

## ANALYSIS OF THE GRAINS SECTOR (WHEAT, BARLEY AND MAIZE) IN ROMANIA

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### Abstract

*This paper aims to present the analysis of the cereals sector in Romania, at the level of 2015-2020, analyzing the evolution trends of areas, production and trade for the main categories of cereals, respectively: wheat, barley and corn grains.*

*Using quantitative statistical methods, the paper analyzed the trend of the grain market, noting that in Romania are cultivated very large areas with grain cereals, being among the leaders of EU countries in terms of area (5.4 million hectares in 2020) and the production obtained (3,402kg / hectares in 2020). It was also noted that in our country, corn has the highest average production per hectare, respectively 3,963kg / hectares in 2020.*

*With the help of the forecast function, it was possible to highlight the forecasts regarding the evolution of areas and productions in the next five years, in the situation where the evolution trend analyzed in the period 2015-2020 is maintained, thus noticing an upward trend of areas cultivated with wheat, barley and corn, and for the production obtained for these cereals a downward trend.*

**Keywords:** cereals, areas, production, prices, consumption, foreign trade, trade balance.

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### Introduction

The world grain market is considered the key to the food industry, as it provides the raw material for food production, thus ensuring the food security of the population.

In terms of size, the grain market is influenced by the area cultivated with grain, which in 2020 was 5.35 million hectares, of which 47.86% corn, 40.15% wheat, 5.38% barley and 6.61% other cereals. This year, Romania ranked first in terms of area cultivated with corn, and in terms of production ranked second, after France. In wheat, Romania ranked fourth in the area cultivated after France, Germany and Poland and sixth in production after France, Germany, Poland, Spain and Italy (Alina Stanciu, 2020).

According to the data published by MADR, at the level of 2020 the cereal production in Romania reached 18.968 million tons, registering a decrease of approximately 38% compared to 2019. Also, the yield showed a reduction of 5,458 kg/hectares in 2019, at 3,600 kg/hectares.

### 1. Literature review

According to Gîndu et al. (2007) The cereals market is considered as a barometer, because it has in structure products that are the basis of the population's diet, anticipating possible changes that may affect the economy in general.

According to Chiran et al. (2008) cereals are of great importance in the world economy, having multiple uses: in human rations, in animal feed, as a raw material for processing

industries where finished products are made, the most important being the food industry that provides food to the population.

Voicilaş and Gavrilăscu (2016) consider that the cereal sector is one of the most important and developed sectors of the agri-food industry in the European Union (EU), with a constant expansion in terms of volume and quality, demand and variety of products offered to consumers. Among cereals, wheat and corn are the main crops of farmers.

Voicilaş and Kalaman (2020) state that Romanian agriculture is mainly based on cereal cultivation, which is traditionally determined by the need for self-sufficiency in population consumption, and favorable environmental conditions (Sima, 2009), as well as opportunities for export. Cereals represent the main crop practiced on arable land, on average 67.8% of arable land and this is a consequence of tradition, but also of the favorable fertile soil conditions in southern, southwestern and southeastern Romania.

According to Turek-Rahoveanu, wheat is the cereal crop that occupies an important place in the strategy of ensuring food security, primarily due to its high nutritional value, long shelf life, but also due to its specific characteristics and suitability for a diverse range of products. bakery. However, corn is a more productive plant than wheat in the climatic conditions in Romania and, in addition, material costs are lower for this crop.

Soare and Dobre (2016) state that corn is the key element in the structure of Romanian agriculture, given that it is the main natural resource for the production of biofuels.

## 2. Analysis of statistical data on cereal crops in Romania

Among the crops analyzed, in the period 2015-2020, the largest area was recorded for corn, which had an average area of 2,544,435 hectares, with variations between 2,402,082 hectares in 2017 and 2,678,504 hectares in 2019. At the level of 2020, the area cultivated with corn reached 2,560,041 hectares, registering a decrease of approximately 2% compared to 2015, respectively 2,605,165 hectares.

**Table 1. Area cultivated with main cereals in the period 2015-2020 (hectares)**

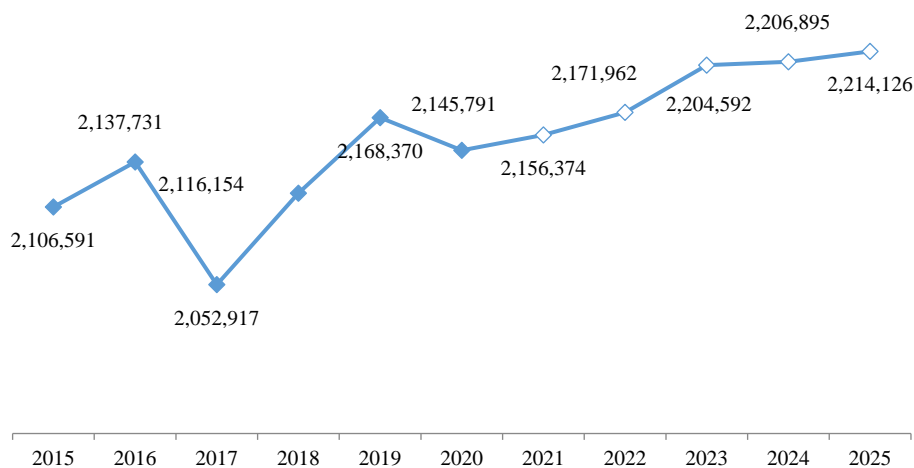
Specification	Years						MIN.	MAX.	AVERAGE	STD. DEV.	VARIATION COEFF. (%)	ANNUAL RYTHM, (%)
	2015	2016	2017	2018	2019	2020						
Wheat	2,106,591	2,137,731	2,052,917	2,116,154	2,168,370	2,145,791	2,052,917	2,168,370	2,121,259	40,011.08	1.89	0.37
Barley	266,941	295,996	268,826	250,797	285,065	287,778	250,797	295,996	275,901	16,669.73	6.04	1.51
Maize or corn	2,605,165	2,580,975	2,402,082	2,439,842	2,678,504	2,560,041	2,402,082	2,678,504	2,544,435	104,350.77	4.10	-0.35
<b>Total</b>	<b>4,978,697</b>	<b>5,014,702</b>	<b>4,723,825</b>	<b>4,806,793</b>	<b>5,131,939</b>	<b>4,993,610</b>	<b>4,723,825</b>	<b>5,131,939</b>	<b>4,941,594</b>	<b>149,166.31</b>	<b>3.02</b>	<b>0.06</b>

Source: INS, accessed on 26.10.2021

\* Coefficient of variation (10- small; 10-20- medium; 20- large)

From the analysis of the statistical indicators calculated for the three analyzed crops, a coefficient of variation of 1.89% for wheat, 6.04% for barley and 4.10% for maize was noticed, indicating the homogeneity of the data series in the analyzed period, its value being below the 10% threshold. The annual growth rate was positive for areas cultivated with wheat and barley, which was 0.37% and 1.51%, respectively, suggesting increases in areas over the period. For the area cultivated with corn, the growth rate showed a negative value of -0.35% indicating a reduction during this period.

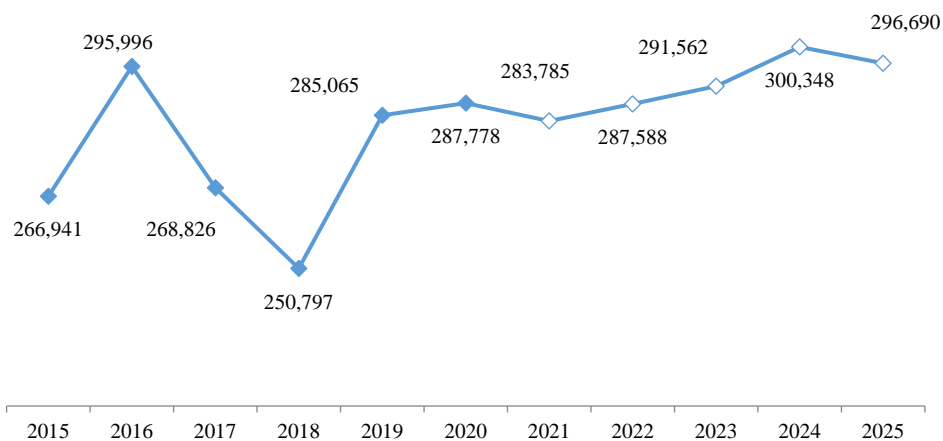
Using the Forecast function in excel, it was possible to observe the future trends of the areas cultivated with wheat, barley and corn, as follows:



**Figure 1. Evolution trend of wheat area in the period 2015-2025 (hectares)**

*Source: INS statistical data processing*

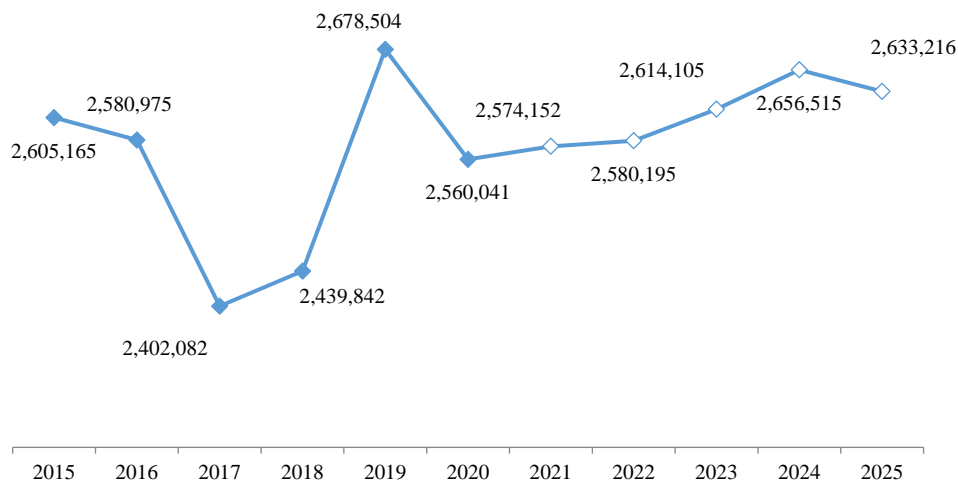
According to estimates, it is expected that by 2025 the area cultivated with wheat will increase, reaching 2,214,126 hectares, in the situation where the evolution trend analyzed in the period 2015-2020 is maintained.



**Figure 2. Evolution trend of barley area in the period 2015-2025 (hectares)**

*Source: INS statistical data processing*

In the case of the area cultivated with barley, following the estimates made through the forecast function, in the next period, respectively 2021-2025, it will reach 296,690 hectares in 2025, highlighting an increase of 11.14% compared to the area recorded in year 2015.



**Figure 3. The evolution trend of the grain maize area in the period 2015-2025 (hectares)**

*Source: INS statistical data processing*

Regarding the area cultivated with grain corn, according to estimates, it will have an increasing trend in the next period, reaching in 2025 2,633,216 hectares, 3% higher than in 2020, respectively 2,560,041 hectares .

**Table 2. Average production per hectare for main cereals in the period 2015-2020 (kg/hectares)**

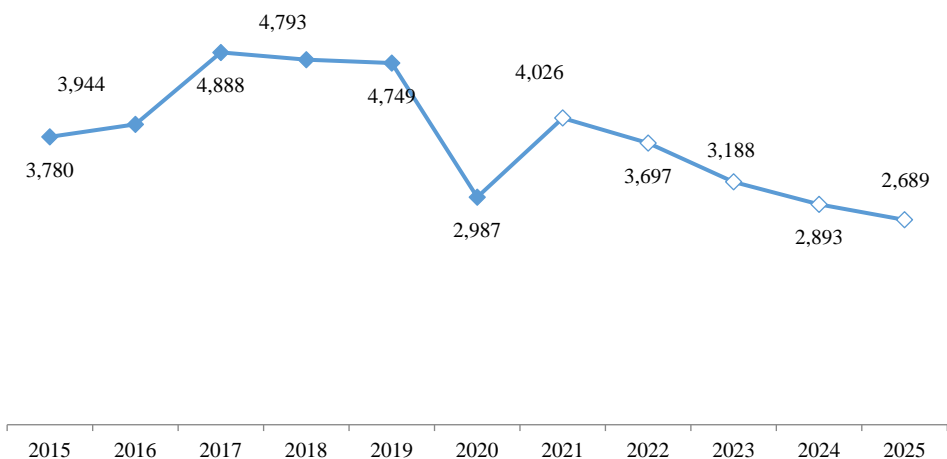
Specification	Years						MIN.	MAX.	AVERAGE	STD. DEV.	VARIATION COEFF. (%)	ANNUAL RYTHM, (%)
	2015	2016	2017	2018	2019	2020						
Wheat	3,780	3,944	4,888	4,793	4,749	2,987	4,888	4,190	753.54	17.98	-4.60	
Barley	4,019	4,283	4,731	5,090	4,702	2,882	5,090	4,285	782.30	18.26	-6.43	
Maize or corn	3,462	4,159	5,959	7,644	6,502	3,462	7,644	5,282	1,663.67	31.50	2.74	

*Source: INS, accessed on 26.10.2021*

*\* Coefficient of variation (10- small; 10-20- medium; 20- large)*

Analyzing the average production per hectares for the main cereals grown in Romania in the period 2015-2020, the following were noted: the average production of wheat and barley registered a downward trend. For wheat in 2020 there was a decrease of 21% compared to 2015, from 3,780 kg/ha to 2,987 kg/ hectares, and for barley the average production decreased by about 28% in the analyzed period, from 4,019 kg/ hectares at 2,882 kg/ hectares. The decrease in production was an effect of unfavorable weather conditions in recent years, with pedological drought endangering cereal production. Due to the severe drought in the main periods of crop vegetation and lack of irrigation, in 2020 cereal production was 40% lower and grain prices began to rise. Regarding the average production of grain maize, the evolution trend was an ascending one, at the level of 2020, registering an increase of 14% compared to 2015.

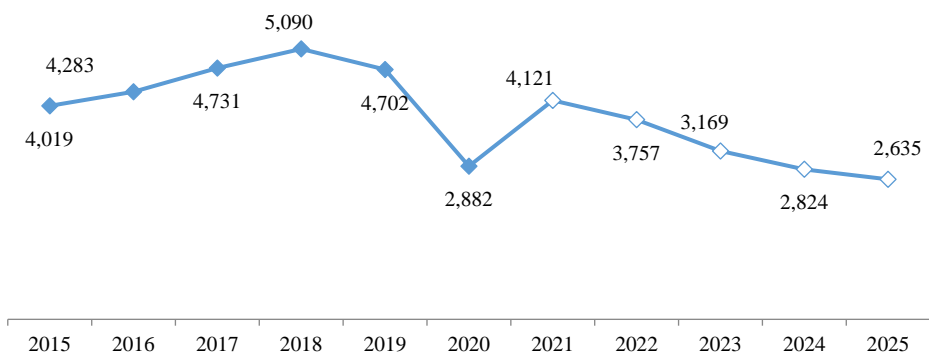
The value of the coefficient of variation determines an average variation of the data for the average production of wheat and barley, this being of 17.98%, respectively 18.26%. Regarding maize production, the coefficient of variation recorded was high, respectively 31.5%, exceeding the threshold of 20%, thus determining a series of inhomogeneous data. The annual growth rate showed negative values for wheat (-4.60%) and barley (-6.43%), indicating decreases in average production for these two crops. In the corn crop, the annual growth rate was 2.74%, its positive value marking increases in average production during the analyzed period.



**Figure 4. The evolution trend of the average wheat production in the period 2015-2025 (kg / hectares)**

*Source: INS statistical data processing*

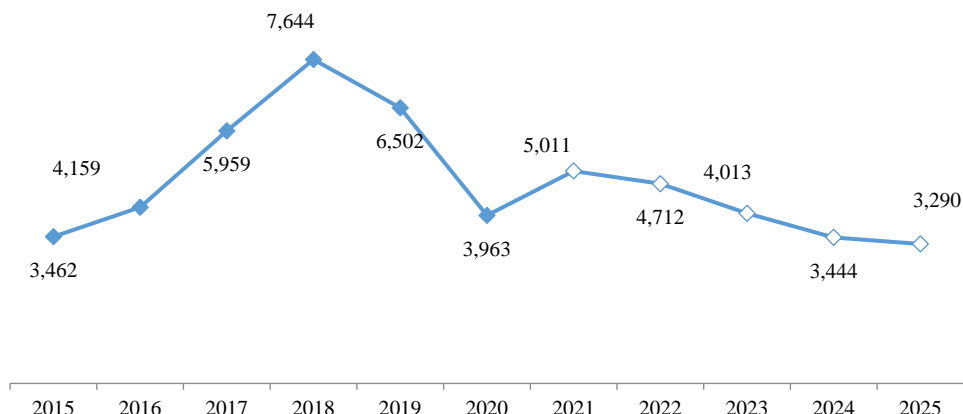
According to the estimates made using the forecast function, the average wheat production will register a downward trend, reaching 2,689 kg/ hectares in 2025, if this trend analyzed in the reference period 2015-2020 is maintained.



**Figure 5. The evolution trend of the average barley production in the period 2015-2025 (kg / hectares)**

*Source: INS statistical data processing*

Regarding the average production obtained from barley, it will register a decreasing trend in the next period, reaching 2,635 kg/ hectares in 2025, 34% lower than in 2015, respectively 4,019 kg/ hectares.



**Figure 6. The evolution trend of the average maize production in the period 2015-2025 (kg / hectares)**

*Source: INS statistical data processing*

In the case of the average production of grain maize, according to estimates, in the next period there is a negative trend, the average production will reach 3,290 kg/ hectares in 2025, noting a reduction of 17% compared to the average production in 2020.

**Table 3. Average purchase prices of the main cereals in the period 2015-2020 (lei / kg)**

Specification	Years						MIN.	MAX.	AVERAGE	STD. DEV.	VARIATION ANNUAL	
	2015	2016	2017	2018	2019	2020					COEFF. (%)	RYTHM, (%)
Wheat	0.74	0.63	0.65	0.68	0.73	0.79	0.63	0.79	0.70	0.06	8.61	1.32
Barley	0.67	0.56	0.58	0.64	0.69	0.71	0.56	0.71	0.64	0.06	9.42	1.17
Maize or corn	0.6	0.62	0.6	0.62	0.64	0.7	0.6	0.7	0.63	0.04	5.94	3.13

*Source: INS, accessed on 26.10.2021*

\* Coefficient of variation (10- small; 10-20- medium; 20- large)

Average purchase prices showed an upward trend in the period 2015-2020 for all categories of cereals analyzed. The most significant increase was registered for grain maize, from 0.6 lei / kg in 2015 to 0.7 lei / kg in 2020, highlighting an increase of approximately 17%. The increase in cereal prices has been largely influenced by the reduction in production in the last two years. In 2020, growth was further exacerbated by the economic effects of the health crisis caused by the Covid-19 pandemic.

From the analysis of statistical indicators, the following were noted: the coefficient of variation expresses the homogeneity of the data series for all categories of analyzed products, its value being below the threshold of 10%. The annual growth rate was positive, the prices

for corn cultivation registering the most significant increases in the analyzed period, its value being 3.13%.

**Table 4. Export with the main cereal crops in Romania**

Specification	Years					
	2015	2016	2017	2018	2019	2020
<b>Exported value - thousand euros</b>						
Wheat and meslin	693,104	1,142,168	999,743	1,035,714	1,136,368	831,297
Barley	300,514	194,234	217,614	232,906	184,984	213,455
Maize or corn	960,997	699,208	731,328	869,278	1,242,281	1,073,952
<b>Exported quantity, Tons</b>						
Wheat and meslin	3,555,281	6,993,999	5,847,830	5,886,756	6,189,461	4,343,629
Barley	1,763,164	1,310,986	1,442,725	1,336,107	-	1,311,007
Maize or corn	5,123,799	3,439,251	3,773,190	4,680,015	6,762,433	5,712,610

Source: *www.intracen.org*, accessed on 26.10.2021

In the period 2015-2020, exports registered significant increases for maize and wheat crops, both in terms of value and quantity. Maize was the most appreciated cereal crop for export, the value of exports reached in 2020 1,073,952 thousand euros, 12% higher than the value recorded in 2015, respectively 960,997 thousand euros. Regarding the barley crop, it was observed that during the analyzed period, both the value and the quantity of the export decreased.

**Table 5. Import with the main cereal crops in Romania**

Specification	Years					
	2015	2016	2017	2018	2019	2020
<b>Imported value- thousand euros</b>						
Wheat and meslin	115,195	331,919	202,846	115,302	158,219	222,917
Barley	82,972	70,515	67,545	45,558	25,683	115,270
Maize or corn	292,619	140,219	126,553	123,267	171,733	318,882
<b>Imported quantity, Tons</b>						
Wheat and meslin	652,265	2,155,963	1,249,985	695,333	880,290	-
Barley	533,792	480,421	467,990	279,727	156,039	-
Maize or corn	1,622,164	583,451	463,117	416,965	627,599	1,338,839

Source: *www.intracen.org*, accessed on 26.10.2021

Analyzing the amount registered for the category of analyzed cereal products, an increase was noticed, both in value and quantity. The most significant increase was recorded in wheat, in 2020, the value of imports being about 94% higher than in 2015. Also, barley cultivation increased by 39% in 2020, compared to the value barley imports since 2015. The increase in imports for these categories of cereals is attributed to the decrease in production obtained, this being very affected by the accentuated sect in the last two years.

**Table 6. Trade balance with cereal products**

<i>Trade balance - thousand euros</i>						
<i>Specification</i>	<i>Years</i>					
	<i>2015</i>	<i>2016</i>	<i>2017</i>	<i>2018</i>	<i>2019</i>	<i>2020</i>
Wheat and meslin	577,909	810,250	796,896	920,412	978,149	608,380
Barley	217,542	123,719	150,068	187,348	159,301	98,186
Maize or corn	668,377	558,989	604,774	746,011	1,070,549	755,070

*Source: www.intracen.org, accessed on 26.10.2021*

The trade balance for the analyzed cereal products registered positive values, the value of exports being significantly higher than the value of imports. There has been an upward trend in the trade balance for wheat and maize. Regarding barley, the trade balance registered a downward trend, registering a significant decrease by 55% in 2020 (98,186 thousand euros) compared to 2015 (217,542 thousand euros).

### **Conclusions**

The cereals sector provides basic food in the population's diet, being among the most consumed products in the food industry, both in Romania and in the member countries of the European Union.

Following the research, a very good potential for cereal cultivation in Romania was noticed, in the period 2015-2020, the cultivated area registering increases for wheat and corn crops, however the average production registered significant decreases, this being affected by drought, phenomenon meteorological that will affect the production of cereals in the coming years, according to forecasts.

It is noteworthy that in 2020 Romania will obtain a production of 16.99 million tons of corn grains, down by about 9% compared to 2018, when 18.66 million tons were reported, although the sown area was more large with 240 thousand hectares. The yield recorded in this culture was approx. 6,500 kg / hectares. The increase of the areas cultivated with corn is attributed to the loss of the areas sown with rapeseed due to the drought of autumn 2019, these areas being reseeded with either corn or sunflower.

Following the forecasts using the forecast function for the period 2021-2025, an optimistic scenario was noted for the area cultivated with cereals, which recorded an increase in all three crops analyzed. In terms of average yield, the calculations revealed a pessimistic scenario, influenced by the decrease in production recorded in the reference years.

Regarding the prices of cereals, in Romania, there was a slight increase in the time period analyzed, a possible cause can be attributed to inflation and rising production costs (rising prices for diesel and plant protection products). It was also noted the interdependence between years with low production and higher prices.

The analysis of foreign trade showed that both the value and the quantity of exports registered on this market exceeded those of imports, thus obtaining a positive trade balance. Romania is one of the largest grain exporters in the EU, the main export markets being represented by countries such as Egypt, Sudan and Jordan.

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