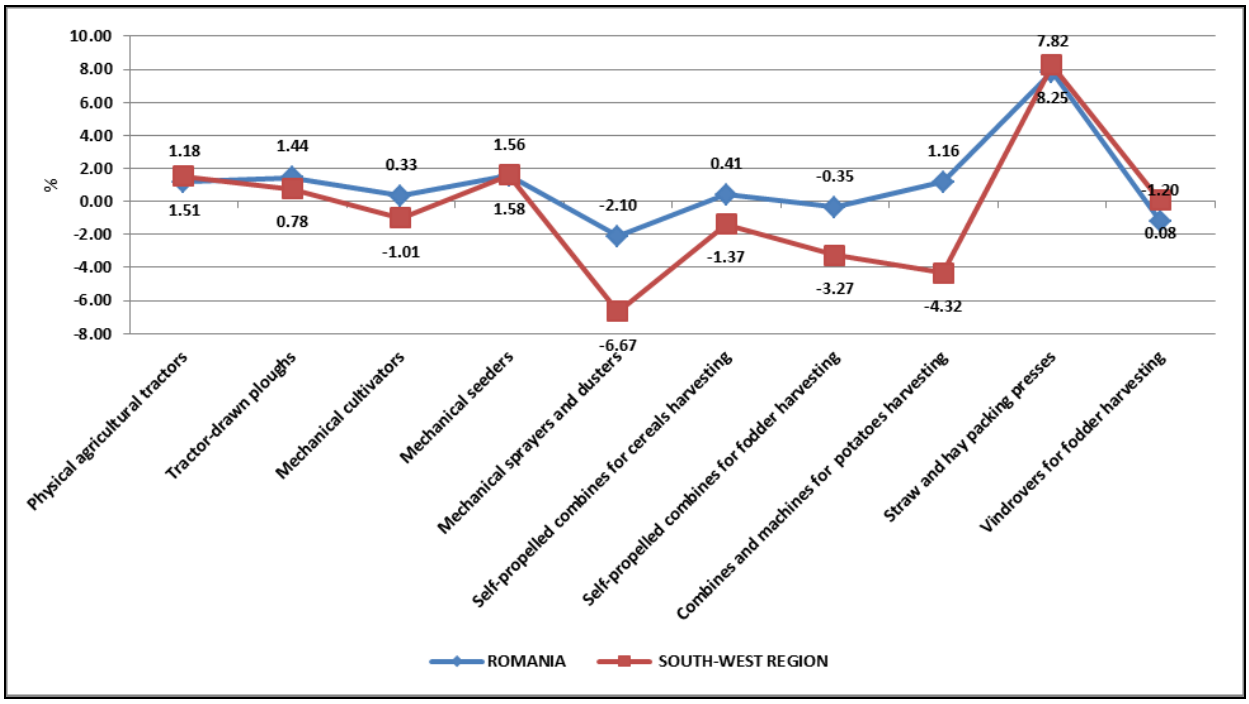

Fig. 3. Technical equipment - annual growth rate, 2004-2014 (%)
Source: Own calculation.

From the equipment point of view, in the South West region, the arable surface per tractor was 42 hectares in 2014 (compared to only 38 ha in the country) this not being an advantage in the context of escalating fragmentation of agricultural land than in other regions and in comparison with other European countries.[5]

Table 3. The loading on agricultural machines (ha/tractor/agricultural machine)

Specification	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Physical agricultural tractors	55	52	47	45	47	46	44	44	44	43	42
Tractor-drawn ploughs	63	62	56	52	55	55	54	52	50	52	52
Mechanical cultivators	334	319	293	272	288	297	294	302	322	326	328
Mechanical seeders	110	104	92	87	92	92	90	90	88	88	83
Mechanical sprayers and dusters	2,844	4,168	3,954	4,812	5,829	3,271	3,517	3,466	4,576	4,318	5,031
Self-propelled combines for cereals harvesting	231	215	189	184	189	190	174	179	187	184	216
Combines and machines for potatoes harvesting	761	8,308	8,406	3,954	6,025	3,153	3,023	3,096	3,778	2,818	1,452
Vindrovers for fodder harvesting	277	288	365	305	302	207	179	157	174	150	128

Source: Calculations based on data series TEMPO-ONLINE, years 2004-2014, INS

The situation crop production

In the South-West Oltenia region the natural resources constitutes, along with agricultural resources, an undeniable potential that cannot be delocalized, but which is showing different degrees of vulnerability to climate change and environmental issues.[1] Soil fertility is affected to a greater or lesser extent by different harmful causes such as: erosion, low

content of humus, compaction, acidity, salinity, excessive texture (sand or clay) deficiency or excess of water and nutrients, chemical pollution.[2]

Table 4. Areas planted with main crops plant

Specification	2004*		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
	Absolute values (ha)	%										
GRAIN	1,000,706	0.0	-3.4	-13.8	-19.9	-18.8	-17.6	-25.3	-20.9	-21.2	-18.1	-18.4
Wheat	492,590	0.0	7.1	-5.9	-20.0	-23.0	-22.5	-18.0	-28.9	-36.8	-21.4	-22.4
Barley and two-row barley	25,266	0.0	59.1	11.0	-1.2	-6.9	29.1	40.0	-2.4	11.8	63.8	74.0
Maize	458,731	0.0	-18.2	-24.1	-22.6	-16.7	-16.7	-39.7	-15.8	-9.7	-24.4	-23.9
Rice	0	0.0	0.0	0.0	0.0	184.2	462.0	516.5	472.9	207.5	-90.7	192.0
Oleaginous	103,403	0.0	-27.0	-20.4	-7.0	11.1	2.2	51.3	34.4	27.6	43.3	41.7
Sunflower	90,617	0.0	-23.0	-18.5	-25.3	-11.4	-24.5	1.6	13.0	27.4	45.9	36.2
Rapeseed	4,445	0.0	0.7	50.6	513.5	641.0	700.8	1326.2	715.0	249.6	239.5	381.8
Soybeans	5,901	0.0	-80.9	-77.3	-84.9	-95.6	-99.4	-97.4	-99.0	-97.3	-98.6	-95.3
Sugar beet	351	0.0	122.5	355.3	-26.8	-100.0	-100.0	-100.0	-100.0	-97.2	-100.0	-84.6
Potatoes- total	10,659	0.0	55.9	57.7	-25.8	69.6	77.5	70.1	74.2	41.8	32.2	22.6
Textile plants	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tobacco	2,236	0.0	-34.1	-84.2	-81.3	-83.1	-100.0	-99.1	-94.0	-92.8	-93.6	-93.9

Source*:* Calculations based on data series TEMPO-ONLINE, years 2004-2014, INS * 2004 = 100

The analysis of the cultivated areas revealed that the surfaces used for a large number of vegetable crops decreased, with significant values for soybeans, sugar beet, tobacco, and but also for grain cereals (eg. maize and wheat). An increase in acreage was registered in the case of rapeseed, rice (except for 2013) and potato, while hemp crop cultivated area has not changed much compared to 2004, considered as a base.

Values for cultivated areas are closely related to the current state of soil quality. This is determined both by the natural conditions which the soils are in, and by the managing methods that do not always ensure the necessary arrangements, the proper way of use, a full and correct implementation of the most appropriate zonal agricultural systems and proper culture technologies.[8]

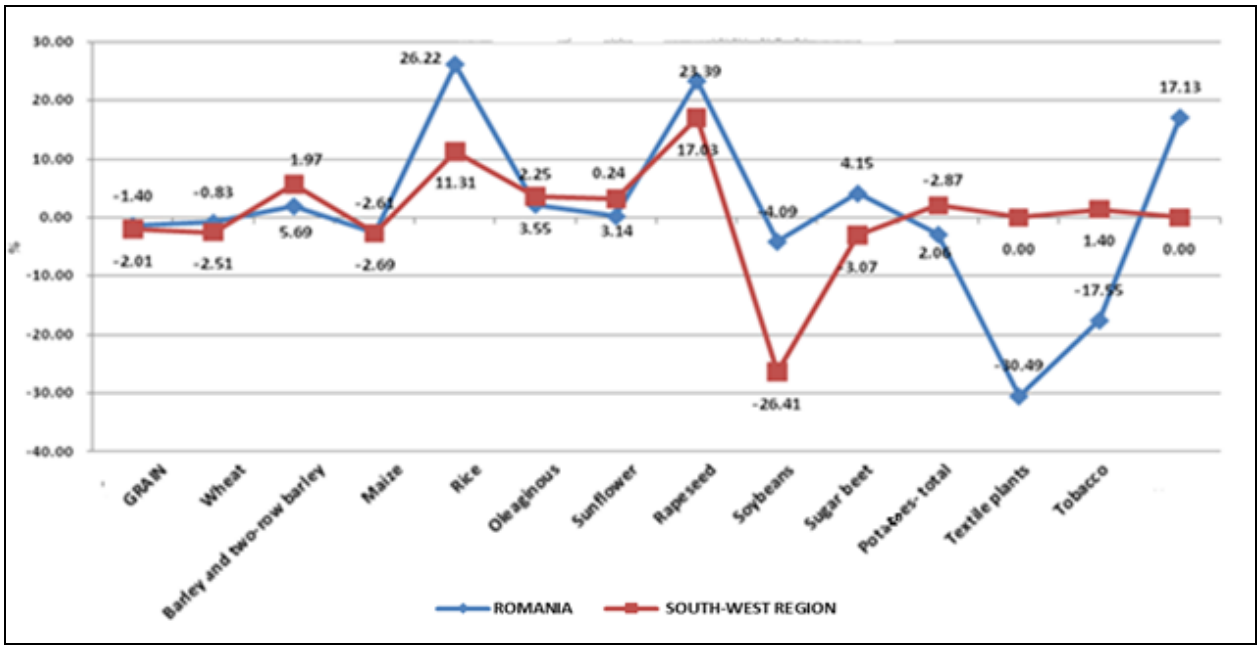

Fig. 4. Dynamics of the vegetable crop areas, 2004-2014 (%)
Source: Own calculation.

The value of crop production has a relevant share in the structure of agricultural production value, ranging from 64.2% (due to floods) in 2005 to 74.9% in 2013 (due to higher yields obtained).

Table 5. Average crop production

Specification	2004*		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
	Absolute values (to)	%										
GRAIN	3,719	0.0	-10.2	-23.7	-77.6	-21.7	-15.5	-15.6	-3.7	-49.5	-8.8	-4.3
Wheat	3,308	0.0	-10.8	-27.6	-76.1	-7.7	-21.2	-25.1	-2.7	-27.6	-14.4	-3.4
Barley and two-row barley	3,536	0.0	-26.2	-39.1	-79.5	-19.5	-22.3	-29.0	-20.2	-37.4	-27.4	-13.4
Maize	4,231	0.0	-4.4	-15.9	-79.0	-32.8	-10.2	1.7	-4.0	-65.5	0.6	-2.2
Rice	0	0.0	0.0	0.0	0.0	82.6	106.3	52.8	95.5	54.8	-34.9	49.0
Oleaginous	2,987	0.0	82.6	106.3	52.8	95.5	54.8	-34.9	49.0	0.0	82.6	106.3
Sunflower	1,014	0.0	60.4	36.5	-33.8	78.3	40.1	69.8	65.8	28.9	25.2	137.2
Rapeseed	1,788	0.0	76.6	-39.1	-86.1	-18.6	-50.7	-13.3	5.3	-70.5	0.0	16.7
Soybeans	15,325	0.0	102.0	32.2	-31.6	-100.0	-100.0	-100.0	-100.0	-32.1	-100.0	-47.3
Sugar beet	14,050	0.0	-21.1	-19.3	-20.0	-20.7	3.4	-1.7	-3.2	-23.1	-4.5	-5.2
Potatoes- total	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Textile plants	1,220	0.0	-25.6	-10.6	-56.9	46.8	-100.0	2.5	21.1	-65.1	-24.3	-15.0
Tobacco	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Calculations based on data series TEMPO-ONLINE, years 2004-2014, INS * 2004 = 100

Table 5 presents the changes in the average yields values of the main vegetable crops in the South-West Oltenia region corresponding to time frame 2005 to 2014 compared with 2004 which considered as a basis. Oilseeds and sunflower showed significant increases of production values, in counterbalances with cereals, soybeans and textile plants which still display a relative increase in 2014.

About potato and tobacco it can be said that there were no changes in production values, these values being superior to the national values, as it can be seen in figure 5.

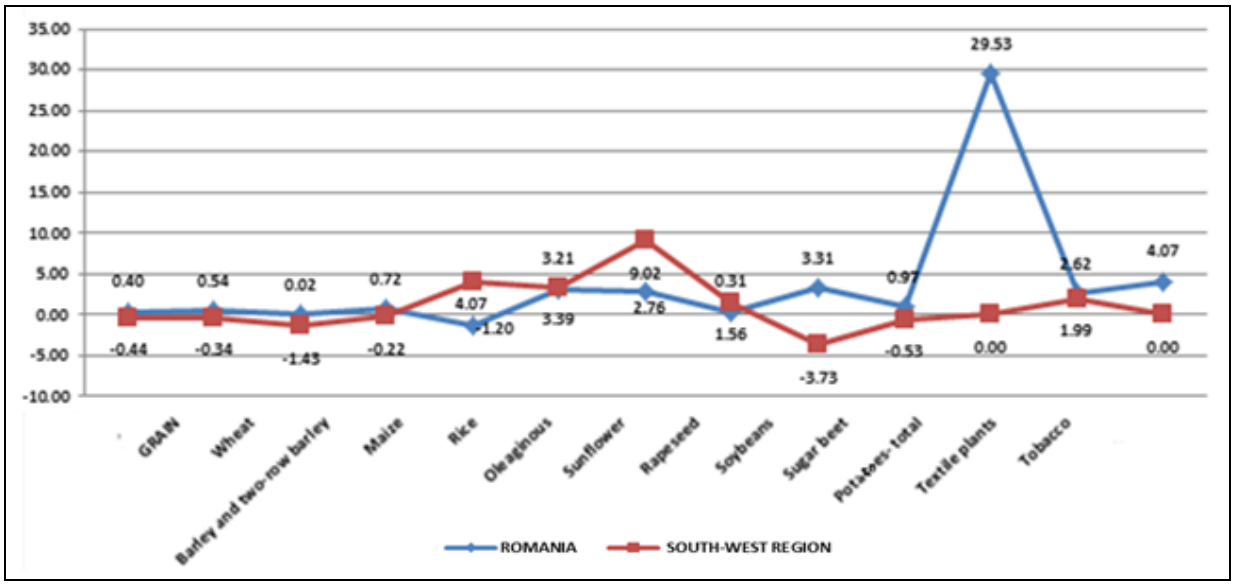

Fig. 5. The average annual production at the main vegetable crops - annual growth pace, 2004-2014 (%)
Source: Own calculation.

CONCLUSIONS

The rural economy of South-West Oltenia, almost totally dependent on agriculture, has become a "subsistence economy", her only role is to provide basic necessities for most of the population.

It is a rural area with a high share of employment in agriculture and low profitability of farming activities due to land fragmentation, small productive units, low mechanization etc. The current state of soil quality is determined both by the natural conditions which the soils are in, and by the managing methods that do not always ensure the necessary arrangements, the proper way of use, a full and correct implementation of the most appropriate zonal agricultural systems and proper culture technologies.

Regarding agricultural area, the South-West

Oltenia region ranks 7th among the other regions of the country (1,797,633 hectares) with 12.32% of the national agricultural area. South-West Oltenia region is the balanced agricultural type, with higher percentages of cereal and oily plant crops. The value of crop production has a relevant share in the structure of agricultural production value, ranging from 64.2% (due to floods) in 2005 to 74.9% in 2014 (due to higher yields obtained). Improvement of the agricultural production structure should meet the requirements of consumer demand and product quality. The dominant extensive character of the agricultural production is determined by the low level of factors allocated (fertilizers, irrigation, seed variety, etc.) that influence the yields and by the decrease of the areas with intensive crops (hemp, tobacco, sugar beet) in favor of cereals and oil plants which have lower yields and lower prices. The reduced level of intensification and diversification of agricultural production maintain low productivity gaps in Romania in the period 2004-2014.

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USES OF DIFFERENT TEMPERATURES TO CONTROL INSECT *Tribolium castaneum* (Herbest) AND WHAT IS THE PREFERRED OWN FOOD IN THE GRAIN STORES

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Abstract

The paper aimed to achieve a laboratory experiment in order to study the type of food favorite by the insect Tribolium castaneum (Herbest), a rusted flour beetle, and the impact of different temperatures at various stages of its life in a university laboratory in Baghdad. The study showed that the favorite food of the rusted flour beetle is flour or grain dust as well as rice, barley, millet and cowpea, but it does not prefer the lentils. This beetle feed is based on grain which has been already hit by one of the primary insects or grain or break the material and fine grains dust while unable the hatched larvae of some insects such as grain beetle (ryzaephilus surinamensis) and beetle (Trogoderma granarium) to produce grain injury. But the older larvae can and start feeding the fetus. The correlation between the degree of the outside air temperature and the degree of grain mass temperature is weak. If the air temperature is at the freezing point, the heat from the interior of grains does not reach such a degree. The optimum temperature for most of stored grain pests ranges between 25-30 C°. Below 20° C, the activity of the insect becomes weak, resulting the decline in egg-laying rate and prolongation of spawns, and the length of the larval stage, and the process of the Virgin, and the duration of generation and thus the lack of the number of generations, and the lowering of the numerical density. Exposed at 5C° for a longer period of time, most of the pests of stores die. At 35C°, the multiplication of many pests of the stores, the shortage of the egg laying, and the life of the insects are affected. But, the beetle (Trogoderma granarium) can live at higher temperatures than the one mentioned above. As a conclusion, it is preferably that grain products to be sterilized at a temperature of 60 C° for 10 minutes to kill all life stages of insects.

***Key words*:** rusted flour beetle herbest, *Tribolium castaneum, Iraq*

INTRODUCTION

Cereal is the main food for humans as wheat, barley, maize and used as a meal by mixing concentrated with some legumes, grain or other feed for animals. The area planted with grain in the world is estimated at about half of the arable land. Cereals are a source of food for humans and animals, due to their chemical composition: 70% carbohydrates and 15% fat, 0.3% fiber & minerals, and this increases the importance of grains in poor countries where cereals are considered a source of cheap calories compared to other sources [3].

Grains and materials stored could be attached during their storage by various insects that cause severe damage[2]. About 20% of crops are destroyed by pests in the post-harvest period and this percentage reaches 80 % sometimes in the Third World as reported [6]. But this percentage of the damage could reach about 40% in the countries that apply the modern techniques in storage.

The disease, insects and the jungles are the main determinants and the biggest challenge for humans who have made unremitting efforts to solve this problem in the pan-Arab nations, in the world and in Iraq, in particular. The Studies of the Arab Organization for Agricultural Development showed that the losses resulting from the injury produced by agricultural pests are around 35-50% of total production and 10-14% of injury caused by lesions stores [1].

In general, the stored food crops in general, cereals and pulses which are particularly of a great significance it is recommended as all States to maintain a strategic stock enough for several months in anticipation of the lack of adequate supplies of the annual production of

food crops due to natural disasters. The material stored exposed to damage from many insects and rodents, microorganisms, fungi, and thus they lose the luster and appearance and seem bleak and spoiled and lose their nutritional value [5].

The insects are among the most important pests of crops and materials stored around the world. They cause great quantitative and qualitative losses,and the UN Food and Agriculture Organization estimated that in 1967 global losses accounting for 10% of the stored grains, which are equivalent to 13 million tons per year in Africa. The FAO estimated the same losses in yellow corn cro and legumes as a result of injury accounting for about 20-50%.

And that the damage arising from the insects in grain is the result of the direct feeding of insects on the endosperm and embryos grain not to mention the pollution caused by their droppings and skins flayed and in addition to the increasing exposure of grain to rot because of scratches and damage and thus unpleasant odors and the rot could infect the grain delivered which can not be accepted by human and animal [3].

Tribolium castaneum (Herbest) is one of the most important insects that affect stored grain [10]. It was found in crushed infected wheat (flour), dates and dried fruits as raisins [3].

The use of chemical control of pests and insects in stores is one of the treatment methods but it causes a lot of health problems and, in addition, over time it leads to the emergence of resistant strains to these pesticides [11]. In addition, a big problem is the deposition of these pesticides in nature and the contamination of food for humans and animals [8]. Because of the losses caused by pests, regarding stored materials and crops, many studies have been expanded on pests that infect crop and food after storage to find alternative methods and means for the use of chemicals to curb the activity and the spread of insects and to reduce the damage caused by it.So recent studies have focused on this area to study the effect of some non-living environmental factors which significantly and directly affect the activity and vitality of insects regarding the temperature in stores [3].

The difficulty of the fight against these insects in their presence with food and the use of pesticides leads to the contamination of those materials pesticides hence it was necessary to search for alternatives to chemical pesticides such as the use of pesticides of plant origin to the lack of residual effects and lack of toxicity to mammals since been expanded for use in various forms such as powders and plant extracts as material proof feed or toxic or inhibitory growth or attractive or repulsive materials.

In this paper it was studied the effect of the temperature and the duration of exposure on the proportion of the loss in the beetle flour, as well as the favorite type of food of this insect[7],[9],[12]. In this purpose, Rues extracts to resistance flour beetle were used. [4].

MATERIALS AND METHODS

In this study, the following methods were used:

(i)Methods of sample collection: The collection of samples from infected stores with flour beetle.

(ii)The food sample preparation: The sample (500 g) of favorite flour as a medium diet of insects and kept in a refrigerator for 48 hours for the purpose of getting rid of morbidity or pesticides, if any. The sample was distributed in two packs per 1 kg capacity.

(iii)The aim was to study the effect of different temperatures on the loss ratios adults and larvae of insect flour beetle *Tribolium castaneum* (Herbest).

Six transactions were selected for the adult insect larvae at a rate of three replicates per treatment and each repeater which put five adults and five larvae of the Insect. Then, it was put in the Petri dishes, containing 20 g of flour and then covered with a thin cloth and tied a rubber bond allow for ventilation and does not allow for the exit of insects from the dish.

Then the container with dishes and insects is treated to various degrees of heat (35, 40, 45, 50, 55, and 60) C° during two different periods (1-2 hours) in order to know the

number of perdition and then to calculate the perdition ratio as in the following equation:
Perdition ratio % = (number of dead insects/total number of insects) x100.

RESULTS AND DISCUSSIONS

Study on the effect of different temperatures on the proportions of adults and larvae perdition of flour beetle *Tribolium castaneum* (Herbest).

Table 1 shows the results of laboratory regrading the study of the effect of different temperatures (45, 50, 55, 60). The destruction of adults and larvae of the beetle *Tribolium castaneum* after one hour was zero for all temperatures, but after two hours the time of the ratio (zero, 46, 73,100) %, respectively, and it gave the highest proportion in the degree of 60 C°. This is consistent with what was found by [2]. We can conclude from the results of Table that: (1) The rates of murder in the insect was increased as the exposure to temperature increased, the temperature of 45 C ° had the best impact on the insect, while the degree of (40,45)° C temperature failed at different periods of exposure.

Table 1. Number and percentage of losses in adults and larvae of flour beetle (*Tribolium castaneum)* during 1-2 hours of various levels of temperatures

Temperature	Number of losses in adults during 2 hours	% of losses in adults during 2 hours	Number of losses in Larvae during 2 hours	% of losses in Larvae during of 2 hours
T1= 45°C	Zero	Zero	Zero	Zero
T2= 50°C	2.33	46	2	40
T3= 55°C	3.66	73	4	80
T4= 60°C	5	100	5	100
L.s.d.	1.373		1.667	

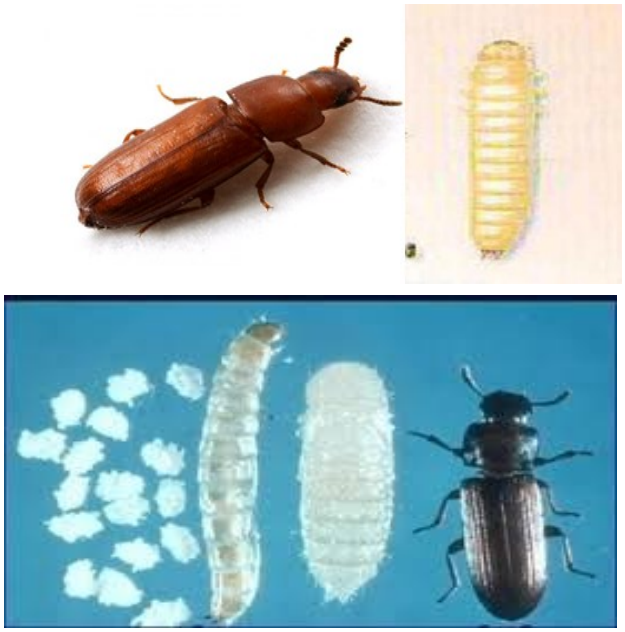
The difference of sensitivity probably goes back to the outer wall of the installation and the extent of its ability to thermal insulation and death body at high temperature. The release of protoplast also explain the high rates of killings of the insect: the mechanical opening of the respiratory stomata of the insect due to lack of oxygen, leading to increased speed of water loss from the body due to the temperature and for the lack of balance of the gas inside the body of the insect tissues followed by the rapid breathing, causing high exchange energy ATP.

Study on food preference of the adults of flour beetle *Tribolium castaneum*

Table 2 shows the preference for food of the adults of flour beetle fed on different types of grains (wheat flour, barley, rice, cowpea, millet) and was feeding ratio (18.54, 19.31, 19.35, 19.46, 19.57), respectively.

Table 2. Food preference of the adults of flour beetle *Tribolium castaneum (Herbest).*

Food Environment	Nutrition percent	Perdition ratio%
Wheat (flour)	18.54	zero
Barley	19.31	zero
Rice	19.35	zero
Cowpea	19.46	zero
Millet	19.57	zero
Lentils	zero	zero



Kingdom *: Animalia*
Phylum *: Arthropoda*
Subphylum: *Hexapoda*
Class *: Insecta*
Subclass *: Pterygota*
Infraclass: *Neoptera*
Order *: Coleoptera*
Family *: Tenebrionida*
Genus *: Tribolium*
Species ***:*** *castaneum*

Photo 1. Flour beetle *Tribolium castaneum* (Herbest).

The rate of death of insects ratio did not indicate any ratio perdition of the insect throughout the breeding period, which lasted 30 days.
On the contrary, the growth has been

observed and the evolution of the numbers of insects on those food circles during the period of education.

As for the Model Food (lentils), it was noted that it is preferable and found the percentage change in perdition insects with no loss of Model Food, which indicates a lack of insect feeding on lentils.

CONCLUSIONS

The favorite food for the flour beetle is wheat flour or grain dust as well as rice, barley, millet and cowpea but not lentils.

It was found a rare presence of flour beetle alone in the sound grain, because it is not strong enough to produce grain injury, but it feeds on grains that have already hit by one of the primary insect or break grain or article accurate and grain dust.

It failed to the newly hatched larvae of some insects, grain beetle and Khapra beetle *Trogoderma granarium* serratus, to sound grain injury, but older larvae can begin to feed the embryo.

The correlation between the outside air temperature and the degree of grain mass temperature is weak, if the air temperature reached the freezing point, the degree of grain temperature in the interior is not up to such a degree, because of the poor thermal conductivity of grain and because of the high degree of heat spots where the infected insects operate.

The optimal temperatures for most of stored grain pests ranges between 25-30 C°. A lower temperature of about 20 C° could reduce the insect activity: egg-laying rate and prolong the hatching, and the length of the larval stage, and the process of the Virgin, and the duration of generation and thus lack in the number of generations, and the lack of numbering density.

All the pests die if they are exposed to a temperature of 5C° for a long time. Also, a temperature of 35 C° is suitable for the multiplication of many pests of stores. An exception is the beetle (*Trogoderma granarium*) that can live at temperatures higher than this temperature. Most of the pests die if they are exposed for a short period at temperatures higher than 45 C°.

The optimum temperature to achieve the perdition of the insects and larvae of the flour beetle is 60C°.

Preferably grain products should be sterilized at a temperature of 60C° for 10 minutes to kill all stages of insects.

The process of larva and eggs are more resistant to smoking with smoking that is in tightly space.

Recommendations:

(i)It is recommended a temperature of 60 C° to combat the flour beetle in grain silos and stores.

(ii)The grain products must be sterilized at a temperature of 60 C ° for 10 minutes to kill all stages of insects.

(iii) The smoking process in a tightly space is frequently used after the eggs hatch and the larvae stage, because the smoke increases the effect on other stages of insects and not affect the eggs and larvae.

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