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Comparative Analysis of Wheat and Sunflower Seeds Branches in Romania and Serbia

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Abstract

Wheat and sunflower seeds are significant products to ensure domestic food security and international trade exchanges. The paper develops a comparative analysis between Romania and Serbia in those regarding the production and export potential of wheat and sunflower, considering that the topic is interesting to study in the current economic, social and political context. The article answers the questions: what role do Romania and Serbia play in the world market for wheat and sunflower seeds and is the current availability of wheat and sunflower seeds sufficient to cover domestic needs in Romania and Serbia? The objectives of the research are to identify the production and export potential for wheat and sunflower seeds and to estimate future trends in the production of these products. The main findings show that the production of wheat and sunflower seeds is sufficient to cover the domestic food security for both countries and to ensure future trade, despite the current unstable political and social situation in Eastern Europe.

Keywords: food security, wheat, sunflower seeds, Romania, Serbia.

Jel Classification: Q10, C53, F10.

1. Introduction

Agriculture is the sector of the economy that is dependent on the soil and the climate conditions, which are important to ensure the food needs of the population. It is characterized by distinct production structures that are not fully exploited and are maintained at a potential stage (Dumitru et al., 2022, Dumitru, 2017).

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Romania occupies an important place in terms of the agricultural area used at the EU level, ranking 6th with approximately 13.9 million hectares, after countries such as France, Spain, and Germany. Of the total area used, about 60% was cultivated arable land, of which 66% was cereals, such as wheat (25.7%) and maize (31.1%) (PwC, 2017).

Globally, the main wheat producing countries in 2019 were China, India, Russia, the United States, and France (FAO, 2019). Wheat is a product of great economic importance in Romania, as demonstrated by the large area cultivated and the volume of trade, both nationally and internationally. Furthermore, for producers, wheat is a main source of income and for consumers it contributes to the country's food security (Boboc, 2017; Arghiroiu, 2015).

Along with cereals, wheat, maize, etc., oilseed crops play an important role for both producers and consumers, both for the production of edible oil and biofuels. Globally, the leaders in sunflower production and trade are Argentina, Ukraine, and Russia, producing 52% of world production (FAOSTAT, 2022). As for Eastern Europe, the main producers are Romania, Bulgaria, Turkey, Moldova, and Serbia (Popescu, 2018, Petre, 2019).

In Serbia, among the predominant cereals, maize is cultivated in 56% of the total cereal area, followed by wheat, which occupies 35%, and represents up to 90% of the cereal area. Wheat appears to be a relatively stable crop, with small variations in production, much smaller than those recorded for maize cultivation (Novković, 2020). Sunflower is one of the most important crops for edible oil production in Serbia, with harvested areas ranging from 154,793 to 187,822 hectares, with an output of 294,502 to 454,282 tonnes, and average grain yields ranging from 1.9 to 2.4 tonnes/hectare (Branković, 2011; Novković, 2020).

Given the importance of wheat and sunflower crops in ensuring food security and in international trade, this paper will compare their situations in Romania and Serbia, which are among the main producing countries in Europe. The paper is structured in six parts. After the introduction, the problem to be studied is stated; then the research question and purpose are established. The fourth part presents the methods used and the results obtained in the following part. Finally, the conclusions of the research are drawn.

2. Problem Statement

Geopolitical changes in Europe in recent decades have had a direct impact on agricultural markets, such as world trade and food markets. Demand for food on world markets is growing due to international developments, global cereal consumption is estimated to increase by 11% by 2026 (Voicilaș, 2020).

The milling sector is dependent on the cereals sector, with extremely high cereal exports and the bakery sector importing large quantities of products to meet domestic demand. The year 2017 presented the highest values in terms of imported quantities of bakery products between 2012 and 2017, with the imported quantity being 140,730 tons, worth 325,978 thousand euros, while the quantity exported by Romania was 59,094 tons, with a value of 139,898 thousand euros (Radu, 2019).

In Romania, the area cultivated with oilseeds reached almost 2 million hectares. Rainfall levels increased soil moisture throughout the country, creating favorable conditions for germination and spring growth. Farmers have reported this in all of Romania, and the annual sunflower harvest is very good, although in the South-Eastern and the Western Region production is 10-25% lower than last year (Iancu, 2022; Micu, 2022).

In Serbia, the sunflower-growing area ranged from 16,415 hectares to 199,316 hectares, with family farms growing sunflowers in 66.8% of the total area. Among the challenges encountered in the market are the rising prices of inputs and primary products, family farms are severely affected, and the only solution is continuous monitoring of profitability (Todorović, 2010).

The importance of wheat and sunflowers in ensuring food security for the population, farmers' income, and international trade makes it an interesting topic to study, especially in the current socioeconomic and political context. Wheat and sunflower prices have increased in recent months due to the uncertain political situation in Eastern Europe: in the week 7-13 April 2022, the average price of sunflower was 625 Euros/tonne, compared to 506 Euros/tonne at the beginning of March, according to the quotations of the Romanian Commodity Exchange (https://www.brm.ro/cotatii-cereale/, 2022), indicating a 23% increase in just a few weeks. The price of wheat rose from 257 Euros/tonne to 307 Euros/tonne in the same period, an increase of 19%. Furthermore, FAO statistics show the same price increases for cereals and sunflower seeds.

3. Research Questions and Objectives

In view of the above, the article aims to answer the following questions: What role do Eastern European countries play in the world market for wheat and sunflower seeds?; Is the current availability of wheat and sunflower sufficient to cover domestic needs in Romania and Serbia?

The objectives of the research are to identify the production and export potential of wheat and sunflower in Romania and Serbia and to estimate future trends for the production of these products.

The research hypothesis is that Romanian and Serbian outputs of wheat and sunflower seeds are sufficient to cover the domestic food security and the foreign trade, although the current unstable political and social situation in Eastern Europe. The assumption is based on previous research (Turek et al., 2018), showing that Romania ranked first among the top sunflower seeds exporters in 2014, with $546,644,000 export value (FAOSTAT).

4. Research Methods

The research is based on data provided by the Food and Agriculture Organization of the United Nations and the Trade Map. Based on the data, forecasts will be made using the Excel function FORECAST. This function predicts values based on data

that exist along with a linear trend and calculates these predictions of future values using linear regression.

The main indicators comparatively analysed are: area and production of sunflower seeds and wheat, export potential of Romania and Serbia for the two crops, and performance of the wheat and sunflower seeds branches in Romania for the time horizon 2021-2030, in the context of existing situations (COVID-19 pandemic, war in Eastern Europe).

5. Findings

In Romania, the area cultivated with sunflowers in 2015 recorded more than 1 million hectares, reaching in 2020 a cultivated area of about 1.2 hectares, showing an increase of more than 18% in the period under review. Sunflower seeds' yield increased by 4%, from 1770 kg/ha in 2015, to 1840 kg/ha in 2020. In 2015, Romania produced 1.15 million tonnes of sunflower seeds, reaching a production of about 2.2 million tonnes in 2020, an increase of 23% (Table 1).

Table 1. Main technical indicators for sunflower cultivation

Country	Indicator	2015	2016	2017	2018	2019	2020	2020/2015 (%)
Romania	Total area (ha)	1,009,140	1,038,414	999,162	1,006,990	1,282,700	1,194,320	18.35
	Average production (kg/ha)	1,769	1,957	2,915	3,041	2,782	1,840	4.03
	Total production (tonnes)	1,785,771	2,032,340	2,912,743	3,062,690	3,569,150	2,198,670	23.12
Serbia	Total area (ha)	166,192	200,299	219,338	239,148	219,404	221,149	33.07
	Average production (kg/ha)	2,630	3,101	2,464	3,068	3,323	2,879	9.47
	Total production (tonnes)	437,084	621,127	540,590	733,706	729,079	636,688	45.67

Source: FAO.

In 2015, Serbia had an area under sunflower cultivation of 166.1 thousand hectares, reaching 221.1 thousand hectares in 2020, an increase of 33%. In terms of average sunflower production, Serbia has seen an increase of 9.5%, from 2630 kg/ha to 2880 kg/ha. The total sunflower seed production recorded by Serbia in 2020 was 636.7 thousand tonnes, an increase of more than 45% compared to the production recorded in 2015 (437 thousand tonnes).

It can be seen that in 2020, the sunflower growing area in Romania is five times larger than the area cultivated by Serbia, and in terms of production, Romania recorded 3 times higher production than Serbia (Table 1). This indicates a higher level of average production in Serbia compared to Romania, as can be seen in Table 1.

Table 2. Evolution of main technical indicators for wheat cultivation

Country	Indicator	2015	2016	2017	2018	2019	2020	2020/2015 (%)
Romania	Total area (ha)	2,102,444	2,135,304	2,051,664	2,116,150	2,168,370	2,281,690	8.53
	Average production (kg/ha)	3,787	3,948	4,891	4,793	4,748	2,960	-21.83
	Total production (tonnes)	7,962,421	8,431,131	10,034,955	10,143,670	10,297,110	6,754,530	-15.17
Serbia	Total area (ha)	589,922	595,118	556,115	643,083	577,499	581,128	-1.49
	Average production (kg/ha)	4,116	4,847	4,092	4,574	4,389	4,944	20.13
	Total production (tonnes)	2,428,203	2,884,537	2,275,623	2,941,601	2,534,643	2,873,503	18.34

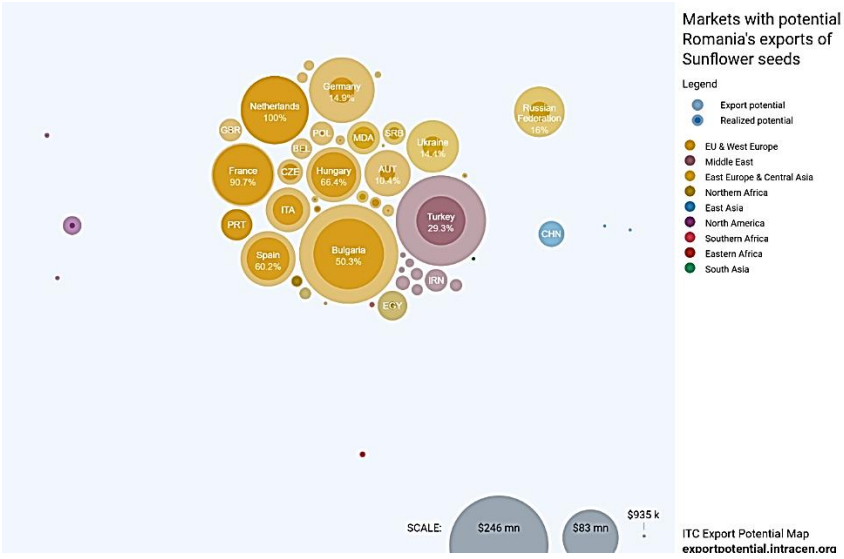
Source: FAO.

In Romania, the wheat area increased by 8% in 2020 (2.53 million hectares), compared to the area recorded in 2015 (2.1 million hectares). Wheat yield decreased by approximately 22%, from 3780 kg/ha in 2015 to 2960 kg/ha in 2020. Total production also decreased by more than 15% in 2020 (6.7 million tonnes), compared to production in 2015 (8 million tonnes).

In Serbia, the wheat area decreased by 1.5% in 2020 when 581 thousand hectares were recorded, compared to the area in 2015 (590 thousand hectares). Although the cultivated area decreases, the average yield increases by 20% in 2020 (4.94 kg/ha) compared to 2015 (4.12 kg/ha). Total production increased by 18% in 2020 (2.9 million tonnes) compared to 2015 (2.4 million tonnes).

Thus, it can be seen that Romania's wheat area in 2020 was higher, about 4 times higher than the area recorded in Serbia, and Romania's production was twice as high (Table 2), again indicating higher wheat yields in Serbia compared to Romania.

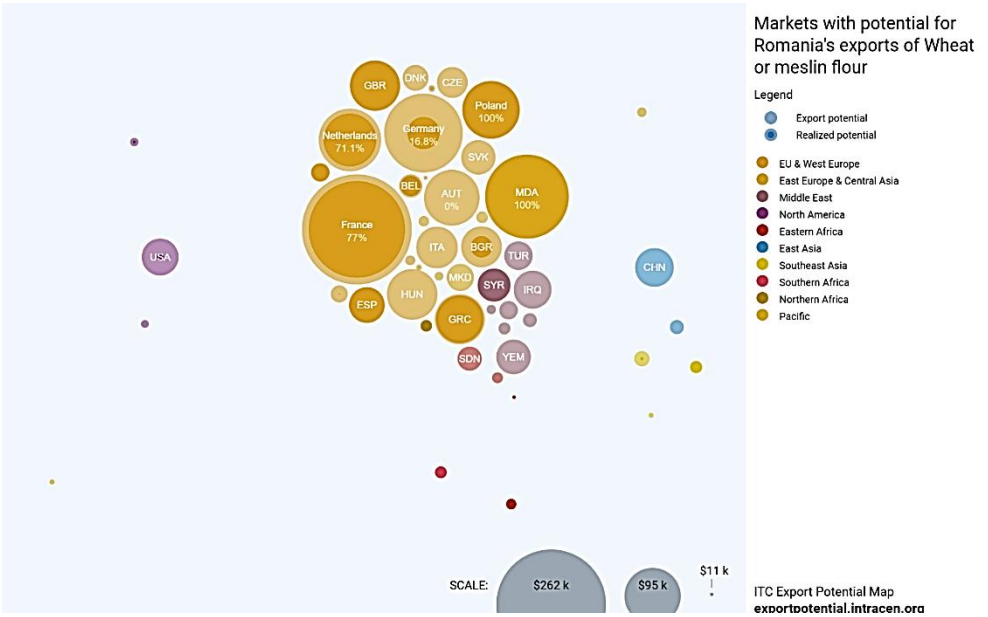
Figure 1. Romania's export potential for sunflowers



Source: intracen.org.

According to the intracen.org website, the markets with the highest potential for sunflower exports are Bulgaria, Turkey, and the Netherlands. Current exports to Bulgaria amount to $124 million and the remaining potential would be $123 million, while in the case of Turkey, current exports amount to $60 million and the remaining potential would be $145 million (Figure 1).

Figure 2. Romania's wheat export potential



Source: intracen.org.

In the case of wheat, the markets with the highest potential for Romanian exports are France, Moldova, and Germany. Current wheat exports to France are worth $202 million, and the remaining potential is around $60 million. And in the case of Germany, current wheat exports stand at $26 million, but the remaining export potential would be $128 million (Figure 2).

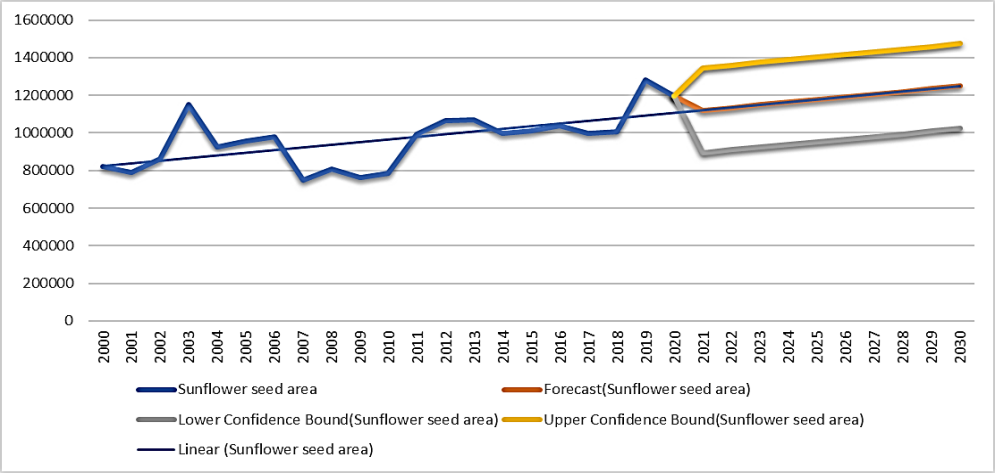
Table 3. World's main sunflower producers in 2019 (tonnes)

Country	Production	% of Top 25
Russia	15,379,287	28,31%
Ukraine	15,254,120	28,08%
Argentina	3,825,750	7,04%
Romania	3,569,150	6,57%
China	2,420,000	4,45%
Serbia	729,079	1,34%

Source: FAO.

In 2019, at the world level, the first place was occupied by Russia with 15.4 million tonnes, followed by Ukraine with a production of 15.3 million tonnes and Argentina with 3.8 million tonnes. Romania is an important player in the oilseed market, ranking fourth in 2019 in sunflower production. Serbia also ranks 15th with a production of 729 thousand tonnes (Table 3).

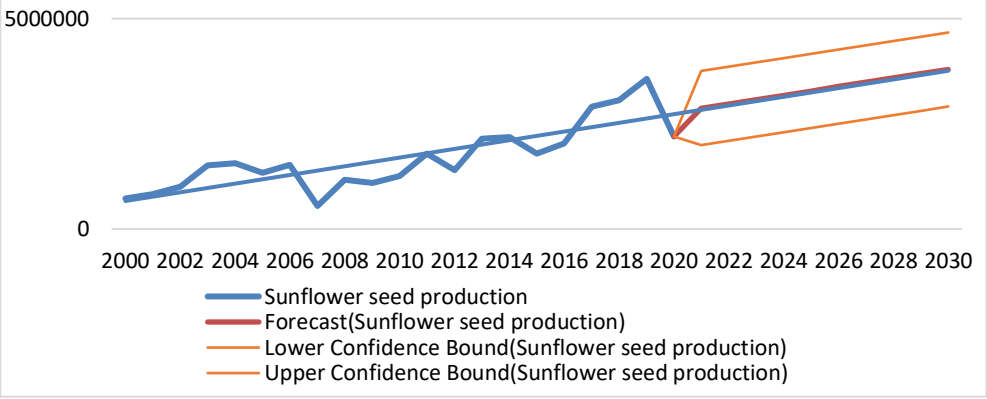
Figure 3. The area under sunflower in Romania, trends and estimates (ha)



Source: Own processing based on FAO data.

In 2000, the area under sunflower cultivation was about 822.1 thousand hectares, reaching a cultivated area of about 1.2 million hectares in 2020. It is estimated that the area under sunflowers in 2030 will be more than 1.2 million hectares. The pessimistic variant estimates an area of 1 million hectares, while the optimistic variant estimates an area of 1.5 million hectares in 2030 (Figure 3).

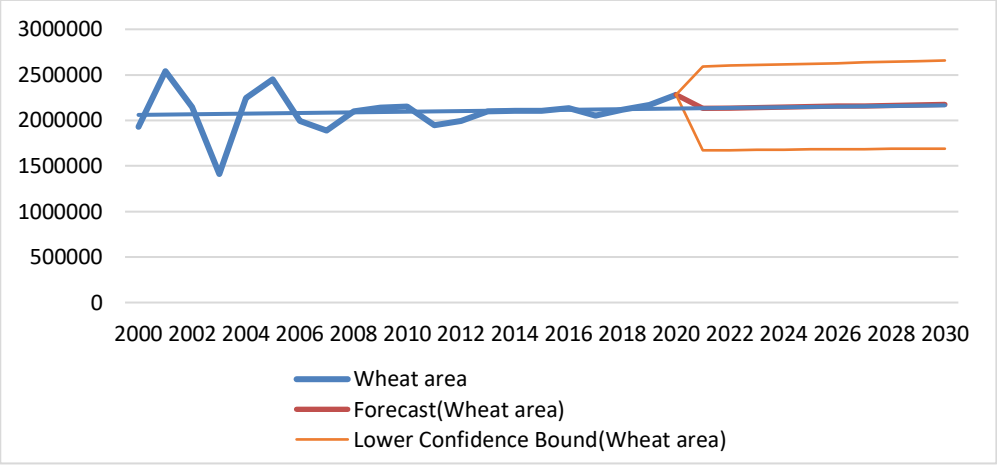
Figure 4. Sunflower seeds production in Romania, trends and estimates (tonnes)



Source: Own processing based on FAO data.

Sunflower seed production in 2000 was around 270.8 thousand tonnes, reaching 2.2 million tonnes in 2020. According to estimates, 3.9 million tonnes will be produced in 2030, an increase of 77% compared to 2020. The pessimistic scenario also estimates sunflower seed production of around 3 million tonnes, while the optimistic scenario estimates production of 4.8 million tonnes in 2030 (Figure 4).

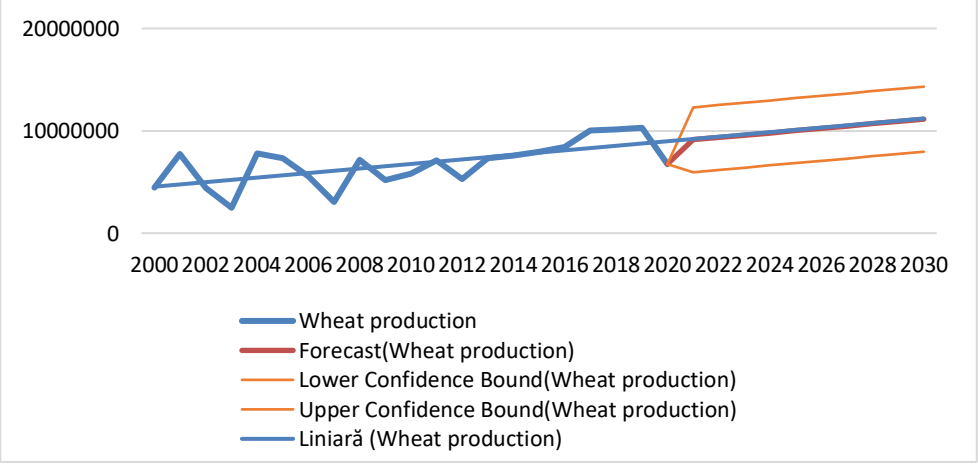
Figure 5. Wheat area in Romania, trends and estimates (ha)



Source: Own processing based on FAO data.

Regarding the evolution of the wheat area in Romania, in 2000 an area of 1.9 million hectares was recorded, reaching a cultivated area of 2.3 million hectares in 2020. Estimates show that in 2030 the wheat area will reach 2.2 million hectares, a decrease of 4.3% compared to 2020. The optimistic scenario estimates a cultivated area of 2.6 million hectares, while the pessimistic scenario estimates a cultivated area of 1.7 million hectares in 2030 (Figure 5).

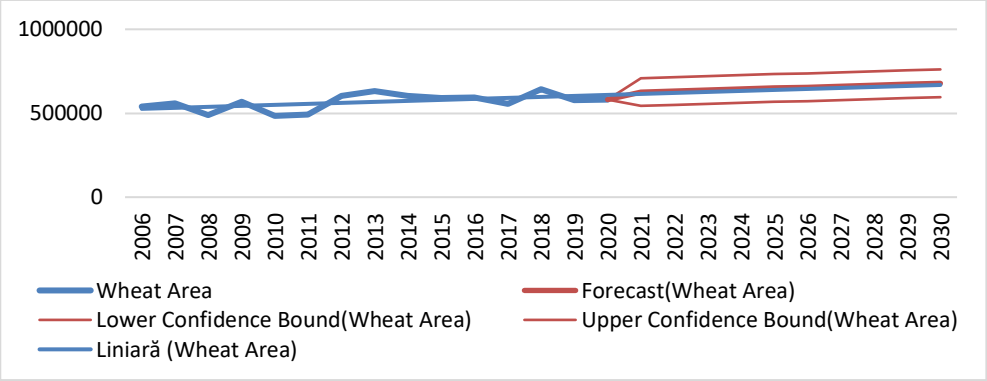
Figure 6. Wheat production in Romania, trends and estimates (tonnes)



Source: Own processing based on FAO data.

Wheat production in 2000 was 4.4 million tonnes, which increased to 6.7 million tonnes in 2020. Production in 2030 is estimated to be 16 million tonnes, up 138% from 2020. The optimistic scenario estimates production at 14.1 million tonnes, while the pessimistic scenario estimates production at 8 million tonnes in 2030 (Figure 6).

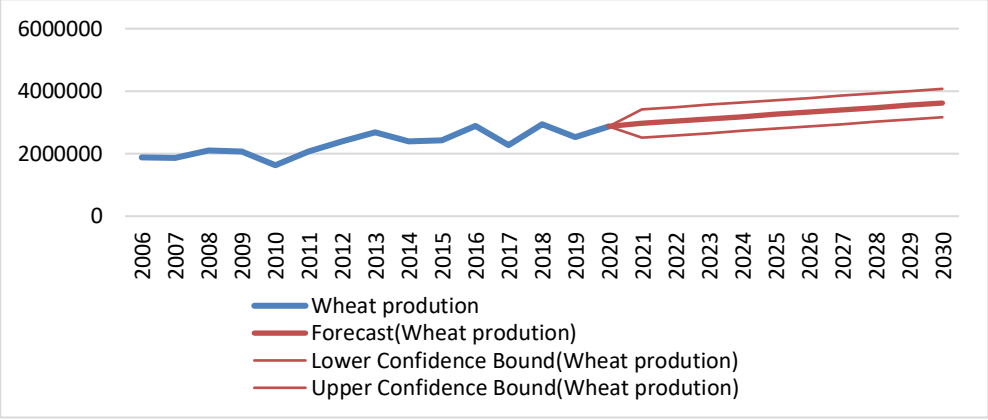
Figure 7. The area under wheat in Serbia, trends and estimates (ha)



Source: Own processing based on FAO data.

In 2006, Serbia recorded an area of 539,813 hectares of wheat cultivation, reaching 581,128 hectares in 2020. According to estimates, in 2030 Serbia will cultivate wheat on 690,000 hectares, an increase of 17.7% compared to the area recorded in 2020. The optimistic variant estimates an area of 780,000 hectares and the pessimistic variant estimates 600,000 hectares (Figure 7).

Figure 8. Wheat production in Serbia, trends and estimates (tonnes)



Source: Own processing based on FAO data.

In Serbia, wheat production in 2006 was 1,875,335 tonnes, reaching 2,873,503 tonnes in 2020. According to estimates, in 2030 production will reach 3,600,000 tonnes, the optimistic variant estimating production of over

4,000,000 tonnes, while the pessimistic variant estimates production of 3,200,000 tonnes (Figure 8).

Table 4. Comparative analysis of wheat balance in Romania and Serbia (1000 tonnes)

Specification	România		Serbia	
	2018	2019	2018	2019
Production	10,143.67	10,297.11	2,941.60	2,534.64
Import Quantity	692.64	853.98	0,95	1.09
Stock Variation	820.01	1,099.59	73,23	428.83
Export Quantity	5,880.52	6,103.15	1,107.38	324.41
Feed	370.32	493.66	310.80	367.35
Seed	889.49	584.63	137.42	166.06
Loss	22.00	15.62	73.71	49.08
Processed	2,853.33	2,853.33	1,240.00	1,200.00

Source: FAO.

In 2019, Romania recorded a production of 10.3 million tonnes of wheat, to which 854 thousand tons of imported wheat were added. At the same time, the quantity exported was 6.1 million tonnes, while animal feed, sowing and losses totalled 1.1 million tonnes, to which was added the 2.85 million tonnes intended for processing, resulting in a change in stocks of around 1.1 million tonnes.

In the case of Serbia, production in 2019 totaled 2.53 million tonnes, of which 429 thousand tonnes were exported, while animal feed, sowing and losses totalled 582 thousand tonnes, resulting in a stock change of 428 thousand tonnes.

Both Romania and Serbia, in terms of wheat, it can be said to ensure food security (Table 4).

6. Conclusions

The results of the study show that the wheat sectors in Romania and Serbia registered growth in both area and production in the reference period 2016-2020. Therefore, the wheat area in Romania increased by 18% in 2020 compared to 2016, while in Serbia the area increased by 33% in the same period. In terms of total production, in Serbia it increased by 9% in 2020 compared to 2016, while in Romania it increased by only 4%. Sunflower cultivation in Romania increased by approximately 9% in terms of area cultivated in 2020 compared to 2016, while Serbia recorded a decrease of 1.5%. In terms of yields, Romania recorded a 22% decrease in average production in 2020 compared to 2016, while Serbia recorded an increase of more than 20%.

According to estimates, the area under sunflower in Romania will remain at 1.2 million hectares in 2030. In the case of sunflower seed production, estimates show that it will reach 3.9 million tonnes in 2030, an increase of 77% compared to the production recorded in 2020. The estimates of the wheat area in 2020 show a decrease of 4.3% in 2030 (2.2 million hectares) compared to the area in 2020 (2.3 million hectares). Wheat production estimates show a significant

increase of 138% in 2030 (16 million hectares), compared to production in 2020 (6.7 million tonnes).

These results validate the hypothesis that the Romanian and Serbian outputs of wheat and sunflower seeds are sufficient to cover the domestic food security and the foreign trade. Future research should consider the political risks that could be significant drivers in agricultural output achievement, logistic issues that could block the proper distribution of cereals, and other unpredictable factors.

References

[1] Arghiroiu, A.G, Cristea, S., Ioan, N.A. (2015). Tendencies Regarding Trade With Oleaginous Seeds Of Romania. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*, 15(3), pp. 49-53, Print ISSN 2284-7995, e-ISSN 2285-3952.

[2] Boboc, D., Popescu, G., Stoian, M., Lădaru, G.R. & Petrache, D.C. (2017). Best Practices for Integrating the Romanian Small Farmers into the Agri-Food Chain. *Amfiteatru Economic Journal*, 19(44), pp. 315-326.

[3] Branković, G.R, Balalić, I.M., Miroslav, Z.Z., Vladimir, J.M., Siniša, B. J., Gordana, G., Šurlan, M. (2011). Characterization of Sunfl Ower Testing Environments in Serbia, *Turk Tarim Ve Ormancilik Dergisi/Turkish Journal of Agriculture and Forestry* 36(3).

[4] Dumitru, E., Tudor, V., Micu, R. (2017). Analysis Regarding the Direct Payments in the European Union, *Scientific Papers-Series Management Economic Engineering in Agriculture and Rural Developmen*t, Vol. 17(4), pp. 113-116.

[5] Dumitru, E.A., Ursu, A., Tudor, V.C., Micu, M.M. (2021). Sustainable Development of the Rural Areas from Romania: Development of a Digital Tool to Generate Adapted Solutions at Local Level. *Sustainability*, 13, p. 11921, https://doi.org/10.3390/su132111921.

[6] FAO (2019). www.fao.org.

[7] Iancu, T., Petre, I.L., Tudor, V.C., Micu, M.M., Ursu, A., Teodorescu, F.-R., Dumitru, E.A. (2022). A Difficult Pattern to Change in Romania, the Perspective of Socio - Economic Development . *Sustainability* , 14, p. 2350, https://doi.org/10.3390/su14042350.

[8] Micu, M.M., Dumitru, E.A., Vintu, C.R., Tudor, V.C. (2022). Fintineru, G. Models Underlying the Success Development of Family Farms in Romania. *Sustainability*, 14, 2443, https://doi.org/10.3390/su14042443;

[9] Novković, N., Vukelić, N., Janošević, M., Nikolić, S., Arsić, S. (2020). Analysis and Forecast of the Production Parameters of Major Cereal Crops in Serbia, *Journal on Processing and Energy in Agriculture.*

[10] Petre, I., Nica, M. (2019). Analysis of the Rentability of the Conventional and Ecological Farming in Romania, *Quality-Access to Success*, 20(S2).

[11] Popescu, A. (2018). Romania's Sunflower Seeds Production, Export And Importanalysis of the 2007-2017 Period and Forecast for 2018-2022 Horizon. *Scientific Papers. Series "Management, Economic Engineering in Agriculture and Rural Development"*, 18(4), Print ISSN 2284-7995, pp. 261-270.

[12] PwC (2017). The development potential of the agricultural sector in Romania.

[13] Radu, L. (2019). The Bakery Sector of Romania – Present, Challenges and Perspectives in the Context of Increasing Competitiveness, *Basiq International Conference, New Trends in Sustainable Business and Consumption.*

[14] Todorović, S., Filipović, N., Munćan, M. (2010). Economic Analysis Of Sunflower Production on Family Farms in the Republic of Serbia, *Research Journal of Agricultural Science,* 42(3).

[15] Turek Rahoveanu, A., Turek Rahoveanu, M.M., Ion, R.A. (2018). Energy crops, the edible oil processing industry and land use paradigms in Romania – An economic analysis. *Land Use Policy* 17, pp. 261-270.

[16] Voicilaş, D.-M., Kalaman, O. (2020). Cereal Market in the Black Sea Region – Comparative Analysis for Romania and Ukraine, *Agricultural Economics and Rural Development*, New Series, Year XVII, No. 2, pp. 183-198.