BEE HONEY PRODUCTION IN ROMANIA, 2007-2015 AND 2016-2020 FORECAST

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Abstract

The paper analyzed the situation of honey production in Romania and by micro-region of development using the empirical data provided by National Institute of Statistics for the period 2007-2015, it determine de trend lines and regression functions and set up the forecast for the period 2016-2020. In 2015, Romania had 1,392.8 thousand bee families, by 41.81 % more than in 2007. They produced 27,893 tons by 66.35 % more than in 2007 according to NIS, but according to the EU Commission Romania came on the top position with 35,000 tons honey. The contribution of the micro-regions of development to honey production is in the decreasing order the following one: South West Oltenia, Center, North East, South Muntenia, West, North West, South East and Bucharest-Ilfov. The general trend in honey production was an increasing one, as reflected by the linear regression functions, both at country level and almost all the micro-regions except Bucharest-Ilfov. In 2020, it is estimated as Romania will produce 34,400 tons based on the average growth rate of 9.06 %. To increase honey production, beekeepers should keep more than 100 bee families per apiary, apply new technologies, use modern hives, selected bee queens, assure a corresponding feeding, maintenance and health to the bee families. Honey market should be extended by a more intensive promotion of the bee products, a higher quality of honey and development of organic honey and Romanian brands. In this way, beekeepers' income and living standard will increase as well as of the rural communities where they belong to.

Key words: bee families, honey production, dispersion, territory, present and future, Romania

INTRODUCTION

Apiculture is an economic sub-branch of agriculture allowing the use of natural resources to produce honey and other bee products by means of the bee families. It is a pleasant and useful occupation, a way to stop or reduce the rural population migration to the cities, a source of income or additional income and a mean to improve the living standard of the people living in the rural space, a source of export opportunities, and a natural solution for crop pollination. Also, it contributes to the preservation of biodiversity and environment [18, 19].

Bee families offer a large variety of products like: honey, pollen, beeswax, propolis, and bee venom to beekeepers, which allow them to earn important income from their selling [14].

Honey is a natural product carried out by bees from flowers nectar. It is considered a high nutritive value food due to its chemical composition: 80-85 % carbohydrates, 15- 17 % water, 0.3 % proteins, 0.2 % ashes, vitamins, amino-acids, organic acids, minerals, enzymes, bioflavonoids and antioxidants. This reflects its high nutritive value and therapeutic qualities and justifies why honey is used in human consumption, in medicine, cosmetics, food industry etc.[17].

Romania has a suitable geographical position, three types of relief, a continental climate, and a high potential to produce honey, at least 20,000 tons from about 11 million ha of cultivated and wild flora [2].

Romania is characterized by the diversity of the melliferous flora determined by the large variety of plant species, flower sizes, blooming periods, genetic potential of the cultivated crop, relatively uniform distribution of the flora in the territory. For this reason, beekeeping is spread in all the eight micro-regions of development and in all the 41 counties of the country [3].

The melliferous spontaneous and cultivated

resources are very important for bee families and also for beekeepers who have to be able to identify their location and settle their apiaries in the areas suitable for pickings which could strengthen the bee families to produce more honey, pollen and other products [4].

In 2011 Romania came on the 7th position in the EU with 40.000 beekeepers owning over 1.2 million bee families, and 21.000 tons honey production. Honey yield accounted for 18.5 kg per bee family, 2 times higher than in 1990 and considered the key factor of honey production growth.

The average apiary size was very small 23 bee families, ranging between 20 and 400 bee families [15].

An apiary is efficient from an economic point of view if the number of bee families is higher than 100. The higher the number of bee families, the higher the economic efficiency [20].

The increase of honey production is mainly determined by honey yield. A higher honey production and high honey quality could cover better the internal market and increase exports [21].

The export of honey is also determined by the low honey consumption per inhabitant, representing about a half of 1.5 kg/inhabitant, the EU-28 average.

About 60 % of honey production and 80 % of organic honey production was exported mainly in the EU market (Germany, United Kingdom, Nordic countries, Italy etc) where it is a deficit in the market. In 2011, honey price ranged between Euro 2.4-3,5 per kg according to honey type and the value of the exported honey accounted for Euro Million 29.6 [15].

In 2015, Romania produced 35,000 tons of honey by 75 % more than in 2014, which placed it on the 1st position in the EU-28. This was possible because of the favorable year 2015 for pickings and efforts made by beekeepers to increase honey yield per bee family and deliver more honey in the market. In this respect, the absorption of about 10 % of the Euro 66.2 Million budget, of which 50% from the EU and 50 % from the national budget has been of much help for beekeepers

[13, 22, 23].

Therefore, Romania is an important honey producer in the EU. It is situated on the top position being followed by Spain, Hungary, Germany, Italy, Greece, France, Poland, Portugal, Croatia.

As long as the EU domestic production is able to cover only 60 % of consumption, the EU is a net importer of honey. This is a reason for the Romanian beekeepers to increase the number of bee families, honey production and honey export in the EU market [7].

In this context, the main objective of the paper was to analyze the evolution of honey production in Romania in the period 2007-2015 and establish the forecast for the period 2016-2020. In this purpose, the paper presented the evolution of the number of bee families and honey production in the country and by micro-regions of development to identify the territorial distribution, like a basis to set up the estimates of the future honey production in the next five years. The paper also presents the main problems the beekeepers are facing and finally the conclusions are accompanied by concrete solutions which should be taken into consideration by beekeepers to improve honey production and increase their incomes.

MATERIALS AND METHODS

The paper was set up based on the empirical data provided by the National Institute of Statistics in the year 2016 regarding the number of bee families and honey production in Romania in the period 2007-2015.

Honey production was analyzed both at the country level and also by micro-regions of development.

The following aspects have been approached in the paper: evolution of the number of bee families in Romania and in the territory by micro region; evolution of honey production at country level and by micro region; average growth rate and total honey production in the analyzed period; description statistics for these two indicators: mean, mean error, median, standard deviation, standard deviation error, variance, kurtosis, skewness, minim and maximum values, and variation

coefficient; linear regression function for honey production at the country level and by region, and also the honey production forecasting for the next five years, 2015-2020. The main methods used have been the following ones:

-Fixed basis index, $I_{FB} = (y_t/y_0)*100$ (1)

-Variable basis index, $I_{VB} = (y_t/y_{t-1})*100$ (2)

-Average growth rate,

$\bar{R} = (\bar{I}*100) - 100,$ (3)

where $\bar{R}$ = average growth rate and $\bar{I}$ = average index of dynamics, [1].

$\bar{I} = \sqrt[n-1]{\dfrac{y_t}{y_1}}$ (4)

-The average annual growth rate was calculated using the formula:

$\bar{R}_a = \left(\sqrt[n-1]{\dfrac{y_n}{y_0}} - 1\right)*100.$ (5)

-Total honey production in the period 2007-2015 was determined using the formula:

$Y_t = \sum_{t=1}^{n} y_t.$ (6)

-Average honey production in the period 2007-2015 was calculated according to the formula:

$\bar{y} = \dfrac{\sum_{t=1}^{n} yt}{n}$ (7)

-The graphical method was used to illustrate the dynamics of the number of bee families and honey production at the country level and by region.

-The trend of honey production at the country level and by micro region, $\widehat{yt} = f(t)$, i $= \overline{1,n}$ was analyzed using the linear regression function according to the formula:

$\widehat{yt} = a + bt,$ (8)

where t = 1÷T considering that $\sum(y_t - Y_t)^2$ min, that is $\sum(yi - a - bt)^2$ min. The solutions for the a and b parameters were calculated according to the formulas:

$a = \dfrac{\sum yt}{n}$ (9)

and $b = \dfrac{\sum t y_t}{\sum t^2}$ (10)

and also using the least square method [5].

-The horizon 2016-2020 forecasting was based on the extrapolation of the statistical series of data, according to the average growth rate of honey production in the period 2007-2015, mathematically represented by

$Y'_{ti} = y_0 + t_i \bar{\Delta}'.$ (11)

-The data and the results were tabled and correspondingly interpreted.

RESULTS AND DISCUSSIONS

Number of beekeepers, apiaries and bee hives. In 2015, in Romania, there were 22,930 beekeepers (apiaries), of which 1,545, that is 6.73 % keep over 150 bee families, and the number of bee hives totalized 1,586,000. This means that the average size of an apiary is 69.16 bee hives.

Over 50% of the number of apiaries are of small size and just about 20 % are of high dimension.

According to the EU, the Standard Output for a bee family is 52.26 SO. But taking into account the EU funding to support beekeepers to enlarge their apiaries, the small farms size should range between Euro 8,000 and 11,999 Euro SO (meaning 155-229 bee families) and the medium and larger sized apiaries should have between Euro 12,000 and 50,000 SO (meaning 230- 957 bee families) [6].

Photo 1. A beekeeper and bee families at rape pickings

Number of bee families. The number of bee families increased by 41.81 % in the analyzed period from 982.5 thousands bee families in 2007 to 1,392.8 thousand bee families in 2015.

This was determined by the incentives offered to beekeepers to encourage them to keep more bee families, as Romanian honey is more and more required for export due to its high quality.(Fig.1.)
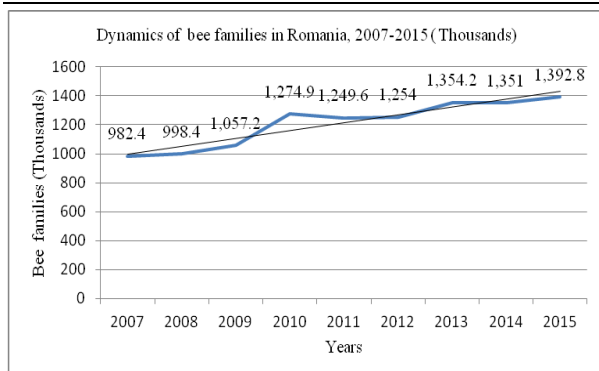
Fig.1. Evolution of bee families in Romania in the period 2007-2015 (Thousands)
Source: Own design based on NIS Data base, 2016, [16]

Dispersion of bee families by micro-region of development. The number of bee families is not equally distributed in the territory due to the climate conditions and opportunities for pickings in close relationship with the existent flora.

The ranking of the regions, in the decreasing order, in the year 2015 is the following one: the top position is occupied by South West Oltenia region with 298.1 thousand bee families; on the 2nd position comes the Central part of Romania with 202.2 thousand bee families; on the 3rd position is situated the North East region with 198.7 thousand bee families; on the last positions are: West region with 172.7 thousand bee families, North West region with 171.2 thousand bee families, South East region with 138.3 thousand bee families and finally, Bucharest-Ilfov region with 13.8 thousand bee families (Table 1).

Table 1. Dispersion of bee families by region of development in Romania, 2007-2015 (Thousands)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2015/2007 %
North West	128.9	126.5	129.2	170.3	162.3	162.4	170.9	174.8	171.2	132.81
Center	145	145.4	154	184	185.5	188.8	195.7	191.4	202.2	139.44
North East	138.7	138.2	143.7	178.7	170.8	170.7	195.3	193.3	198.7	143.25
South East	127	128.5	136.2	152.5	150.5	141.2	138.3	136.7	138.3	108.89
South Muntenia	145.9	150.9	164.7	193.1	184.8	185.6	192.1	194.2	197.9	135.64
Bucharest Ilfov	22.4	21.9	16.1	19.2	17.8	18.9	18.2	13.9	13.8	61.60
South West Oltenia	141.5	145.4	173.9	197	210	218.3	270.7	275.5	298.1	210.67
West	132.8	141.5	139.3	180	168	168.2	172.8	171.1	172.7	130.04
Total	982.2	998.3	1,057.1	1,274.8	1,249.7	1,254.1	1,354	1,350.9	1,392.9	141.81

Source: Own calculation based on NIS Database, 2016 [16]

Photo 2. Apis Mellifera Carpatica

In the analyzed period the highest growth in the number of bee families, more exactly a more than a double number, was noticed in South West Oltenia, and at the opposite pole it is situated Bucharest Ilfov region where the number of bee families declined by about 48.40 %. In almost all the regions of Romania, the number of bee families increased, except Bucharest Ilfov region.

The percentage distribution of bee families by region is shown in Fig.2 for the year 2007 and in Fig.3. for the year 2015.
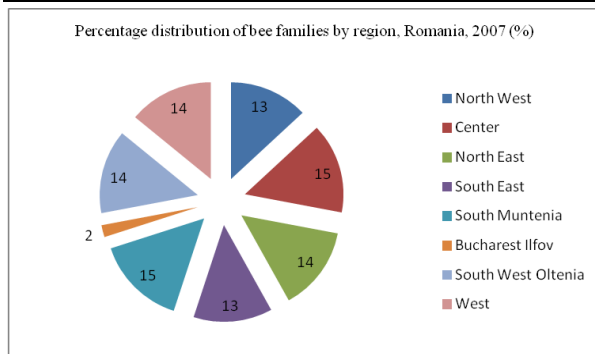
Fig.2.Distribution of bee families by region in 2007 (%)
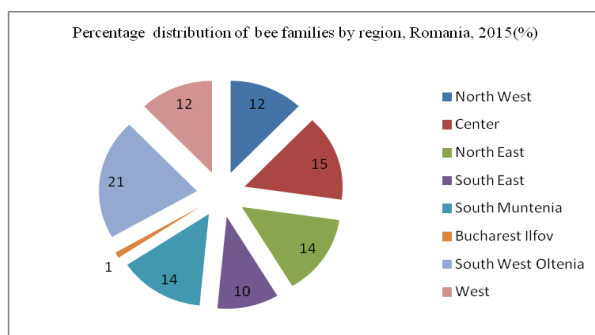Source: Own design based on NIS Data base, 2016 [16]

Fig. 3. Distribution of bee families by region in 2015 (%)
Source: Own design based on NIS Data base, 2016 [16]

Photo 3.Bee family

Honey production. Honey production increased at country level by 66.35 % from 16,767 tons in 2007 to 27,893 tons in the year 2015. This was due to the increased number of bee families and also due to the growth of the honey yield per bee family(Fig.4.)

The production was smaller in the years with weak pickings because of the serious droughts, more exactly in 2007, 2009, 2012 and 2014.

As the number of the bee families is owned in proportion of 99.9% in the private sector, honey production is almost entirely produced in the private apiaries.
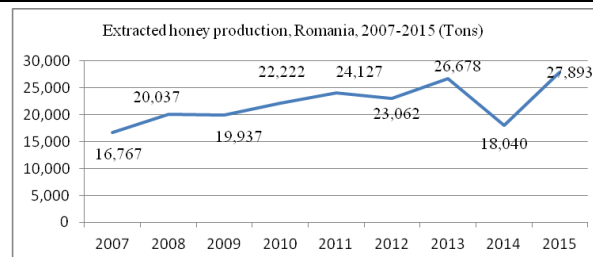

Fig. 4. Evolution of the extracted honey production in Romania in the period 2007-2015 (Tons)
Source: Own design based on NIS Data base, 2016 [16]

Dispersion of honey production by micro-region. Being influenced by the distribution of bee families in the territory and their honey yield, honey production varied from a micro region to another. As it is expected the decreasing order of honey production by micro-regions is similar with the ranking of the region based on the number of bee families.

The highest growth in honey production was recorded in North West region (+100.56 %), and a deep decline of - 26.32 % was recorded in Bucharest Ilfov area. But, the general trend was an increasing one in all the regions, except Bucharest Ilfov (Table 2).

The percentage distribution of honey production by region is shown comparatively for the year 2007 and 2015 in Fig.5.
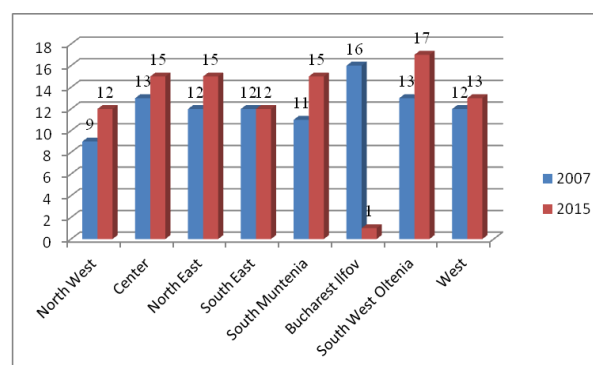

Fig. 5. The percentage distribution of honey production by micro-region in 2007 and 2015 (%)
Source: Own design based on NIS Data base, 2016 [16]

Comparative analysis between the percentage growth of honey production and the growth of the number of bee families. Looking at the figures in Table 1 and Table 2 regarding the increase/decrease across the whole analyzed period 2007-2015, it is possible to identify in what measure the two influence factors: number of bee families and

honey production per bee family have determined the total honey production at the

country level and by each micro-region of development.

Table 2. Dispersion of honey production by region of development in Romania, 2007-2015 (Thousand Tons)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2015/2007 %
North West	1.78	2.53	2.42	2.77	3.16	2.91	3.12	2.29	3.57	200.56
Center	2.63	2.98	3.21	2.89	3.47	3.35	3.96	2.53	4.27	162.35
North East	2.44	3.36	2.54	3.89	3.69	3.37	3.43	2.71	4.08	167.21
South East	2.33	2.46	2.55	2.65	2.73	2.92	3.13	2.25	3.27	140.34
South Muntenia	2.22	2.74	2.69	3.59	3.32	3.40	4.15	2.69	4.06	182.88
Bucharest Ilfov	0.38	0.39	0.30	0.23	0.22	0.22	0.38	0.17	0.28	73.68
South West Oltenia	2.58	2.82	3.46	3.41	4.04	3.80	4.49	2.72	4.66	180.62
West	2.46	2.75	2.75	2.79	3.51	3.10	4.02	2.68	3.71	150.81

Source: Own calculation based on NIS Database, 2016 [16]

At the country level, it is easy to notice that the number of bee families increase is less than the honey production growth, meaning that the average honey production per bee family is the key factor with the deepest impact on total honey production. And this situation characterizes almost all the micro-regions except, South West Oltenia and Bucharest Ilfov, where the growth of the number of bee families had a higher influence than honey yield on honey production.

The average growth rate of honey production during the analyzed period was the following one: 11.86 % in North West, 11.63 % in South West Oltenia, 10.95 % in South Muntenia, 10.49 % in North East, 9.81 % in the Central micro-region, 7.75 % in West micro-region, 5.60 % in South East and 4.25 % in Bucharest-Ilfov micro-region (Table 3).

Table 3. Average growth rate of honey production by region of development in Romania, 2007-2015 (%)

	2008	2009	2010	2011	2012	2013	2014	2015	Average growth rate % 2007-2015
North West	42.13	-4.35	14.46	14.07	-7.92	7.21	-26.61	-55.89	11.86
Center	13.30	7.71	-9.96	20.06	-3.46	18.20	-36.12	68.77	9.81
North East	37.70	-24.41	53.14	-5.15	-8.68	1.78	-21.00	50.55	10.49
South East	2.92	3.65	3.92	3.01	6.95	7.19	-28.12	45.33	5.60
South Muntenia	23.42	-1.83	33.54	-7.53	2.40	22.00	-35.29	50.92	10.92
Bucharest Ilfov	2.63	-23.08	-23.34	-4.35	0	72.72	-55.27	64.70	4.25
South West Oltenia	9.30	22.69	-1.45	18.47	-5.95	18.15	-39.43	71.32	11.63
West	11.78	0	1.45	25.80	-11.69	29.61	-33.34	38.43	7.75
Romania	19.51	-0.50	11.49	8.55	-4.40	15.65	-32.36	54.60	9.06

Source: Own calculation based on NIS Database,2016 [1]

Photo 4. Honey in jars

Descriptive statistics for the number of bee families and honey production at country level is presented in Table 4.

Table 4 .Descriptive statistics for the number of bee families and honey production

	Bee families	Honey production
Mean	1,211.611	22,084
Standard error	52.46	1,255.11
Median	1,254	22,222
Standard deviation	157.38	3,765.35
Variance	24,768.23	14,177,866.44
Kurtosis	-1.486	-0.963
Skewness	-0.593	0.202
Minimum	982.4	16,767
Maximum	1,382.8	27,893
Coefficient of variation (%)	12.98	17.05

Source: Own calculation based on NIS Database, 2016 [16]

Linear regression functions for honey production for the analyzed period for Romania and each micro-region of development are presented in Fig.6-13.
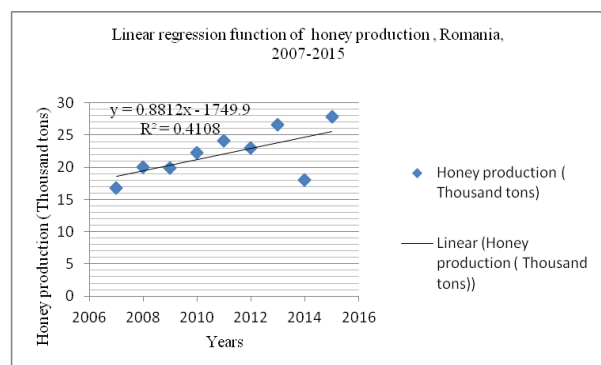

Fig.6. Linear regression of honey production at Romania's level in the period 2007-2015
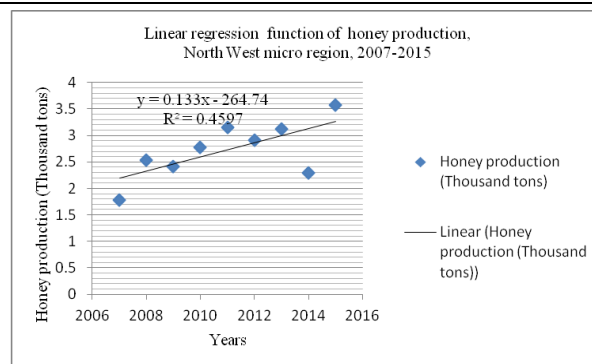Source: Own design based on NIS Data base, 2016 [16]

Fig.7. Linear regression of honey production for the North West micro-region in the period 2007-2015
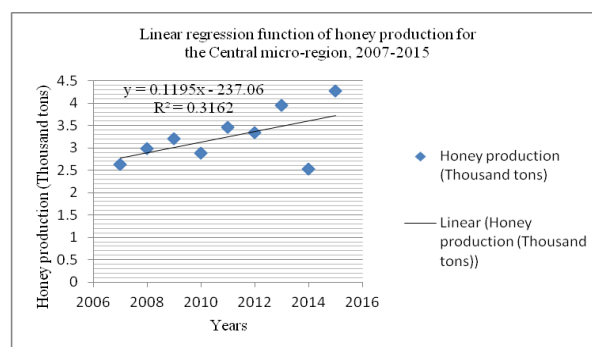Source: Own design based on NIS Data base, 2016 [16]

Fig.8. Linear regression of honey production for the Central micro-region in the period 2007-2015
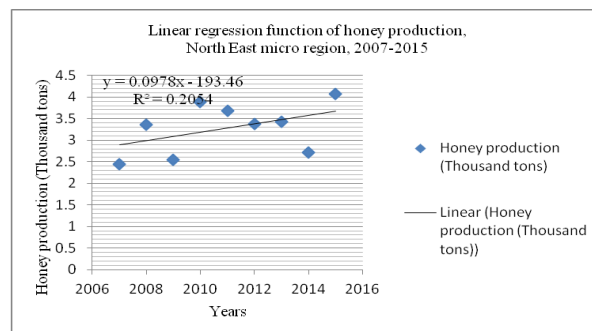Source: Own design based on NIS Data base, 2016 [16]

Fig.9. Linear regression of honey production for North East micro-region in the period 2007-2015
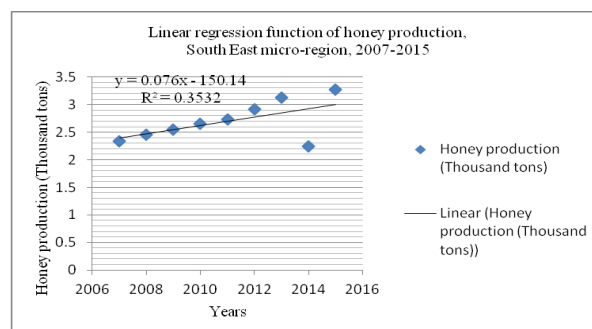Source: Own design based on NIS Data base, 2016 [16]

Fig.10. Linear regression of honey production for South East micro-region in the period 2007-2015
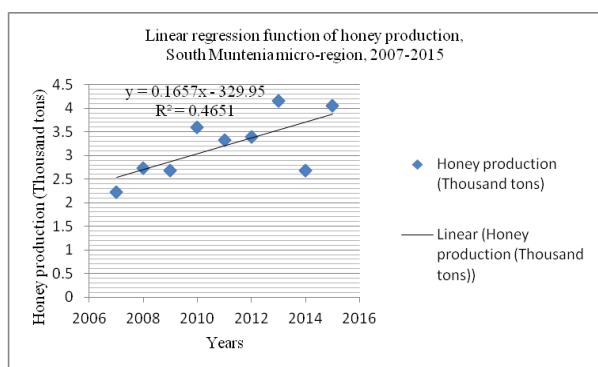Source: Own design based on NIS Data base, 2016 [16]

Fig.11. Linear regression of honey production for South Muntenia micro-region in the period 2007-2015
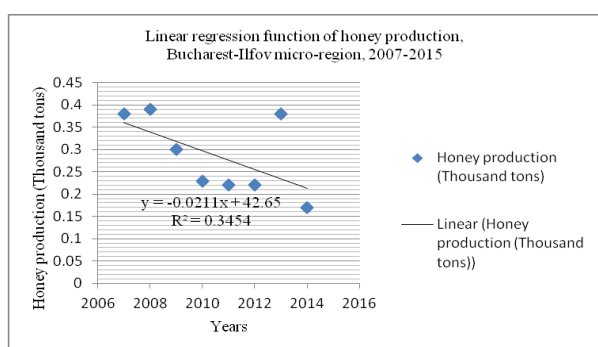Source: Own design based on NIS Data base, 2016 [16]

Fig.12. Linear regression of honey production for Bucharest-Ilfov micro-region in the period 2007-2015
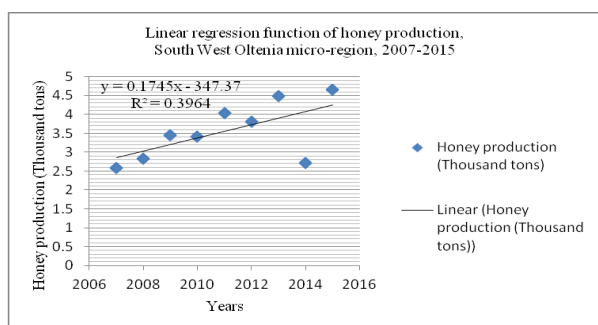Source: Own design based on NIS Data base, 2016 [16]

Fig.13. Linear regression of honey production for South West Oltenia micro-region in the period 2007-2015
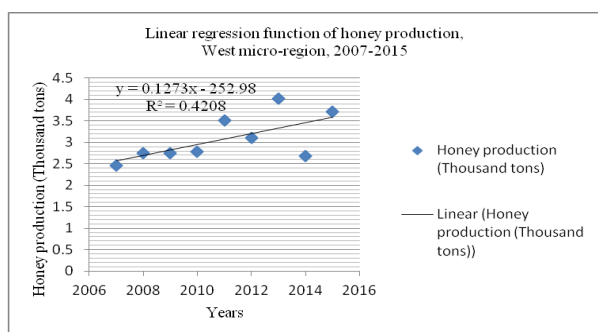Source: Own design based on NIS Data base, 2016 [16]

Fig.14. Linear regression of honey production for West micro-region in the period 2007-2015
Source: Own design based on NIS Data base, 2016 [16]

Photo 5. Fair of honey and other bee products.

Honey production forecast for the period 2016-2020. Taking into consideration the average growth rate of honey production for the period 2007-2015 and the average honey production in the same interval, it was forecasted the production for the next five years, as shown in Table 4. As one can see, Romania could produce more honey reaching 34.4 tons in the year 2020. The highest contribution to this production is expected to be given by South Muntenia, North East, Central area, North West and West micro regions of development.

The main problems Romania and Romanian beekeepers are facing are the following ones:

-The small apiary size, which is in average 69 bee families/apiary in 2015 which could not allow a higher marketed honey amount, a lower production cost, and a higher income for beekeeper.

-The climate change from a year to another, the alternation of extreme climate phenomena concretized in a large variation of temperatures, severe droughts, high rainfalls, cold winters etc with a negative influence on the bee family power, pickings and honey yield.

-The more and more reduced opportunities for bee families to contribute to the crop pollination and collect the nectar due to the use of new varieties and hybrids by farmers.

-The treatments applied for plant protection using more pesticides etc created important problems regarding the poisoning of the bee families and bringing losses to beekeepers.

Table 5. Honey production forecast in Romania and by micro-region of development for the period 2016-2020 (Thousand tons)

	Total honey production 2007-2015 (Thousand tons)	Average honey production, 2007-2015 (Thousand tons)	Average growth rate, 2007-2015 (%)	Honey production forecast 2016-2012 (Thousand tons)				
				2016	2017	2018	2019	2020
NW	24.28	2.72	11.86	3.04	3.40	3.80	4.25	4.75
C	29.29	3.25	9.81	3.56	3.90	4.28	4.69	5.15
NE	29.51	3.27	10.49	3.61	3.98	4.39	4.85	5.35
SE	24.29	2.70	5.60	2.85	3.00	3.17	3.34	3.52
S Munt.	28.86	3.21	10.95	3.56	3.94	4.37	4.84	5.36
Buc.-Ilfov	2.57	0.28	4.25	0.29	0.30	0.31	0.32	0.33
SW Olt.	31.98	3.55	11.63	3.96	4.42	4.93	5.50	6.14
W	27.77	3.08	7.75	3.32	3.58	3.85	4.14	4.46
Romania	198.72	22.08	9.06	24.08	26.26	28.63	31.22	34.4

Source: Own calculations.

-The high price for fuel increased the transportation cost of the bee families in the pastoral pickings.

-The high price for apiary inputs (bee families pavilion for transportation in pastoral, honey extractors, medicines, etc) led to increased bee family maintenance and production cost.

-The appearance of the syndrome CCD (Colony Collaps Disorder) more and more frequently conducted to the loss of bee families and this is a new problem among the others for the Romanian apiculturists.

-The honey collection, storage, bottling and labeling, and branding is another problem the beekeepers are facing.

-Honey price is still low and in the years with low pickings and honey production, it does not cover production costs.

Similar problems were identified in Bulgaria and other countries too [14].

-Another problem is represented by the use of antibiotics (mainly streptomycin) in sugar syrup offered by beekeepers to the bee families to stimulate feeding in spring season, to stimulate the bee queen and prevent the occurrence of bee diseases. For this reason, antibiotics are found sometimes in honey whose consumption could determine resistance to them in the human body [24].

All these problems should be carefully analyzed by Romanian Beekeepers Association and Ministry of Agriculture and Rural Development to find the suitable solutions. In this respect, the National Apiculture Programme, established based on EU Regulation No.1308/2013, completed with EU Regulations No.1366/2015 and 1368/2015 provides measures and funds to meet beekeepers needs and foster the production and marketing of apiculture products [8, 9,10, 12]. For the period 2017-2019 are provided Euro 216 Million to be spent on national apiculture programmes in the 28 EU Member States. The EU funding for these programmes is based on the number of beehives according to EU Commission Implementing Decision No.1102/2016 [11].

The following specific measures are eligible to be financially supported by this programme:

(i)technical assistance (Beekepers training on breeding or disease prevention, extraction, storage, packaging of honey etc.);

(ii)combating beehive invaders and diseases, particularly varroasis; (iii)rationalisation of transhumance (important for pollination and bee nutrition);

(iv)analyses of apiculture products (honey, royal jelly, propolis, pollen and beeswax);

(v)restocking of hives;

(vi)applied research;

(vii)market monitoring;

(viii)enhancement of product quality (to exploit the potential of apiculture products on the market).

CONCLUSIONS

Romania has 22,930 beekeepers (apiaries) where there are kept 1,586,000 bee hives. The average size of an apiary is 69.16 bee hives, but 6.73 % of beekeepers, that is 1,545

owners have over 150 bee families.

In 2015, there were 1,392.8 thousand bee families, by 41.81 % more than in 2007. The climate conditions and the natural and cultivated flora do not determine an equal distribution of the bee families in Romania's territory. The decreasing order of the micro-regions where bee families are grown is: South West Oltenia, Center, North East, South Muntenia, West, North West, South East and Bucharest-Ilfov.

In 2015, Romania's honey production was 27,893 tons by 66.35 % more than in 2007 according to NIS Database 2016. According to the EU Commission Report, Romania is on the top position in the EU-28 with 35, 000 tons. The distribution of honey production in the territory is similar with the one of the bee families.

The linear regression functions reflected an increasing general trend of honey production in the analyzed period both at the country level and almost all the micro-regions, except Bucharest-Ilfov where production declined in close relationship with the number of bee families.

The forecast for the period 2016-2020 estimates that in 2020, Romania will produce 34,400 tons of honey for an average annual growth rate of 9.06 %. Important contributions are expected to be given by each micro-region of development.

The development of beekeeping should continue the tradition long of thousands years in Romania. To grow honey production, beekeepers must continue to increase the number of hives and bee families, to strengthen the bee family power, to improve and complete feeding using a large variety of resources, to assure a good maintenance and health to the bee families and prevent and correspondingly treat bee diseases respecting the thresholds imposed by the EU regarding the use of medicines.

An increased honey production could cover better the internal market and domestic consumption and also could stimulate honey exports in the EU and other countries. Also, it could bring more incomes for apiarists and improve their living standard.

The development of beekeeping will contribute to the development of the communities in the rural areas, and also could have a positive impact on processors and retailers.

Honey is important in Romania's agro-food export, successfully contributing to the trade balance and helping the country to be a net exporter for this product.

To increase honey production, beekeepers could be aware that their apiary must have more than 100 bee families to be profitable.

They must apply new technologies, using modern hives, selected bee queens, corresponding feeding, to assure a better maintenance and health control of the bee families.

The marketing of the bee products must be intensified by a better analysis of the domestic and international market in order to assure the enlargement of the bee products market, by a more intensive advertising and promotion of the bee products to increase domestic consumption, a higher quality of honey to help sale price to be higher and cover better the production costs, the development of organic honey and other bee products to increase the acquisition price, the development of Romanian brands, the guarantee of the high quality.

REFERENCES

[1]Anghelache, C., Manole, A., 2012, Dynamic/Chronological Series(time series), Romanian Statistical Review, No.10/2012, pp.1-10
[2]Antonie Iuliana, 2016, Honey resources og Avrig City (Sibiu county) and economic relevance, Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development Vol. 16, Issue 4, 2016, pp.37-41
[3]Antonie Iuliana, 2014, Study upon the melliferous basis of Vurpar locality (Sibiu county), Scientific Papers Series Management , Economic Engineering in Agriculture and Rural Development, Vol. 14, Issue 1, 2014, pp.17-20
[4]Antonie Iuliana, 2014, The biodiversity of the melliferous plants in the surroundings of the town Sebes (Alba county) and their economical importance, Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development Vol. 14, Issue 4, 2014, pp.13-18
[5]Baron, T., Biji, E., Tövissi, L., et al., 1996, Theoretical and Economic Statistics, Didactical and Pedagogical Publishing House, Bucharest, pp. 205-210

[6]Ene Andra Elena, 2015, EU Funds for beekeepers, http://www.informativ.info/economic/237-fonduri-nerambursabile-pentru-apicultori

[7]European Commission, Agriculture and Rural Development, Beekeeping and honey, https://ec.europa.eu/agriculture/honey_ro

[8]EU Regulation No.1308/2013, http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32013R1308

[9]EU Regulation No.1366/2015, http://eur-lex.europa.eu/legal-content/EN/ALL/?

[10]EU Regulation No.1368/2015, http://eur-lex.europa.eu/legal-content/EN/ALL/?

[11]EU Commission Implementing Decision No.1102/2016, https://ec.europa.eu/agriculture/honey/programmes/national-apiculture_ro

[12]EU Commission, National Apiculture Programmes, https://ec.europa.eu/agriculture/honey/programmes/national-apiculture_ro

[13]Grigoras, M.A., 2016, Trends in Romania's animal production, Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development, Vol. 16, Issue 4, pp.137-148

[14]Koprivlenski, V., Dirimanova Violeta, Agapieva Valentina, 2015, Economic analysis of state and development of beekeeping in Bulgaria, Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development,Vol.15(2):167-170

[15]Mierlita, T., Tabacila Nicoleta, Teodoroiu Flavia, 2014, The evolution of honye production in Romania between 2000 and 2011, Scientific Papers Series Management , Economic Engineering in Agriculture and Rural Development, Vol.14(1)2014:227-230

[16]National Institute of Statistics Data Base, 2016

[17]Okpokiri, C.I., Nwachukwu, I.N., Onwusiribe, C., N., 2015, Determinants and profitability of honye production in Ikwuano local government area, Abia State, Nigeria, Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development Vol. 15, Issue 3, 2015, pp.211-216

[18]Pirvutoiu, I., Popescu Agatha, 2011, Analysis of Romania's honey market, Scientific Papers Animal Science and Biotechnologies, Vol.44(2):500-503

[19]Popescu Agatha, 2012a, Research on beekeepers' income estimation based on honey production, Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Animal Science and Biotechnologies, Vol.69(1-2): 185-191

[20]Popescu Agatha, 2012b, Research regarding apiaries structure and its relationship with honey production, Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Animal Science and Biotechnologies, Vol.69(1-2):332-334.

[21]Popescu Agatha, 2013, Study concerning trends in Romania's honey market, Lucrari stiintifice Zootehnie, Vol.59, pp.153-158

[22]Romania becomes first in EU for honey production, 16 Jan.2017, http://www.romania-insider.com/romania-becomes-first-eu-honey-production/

[23]Stur Beata, 2017, Romania tops EU honey production, Jan 17, 2017, https://www.neweurope.eu/article/romania-tops-eu-honey-production/

[24]Tamba-Berehoiu Radiana, Visovan M.Diana, Popa Ciprian-Nicolae, 2013, Study on the presence of antibiotic residues in honey intended for public consumption, Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development Vol. 13, Issue 3, 2013, pp.305-308