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ANALYSIS OF THE DEGREE OF SUFFICIENCY WITH SUNFLOWER PRODUCTION IN THE REPUBLIC OF MOLDOVA

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Abstract

The paper purpose is to analyze the degree of assurance with sunflower production in the Republic of Moldova on the basis of the statistical data from the National Bureau of Statistics. The methods used to process the data are: analysis, synthesis, comparison and monographic. In the period of the years 2016-2023, the surface of sunflower increased approximately 1.7 times, reaching 391,9 thousand hectares in 2023 in the households of all categories. The gross harvest of sunflower in all categories of producers increased respectively by 12.0; 53.9 and 20.9% in 2023 compared to 2016, 2020 and 2022.In 2021, it was obtained the highest seed production. The good results are due to well-trained specialists, but also on the strength of the fact that the degree of insurance with agricultural machinery in the agricultural companies is at a high level. The high value of the net profit generated from the sunflower production determines the local producers to increase the areas of this crop. The increase of the sunflower oil volume intended for export denotes the fact that Moldova has reached a high level of competitiveness even at the international level. The Ministry of Agriculture and Food Industry made the decision to grant a license on import of the sunflower seeds to the enterprises that process this type of production for ensuring the continuity of the activity of the oil companies in the country.

Key words**:** *export, sunflower, oil, agricultural producers, food security*

INTRODUCTION

In the Republic of Moldova, sunflower production is sufficient to meet domestic consumption, thus ensuring national food security.According to the information presented by the National Bureau of Statistics of the Republic of Moldova, sunflower production is satisfactory, ensuring the necessary quantity for domestic consumption, thus ensuring the possibility of exporting excess production. This situation created on the local sunflower production market allows ensuring economic stability. At the same time, the relevant bodies in Moldova emphasize the local processing of sunflower seeds, thus, entrepreneurs contribute to the production of added value, in this case, we refer to the production of sunflower oil and its export, but not the seeds. However, the agricultural sector faces challenges such as rising agricultural input costs and price volatility on the international market, which can impact both production and profitability.

The authors Tcaci et al. (2021) mentioned that all the activities from the economic field bears costs for the human, the material and the financial resources [13].

Another challenge is climate change, which significantly affects sunflower production in the Republic of Moldova, influencing both yields and crop quality. Prolonged droughts and extreme temperatures during the vegetative period hinder plant development and limit seed formation, reducing production, especially in the southern and central regions of the country. For example, in years of severe drought, average yields per hectare can drop below 1 ton compared to 2-2.5 tons in favorable conditions. Additionally, uneven and torrential rainfall leads to soil erosion and reduces the moisture reserves available to plants. Global warming has extended the growing season, which may encourage pest infestations and the spread of diseases such as downy mildew and gray mold, directly affecting seed quality and oil content. Climate change has also contributed to a decline in the

average oil content of seeds, which in drought years can fall below 38%, compared to the standard of 44% [4].

Another significant factor is excessive monoculture, which depletes the soil and infests it with specific diseases and pests such as downy mildew or sunflower moths. This agricultural practice reduces soil fertility and crop efficiency, requiring additional investments in fertilizers and phytosanitary treatments.

To overcome these challenges, it is essential to implement modern agricultural practices, diversify crops, promote optimal crop rotation, and develop irrigation systems to ensure production stability. In the absence of modern irrigation systems and adaptive technologies, producers are exposed to major fluctuations in both production and income.

An important role for the sustainable development of the country belongs to its population. Therefore, the government pays a great attention to the level of the food security and nutriment.

As the level of self-sufficiency with production is one of the indicators that describes the level of the food security of the country.FAO attaches special importance to this indicator as a factor of stability, which reduces the vulnerability to fluctuations in the domestic and the international agricultural markets.

The Food and Agriculture Organization of the United Nations (FAO) emphasizes that "the raising the level of nutrition and living conditions of the population, improving the yield of production and the effectiveness of the distribution of all food and agricultural products, improving the condition of rural populations and contributing to the development of the world economy" [7].

From the food production and marketing to the nutrition education legislation, promoting the nutrition standards in the business practices, FAO is concerned with the entire food chain, from the cultivation of raw materials to family distribution. Within all these concerns, the organization aims for development based on equitable growth and the support of policies focused on the needs of peoples in general and vulnerable populations, from a nutritional point of view.

FAO provides services for the food and nutrition assessment to help the governments to determine the effective measures in time. Also, it is responsible for analysis of the consumption structure and the supply of foods, in detection of the problems and for the purpose to establish all the priorities, in identifying the vulnerable categories that call for the emergency measures [7].

Currently, FAO (2016) defines the food security as the situation in which "all people have physical, social and economic access, at all times, to sufficient, safe and nutritious food that meets their dietary requirements and preferences for an active life and healthy". In the mid-90s of the 20th century, the term nutrition was added to the concept of food security, this means the use of the food by the organism of the human. Initial, the syntagma "food and nutrition security" was used, showing the increasing importance given to nutrition and the fact that food is not only sufficient, but also safe and nutritious [7].

FAO also uses other notions to express the complex concept of the food security. Thus, there are notions such as adequate nutrition, individual food security, family food security and national food security.

The adequate nutrition is assessed over three-time intervals:

- in the short term, the sufficient nutrition is ensured if the amount of energy consumed corresponds to the needs of energy of the person, that can vary depending on the weight, gender, age, state of health, physical and intellectual effort;
- in the medium term, the appropriate nutrition can be provided if there is no protein-caloric lack of proper nutrition;
- in the long term, nutrition can be ensured if there is no chronic caloric malnutrition [7].

The individual food security is the individual's ability to have access to safe and nutritionally sufficient food that ensures a healthy life.

The family food security is necessary to ensure the individual one, but it is not sufficient because the available food is not distributed among the family members according to each one's energy needs.

The food security of the country corresponds to its ability to ensure the family food security

and the individual food security not giving up other strategic goals.
According to Scerbacov(2016), food security is evaluated at the world (global),regional, national, family and individual level [12].
To establish the national food security level over a certain period of time, usually a year, the food energy availability per person is calculated. Food security of a country should not be confused with the notion of food self-sufficiency. Food self-sufficiency also includes the availability of food energy, which must be ensured from domestic production. In some countries, food security is ensured despite the fact that the level of food self-sufficiency is low. This is the situation for countries with the extremely limited agricultural resources, such as the oil-producing ones in the Middle East. They are making intense efforts to increase their degree of the food self-sufficiency, thus reducing their high import of food and the dependence on the world agricultural market [8].
In this context, the purpose of the paper is to analyze the level of self-sufficiency with sunflower production as an indicator proposed by FAO for determination of the level of the national food security.

MATERIALS AND METHODS

The entire analysis elaborated by the author is made by using the data of the National Bureau of Statistics of the Republic of Moldova. The works of the scientists of the country were analyzed, as well as those of the foreign scientists.
Method of analysis, synthesis and comparison were applied for interpreting the obtained results.
Fixed basis index was used to comparatively assess the values of each studied indicator in the last year of study versus the first year of the period.
Sunflower trade balance (TB) was determined making the difference between the export value and import value, as shown by the formula:
TB = E - I
where:
E = Export value
I = Import value.
Self-consumption rate (SCR) was calculated using the formula:

SCR = 100 *(P - E)/ P .....(1)
where:
P = production
E- Export.

Self-sufficiency rate (SSR) was calculated using the formula:

SSR = 100* P/DC.....(2)

where:
P = production
DC = Domestic Consumption.

RESULTS AND DISCUSSIONS

The sunflower is an economically and agronomically important crop. It has a fully mechanized technology, achieves high productions and is easily and profitably capitalized.

Sunflower cultivated area

Figure 1 presents the cultivated area with sunflower, 2016-2023.

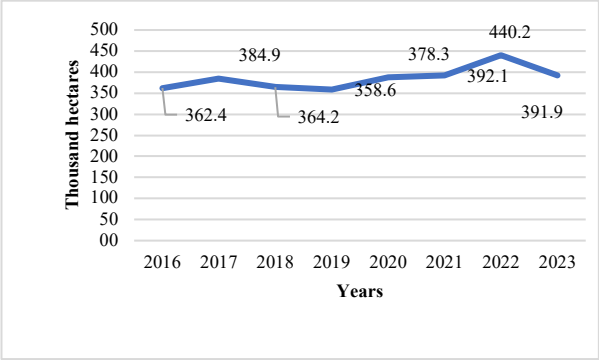

Fig. 1. The sunflower sown areas in all categories of producers (thousand hectares)
Source: [4].

According to the data presented in Figure 1, we can conclude that the sunflower areas in the Republic of Moldova decreased in 2023 compared to 2022 by 11%, the main cause being drought.
It should be noted that sunflower cultivation is quite profitable, provided that technologies are followed. This fact can serve as one of the main reasons for the increase in sunflower cultivated

areas. But unfortunately, the producers do not respect the crop rotation. Thus, before the analyzed period, the sunflower crop was cultivated on the same surface at an interval of 6-7 years, at the current stage the interval has been reduced to 4 years. This fact has a negative consequence, reducing the quality of the soil.

In the opinion of the expert RijaIu. cited by [2], until 2021 year, the Republic of Moldova exported mostly sunflower seeds, i.e. raw material with a lower level of profitability, and much less sunflower oil which ensures added value [2].

Currently, the sunflower oil that is cold pressed and that contains a large amount of oleic acid registers a high demand in the market. In addition, sunflower groats is introduced into the animal feed ration.

Sunflower seed yield

Figure 2 shows the yield level of sunflower seeds by year.

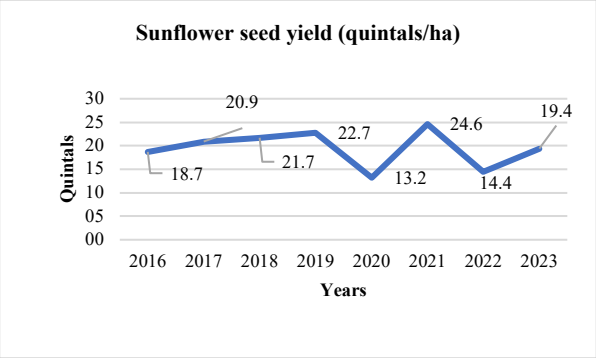

Fig. 2. Yield per hectare of sunflower in all categories of producers (quintals/ha)
Source: [4].

Yield level varied depending on various factors such as: the hybrid performance potential, fertilization degree and climate conditions.

The expert Iu.Rija said that in the case of introducing fertilizers in a smaller amount, the average yield of the sunflower crops will decrease, which will reduce the profit of the enterprises and as a result, the production costs will not be covered [3].

In the last two years, the price of the mineral fertilizers has increased significantly. The share of these types of fertilizers in the total costs is quite high, constituting approximately 30%. The agricultural producers introduce these fertilizers to achieve higher productivity of field crops. For some types of fertilizers, the price has increased in the limits between 1.8-2.5 times [3].

Sunflower seed production

The dynamics of sunflower seed production is shown in (Fig. 3). The trend is in general similar with the yield tendency in the studied period.

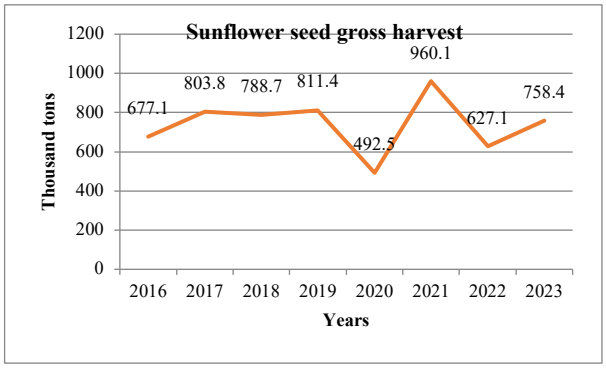

Fig. 3. Gross harvest of sunflower in all categories of producers (Thousand tons)
Source: [4].

The data presented in Figure 3 confirm that 2021 was the most favorable year for sunflower cultivation. In that year, sunflower production reached a volume of 960 thousand tons. Also, an increase in the sunflower harvest was achieved in 2023. If we compare the harvest received in 2023 with 2016, 2020 and 2022, we observe an increase of 12.0, 53.9 and 20.9%.The highest value of this indicator was reached in the year 2021 in value of 960.1 thousand tonnes.

The level of training of the specialists and the provision of the domestic producers with agricultural techniques are the main factors that favored this remarkable result.

On the telegraph.md site, A. Slusari mentioned that in August and September of 2023 year a large number of local producers were forced to sell their sunflower seed production at a maximum price of 5 lei per kilogram. Both the Trans-Oil and other large processing enterprises informed the local producers that if they did not accept the proposed price, the sunflower seed production would be imported from Ukraine[14].There is a monopoly in the production and processing of the sunflower seeds, with a 100% market share. The situation is worrying both for the authorities and for the

agricultural producers, as it has a negative impact on the industry and the entire economy. The Ministery of Agriculture and Food Industry V. Bolea, specified that the possession of the absolute control by the same processing enterprise creates barriers in this branch and consequently will result in the decrease of prices for the enterprises producing sunflower seeds. Thus, discussions took place between the representatives of the ministry and the agricultural producers with the aim of establishing a series of measures that would allow ensuring the fair competition in this absolutely necessary industry [5]. The processing of the sunflower production will allow the creation of new jobs.

Sunflower seed resources and uses according to sunflower balance

Sunflower resources and uses

Table 1 shows the sunflower seed resources and Table 2 the uses in 2022.

Seed resources are not enough to cover the processing capacity of the manufacturing plants into sunflower oil.

Table 1. Sunflower seed resources in 2022 (Thousands tons)

Product	Resource			
	Production	Import	Variation of inventory	Total resources
Sunflower	627.1	105.1	30.1	762.3

Source: [10].

Table 2. Uses of sunflower production, thousands of tons, year 2022

Specification	2022
Export	434.2
Seeds	2.7
Feed	3.2
Processing for non-food purposes	312.7
Losses	5.9
Personal consumption of the population	3.6
Total uses	**762.3**

Source: [10].

The Ministry of Agriculture and Food Industry has decided to grant the sunflower seed import license to several processing enterprises in order to maintain the operation process of the oil factories in our country. The decision was taken due to the liquidation of sunflower seed inventory, and the aim being to avoid the price increases for the oil production on the local markets. On the information Portal Agricol.md, A. Slusari mentioned that 70 thousand tons of sunflower seeds are needed. Ukraine is the base country from which the required quantity of sunflower will be imported [1].

Sunflower export

Analyzing the volume of EU sunflower seed imports by country, we deduce that the Republic of Moldova is in 4th place, being surpassed by Ukraine, Argentina and Russia. For example, in the period 2023-2024, the EU sunflower seed import share from the Republic of Moldova was 52.8% [4, 9].

In value terms, the quantity of sunflower seeds exported to the EU market in 2023 and 2024 is more than 190 thousand tons, approximately 50% more than in the period 2022-2023.

The Republic of Moldova sells sunflower seeds abroad to such countries as Romania, Bulgaria, Turkey, Spain.According to the expert Iu. Rija, our country's tendency to export to the EU is positively appreciated because the reorientation to this market has brought with it a number of advantages. In the previous years it was exported to the CIS countries. The dynamic increase in demand from the EU states indicates an intensification of partnership relations in the foreign trade [6].

In the information portal NOI.MD it is mentioned that the production volume of the sunflower oil which is exported indicates that the Republic of Moldova has many competitive advantages at the international level. The oil which is obtained by the national enterprises is of a high quality [11].

Table 3. Sunflower seeds exported quantity, 2019-2022 (Tons)

Year	Exported amount (Tons)
2019	577.5
2020	381.4
2021	302.7
2022	336.3
2022/2019 %	58.2

Source: [17].

Table 3 shows the data of the exported quantity of sunflower seeds in the period 2019-2022 by the Republic of Moldova. The information reflect a decrease year by year of the exported

quantities of sunflowers seeds by 41.8%from 577.5 tons in 2019 to 336.2 tons in the year 2022.

Zaharco S. considers that among the problems of the producers are: poorly developed infrastructure, limited accessto some technologies and finance, not applicableexport promotion tools [16].

Sunflower trade balance

Based on the data from The Observatory of Economic Complexity, OEC [14],it was determined sunflower seed trade balance in the period 2016-2023 (Table 4).

As export values are higher than import values in each year of the analyzed period, the sunflower is a positive one, reflecting that the Republic of Moldova is a net exporting country.

Table 4. Sunflower seed trade balance, 2016-2023, Republic of Moldova (USD Million)

	Export Value	Import value	Trade balance
2016	279	20.7	+258.3
2017	298	21.2	+276.8
2018	221	26.9	+194.1
2019	235	23.6	+211.4
2020	168	27.9	+140.1
2021	192	37.2	+154.8
2022	351	91.9	+259.6
2023	160	43.4	+116.6
2023/2016 %	57.3	209.0	-

Source: Own calculation based on the data from The Observatory of Economic Complexity, OEC [15].

Self-consumption rate with sunflower seeds

Table 5. Self-consumption rate of sunflowers seeds, 2019-2022 (%)

Year	Production	Export	SCR (%)
2019	811.4	577.5	28.8
2020	492.5	381.4	22.5
2021	960.1	302.7	68.5
2022	677.1	434.2	35.9
2022/2019 %	83.4	75.2	+7.1 pp

Source: Own calculations based on the data from [4] and [17].

The self-consumption rate in the Republic of Moldova is low with values below 100%(Table 5).

The degree of self-sufficiency rate with sunflower seeds

The dynamics of the self-sufficiency rate in the Republic of Moldova with sunflower seeds is presented in Figure 4. The data show that this rate is much higher than 100in the entire analyzed period, and its surplus is exported.

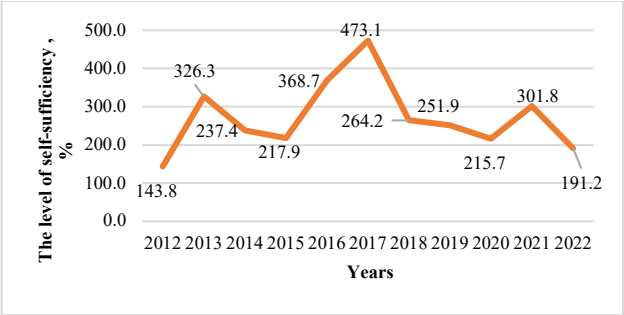

Fig. 4. The level of self-sufficiency with sunflower production, 2012- 2022(%)
Source: Own calculations.

CONCLUSIONS

The sunflower occupies the 4th place among oil crops, followed by the production of palm, soy and rapeseed. In our country, the areas occupied by cultivated with sunflower production increases year by year, achieving 391.9 thousand hectares in 2023 year.

These results are due to the qualified specialist that were trained in this field, as well as applying agricultural techniques. The resulting indicator, namely the net profit, leads producers to opt for this crop.

A major problem is the fact that the practice of planting different crops sequentially on the same plot of land is not respected, because the interval at which the sunflowers are cultivated has reduced to 4 years currently from 6-7 years in 2000, and as a result it leads to the soil degradation.

The increase in the amount of sunflower oil exported highlights the fact that our country has reached a higher level of external competitiveness. The oil obtained by our processing plants is of high quality, this qualifier being assigned by the consumers abroad

At present, the uninterrupted production process of oil processing enterprises is possible due to the involvement of specialists from the Ministry of Agriculture and Food Industry, who decided to grant a license for the import of

sunflower seeds. This decision will help to avoid further increases in oil prices on the domestic market.

Moldova holds the leading position in the export of sunflower seeds, reaching 52,8% in total EU exports in 2022 and 2024 years.

The sunflower seeds are exported to Romania, Bulgaria, Turkey, Spain. In the past years, it was mainly sold to the CIS states. Due to the increase in production quantities requested by the EU countries, the commercial relations are intensifying and the Republic of Moldova will exploit advantages from these actions.

The price of mineral fertilizers has essentially increased during the last two years. The weight of these fertilizers in the total costs is high, being around 30%.

The purpose of introducing their fertilizers is to obtain a higher yield per hectare. The price of fertilizers has increased by 1,8-3 times.

If the fertilizers are introduced less than the technological norms provide, the yield per hectare will decrease and as a result the production costs will not be able to be exceeded by the collected revenues.

Unfortunately, there is a monopoly situation on the domestic market both in the production and processing of sunflower seeds. This situation alarms both the authorities and the producers, because it negatively influences the results obtained in the industry, but also of the economy as a whole.

Since the level of self-supply of the Republic of Moldova exceeds 100%, we can conclude that we are over insured with sunflower production in the analyzed period, and the surplus quantity is exported.

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