

Mihaela KRUZSLICIKA

*The Institute of Agricultural Economics, The Romanian Academy, Bucharest
mkruzslিকা@gmail.com*

REACTION OF THE CEREAL MARKET TO THE DISRUPTION OF TRADE FLOWS IN ROMANIA

ABSTRACT

The paper presents the reaction of the Romanian cereal market to the disruption of trade flows caused by certain shocks, such as the COVID-19 pandemic, which lead to changes with high impact on the functioning of this market, representing an important test for the resilience of the sector. Due to trade liberalization in global markets, including agri-food markets, the competitiveness of exports has become increasingly important, contributing to the creation of the country's competitive advantage. Any restrictions to trade in agri-food products can distort trade flows, and this disruption will have an impact on supply and prices. Maintaining a balance between imports and exports is essential to ensure domestic market stability. International trade in agri-food products plays an important role in global food security. The results show that Romania mainly exports unprocessed agricultural products, with cereals having the largest share in the export structure, cereal supply is dependent on climate change, yet it is one of the products with the lowest volatility. The cereal market shows a more elastic reaction to price responses, even though demand for staple foods is generally inelastic.

Key words: disturbance, market balance, trade, cereals, Romania.

JEL Classification: Q02, Q11, Q12, Q17.

1. INTRODUCTION

This paper analyses the possible disruptions of trade flows, including possible effects on Romania's agri-food trade with the EU countries affected by the COVID-19 pandemic. These trade disruptions include the European markets as well as the global markets. Price volatility is dictated both by objective factors, such as weather conditions (frost during the sprouting period, drought or excessive rainfall during the vegetative cycle), and by subjective factors (price increase, price fluctuations on the world markets – that are not always dictated by the supply and demand for a certain product but rather by the market sentiment, these also having a speculative nature). Cereal markets have a more elastic reaction to price responses than the markets of processed foodstuffs and animal commodity markets.

2. MATERIAL AND METHOD

For the purpose of our study, we carried out an analysis of the literature, to identify specific materials, books, articles and other publications related to the topic of our research. International databases were consulted, such as CABI, Elsevier, Google Scholar and Web of Science, as well as websites of several international organizations, including FAO (*Food and Agriculture Organization of the United Nations*), W.F.P. (*World Food Programme*), I.F.P.R.I. (*International Food Policy Research Institute*), U.S.A.I.D. (*United States Agency for International Development*), as well as of other international non-governmental organizations. We selected and processed the available information that were highly relevant for the topic of our research. The research study addressed the issue in its evolution, at global and European level, within the framework of FAO, EUROSTAT, OECD etc. Relevant indicators for the addressed areas were identified. For the time series analysis, fixed and floating base growth indices were used, together with the Pearson correlation coefficient of data series and the coefficient of variation, which provide a clearer picture of dispersion than the mean squared deviation.

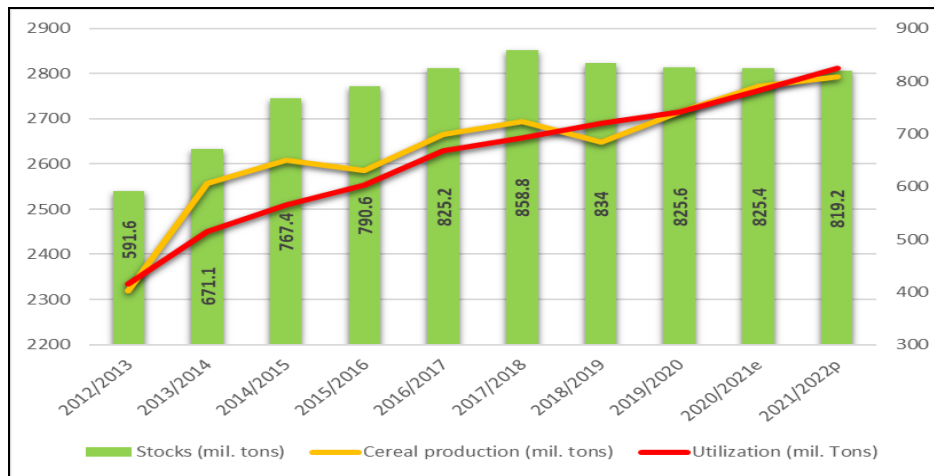
3. RESULTS AND DISCUSSIONS

3.1. CURRENT CONTEXT AT GLOBAL, EUROPEAN AND NATIONAL LEVEL

Productions, average yields and areas worldwide. World cereal production has grown steadily in the period 2012–2020, with prospects for growth in the forecast year 2022 as well. A decrease of stocks over the last 5 years can be noticed, caused by a sharper increase in production utilization. It can be seen from Figure 1 that this increase in production utilization is not likely to generate a shortage of cereals worldwide, the stocks reported as availabilities being estimated to be maintained at 28.5% in the year 2022.

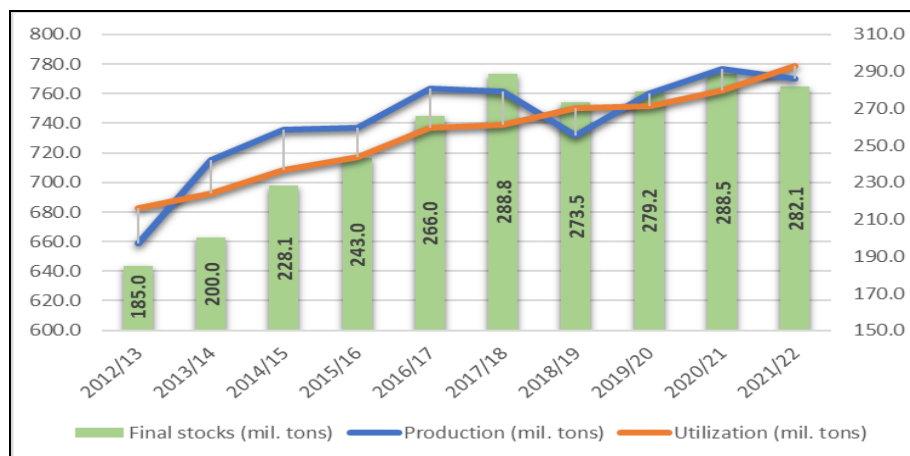
In the year 2020, there was a surplus between production and utilization of 8.5 million tons, with a difference between availability and utilization of over 834 million tons. The expected deficit for the year 2022 is low compared to the cereal stocks of 807 million tons.

In the investigated period, an intensification of trade flows was noticed and political and economic measures were initiated to mitigate trade disruptions. Wheat production had a steadily increasing trend. The exceptional production of the year 2021 (the highest in the investigated period) has resulted in stocks of over 288 million tons. The lowest wheat production was obtained in the year 2019, the decrease in production being caused by productions below expectations in most regions, with world production decreasing by 2.4% compared to the previous year (Figure 2).



Source: FAO, World Food Situation, 2021

Figure 1. Cereals – total production, stocks and utilization worldwide



Source: FAO, World Food Situation, 2021

Figure 2. Wheat production, final stocks and utilizations worldwide

Even in less favourable years for wheat production, the global deficit between production and utilization is much lower than the difference between availability and utilization, so existing stocks can attenuate production shocks by a fairly large margin. However, due to the uneven distribution of production and stocks, there are regions where food security is threatened, mainly in Africa.

Productions, average yields and areas at European level. In the EU-27 member states, the areas under cereals had a decreasing trend in the period 2012–2021. In the year 2021, the areas under cereals were down by 4.3%, to 51970

thousand hectares. Cereal production has seen moderate but steady growth, by the end of 2021 estimated to grow by 12.6%, due to a positive trend in average yields. The estimated yield in the year 2021 is 5.7 tons/hectare, 6% higher than the average of the entire period.

Table 1

Areas, productions and average yields for cereals, at European level

EU-27	Cereals			Wheat			Maize		
	Area	Production	Average yield	Area	Production	Average yield	Area	Production	Average yield
	Thou. ha	Thou. tons	tons	Thou. ha	Thou. tons	tons	Thou. ha	Thou. tons	tons
2012	54309	261689	4.8	21279	112652	5.3	9828	59529	6.1
2013	54972	286120	5.2	21791	124300	5.7	9767	66973	6.9
2014	54710	306219	5.6	22483	133042	5.9	9587	77736	8.1
2015	54183	289709	5.3	22495	136106	6.1	9249	59239	6.4
2016	53648	277371	5.2	22432	120641	5.4	8541	62963	7.4
2017	52000	284960	5.5	21594	128306	5.9	8267	65049	7.9
2018	51916	271272	5.2	21271	115751	5.4	8252	69309	8.4
2019	53244	297015	5.6	22066	132145	6.0	8917	70410	7.9
2020	52287	280642	5.4	20714	118010	5.7	8961	65561	7.3
2021e	51970	294759	5.7	21691	132043	6.1	9082	69046	7.6

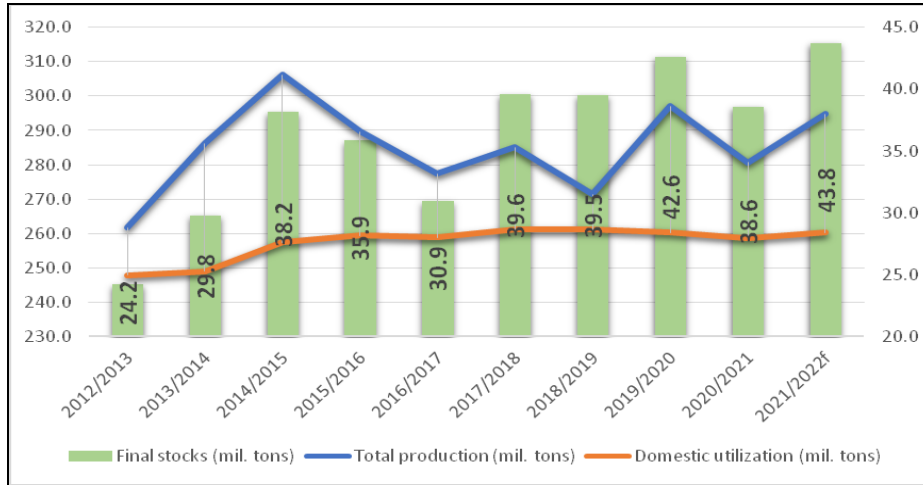
Source: European Commission, Cereals statistics

The area under wheat remained approximately the same, down by 0.4% from the average; production increase by 5.4% is due to the 5.9% increase of average yield compared to the average. In maize, a slight increase of areas can be noticed, by 0.4% compared to the average. Production in the year 2021 is estimated at 69046 thousand tons, up by 3.7% from the 2012–2021 average. The average yield in maize, estimated at 7.6 tons/ha is the third largest yield, after that of the year 2018, of 8.4 tons/ha and that of 2014 of 8.1 tons/ha.

Balance sheets for cereals in Europe. Total cereal production, as presented in Figure 3, in the EU-27 member states, is higher than domestic utilization throughout the period 2012–2022 and in perspective for the year 2022. A slight increasing trend can be noticed in total production, the coefficient of variation being 4.3%.

The domestic utilization is relatively constant, as it can be seen from Figure 3, with a coefficient of variation of 1.8%, always lower than production. The cereal output value at European level was 280.6 mil. tons in the year 2021, with a growth perspective of 5% in the year 2022, up to 294.8 mil. tons.

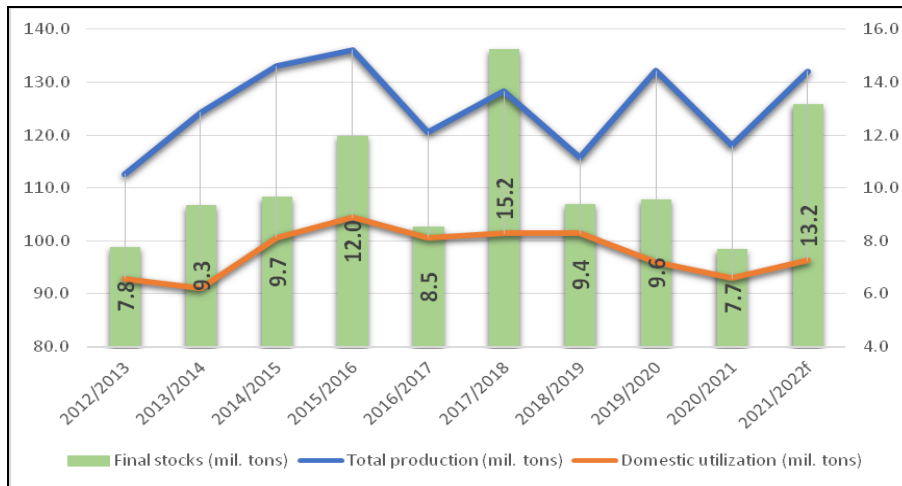
The production/utilization ratio was positive throughout the investigated period. The domestic utilization to total availabilities represents 75%, on average, over the entire period. Final stocks have an increasing trend in the investigated period, the stock/utilization ratio being 14.9% in the year 2021.



Source: European Commission, Cereals statistics

Figure 3. Production, utilization and final stocks – cereals – EU-27 (mil. tons)

Wheat balance sheets – EU-27. An increasing trend can be also noticed in wheat production, which totalled 118 mil. tons in 2021, to reach 132 mil. tons in 2022. Final wheat stocks feature a higher variability than total cereals, with a coefficient of variation of 22.8% (Figure 4).



Source: European Commission, Cereals statistics

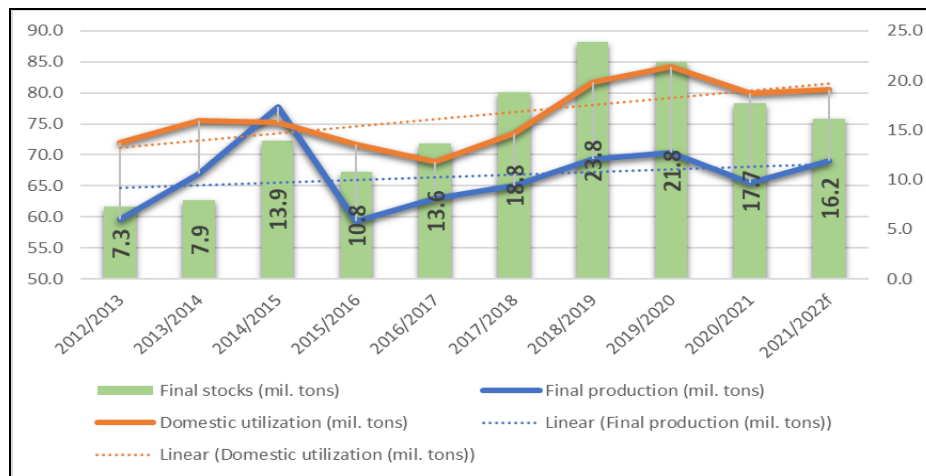
Figure 4. Production, Utilization and Final stocks – wheat – EU-27 (mil. tons)

The availabilities/utilization ratio has an average value of 71.2% throughout the investigated period. The domestic utilization is relatively constant, while the

trend of total production is slightly increasing, due to the sharper increase of average yields in the conditions of decreasing areas.

The production/utilization ratio is constantly greater than one, the average of the last 9 years being 128.3%, which makes the EU-27 represent, together North America (USA and Canada), one of the important exporters worldwide, with Asia being the main export market. The top 5 EU wheat producers, in the year 2021, are France, Germany, Poland, Spain and Romania.

Maize balance sheets – EU-27. In the case of maize production (Figure 5), it can be seen that production in EU-27 is significantly lower than utilization, with the exception of the year 2015, which makes the EU-27 a net importer of maize, the export/import ratio being about 28% on average in the 9 years.



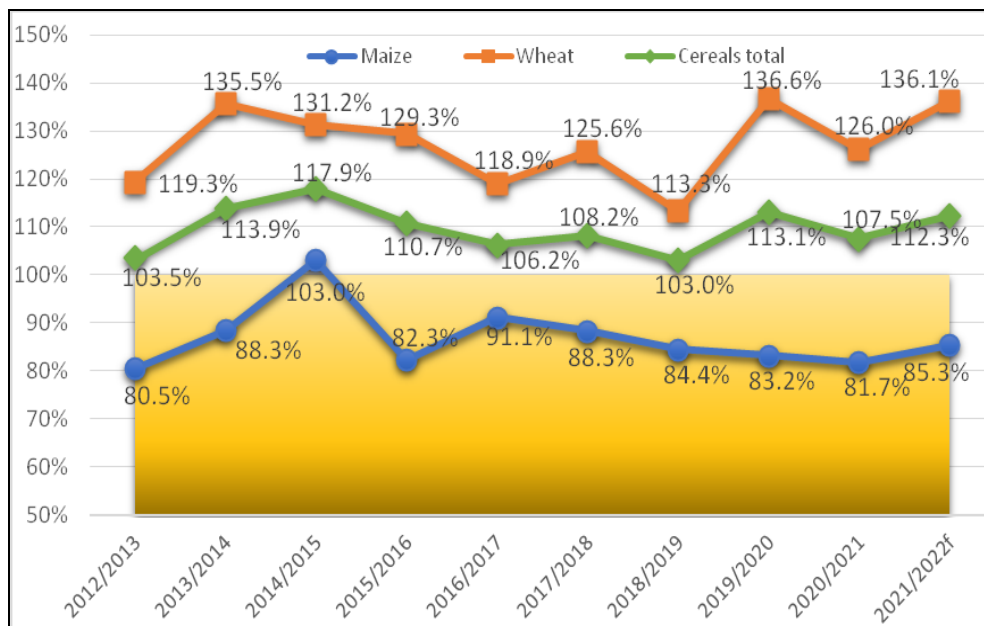
Source: European Commission, Cereals statistics

Figure 5. Production, utilization and final stocks – maize – EU-27 (mil. tons)

Although an increasing trend in production and stocks can be noticed, this trend is lower than the increasing trend of utilizations, mainly due to the use for animal feeding. While for human consumption approximately 4.7 million tons of maize are used, consumption for animal feeding was about 68.1 million tons in the year 2020. The top 5 EU producers, in the year 2021, are France, Romania, Poland, Italy and Hungary.

Self-sufficiency degree in cereals – EU-27. There was self-sufficiency in total cereals in EU-27 throughout the investigated period, with the exception of maize production, in which there was a constant deficit, and the trend has been increasing (Figure 6).

Productions, average yields and areas at national level. In Romania, the production of cereals grew constantly, mainly due to the increase of average yields per hectare, the Pearson correlation coefficient being 0.995.



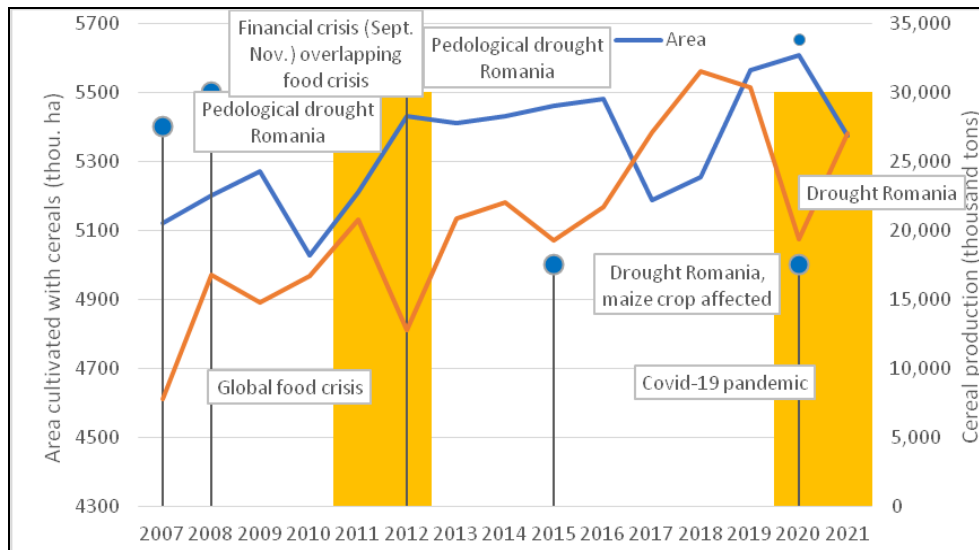
Source: European Commission, Cereals statistics

Figure 6. Self-sufficiency in cereals – EU-27

The years with the lowest productions of cereals were 2007, 2012, 2015 and 2020 and had a common cause, namely the prolonged drought. The years with high cereal productions were 2018 (31510 million tons), 2017 (30372 million tons), followed by 2017 (27096 million tons) and 2020 with 27023 million tons. The largest wheat production was obtained in the year 2021, i.e. 11442 million tons, with an average yield of 5.3 tons/ha and the largest maize production was obtained in 2018, with an average yield of 7.6 tons/ha.

In order to highlight the causality between regional environmental factors, production and global events, in Figure 7 we analysed productions and areas cultivated with cereals in the context of major global crises.

2008 was a difficult year worldwide, with two overlapping crises, i.e. the food crisis and the financial crisis. The main causes of the food crisis were the following: global production decline in the year 2008 as a result of climate change and depletion of irrigation water, mainly in Eastern Europe and Australia; reduction of stocks due to the perception that maintaining them generates losses, being expensive and economically inefficient (Trostell, 2008) as well as due to lower global productions in the previous years; the increase in demand mainly in emerging countries and the increase in production costs caused by increases in fuel and energy prices. The financial crisis in late 2008 (September – November) overlapped the food crisis, as a result of economic tensions that accumulated in the period 2000–2007.



Source: Eurostat 2021 data (apro_cpsh1)

Figure 7. Areas cultivated with cereals and productions

In the USA, the Federal Reserve lowered the interest rate to 1% in the year 2003 to boost economic growth. The result was an increase in the demand for credit, mainly for housing (real estate bubble). With the increase of interest rate to 5.25% (2007), against the background of low demand, the value of houses devalued much compared to the level at which credits were contracted, and many persons who had contracted these credits, beyond their own repayment capacity, could not be able to repay them, the American economy stalling in the year 2008 (<https://www.investopedia.com>).

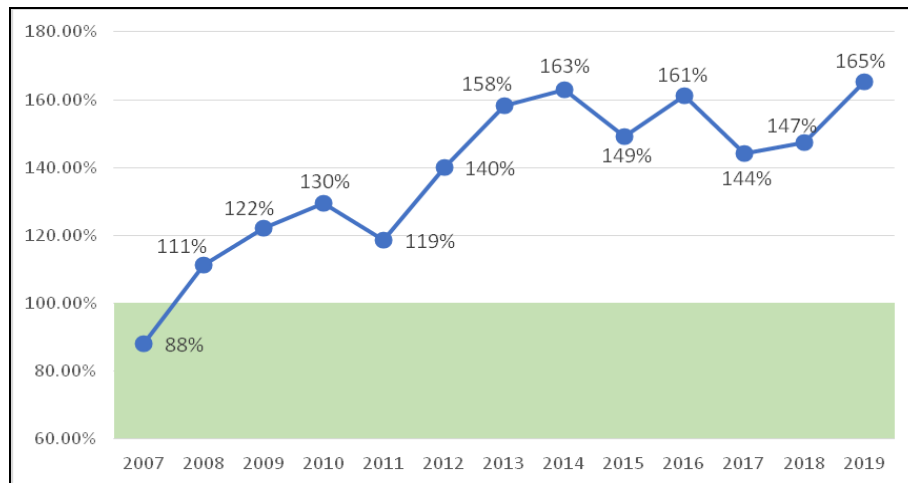
The food crisis of the years 2011–2012 was also the result of adverse climatic factors and of continuous increase in the demand for biofuels (<https://www.imf.org>).

Floods in Australia, Pakistan and parts of India, corroborated with drought in Argentina and Eastern Europe led to a sharp increase in the price of cereals. Although consumer demand increased in emerging countries, this rather materialised in the procurement of higher quality foodstuffs and not in higher consumption of cereals.

All these overlapping events led to a shift of interest from the capital market to the commodity market, including cereals, to reduce the accumulated losses.

Another important element was the increase of demand for biofuels, which put additional pressure on the price of cereals.

In all this economic context, it can be noticed from Figure 8 that the production of cereals in Romania was more sensitive to climatic factors than to economic factors at global level. The production decline is rather the result of unfavourable climatic factors, mainly severe drought and lack of adequate irrigation infrastructure than of global economic influence.



Source: Author's processing based on Food balance sheets 2007–2019, NIS

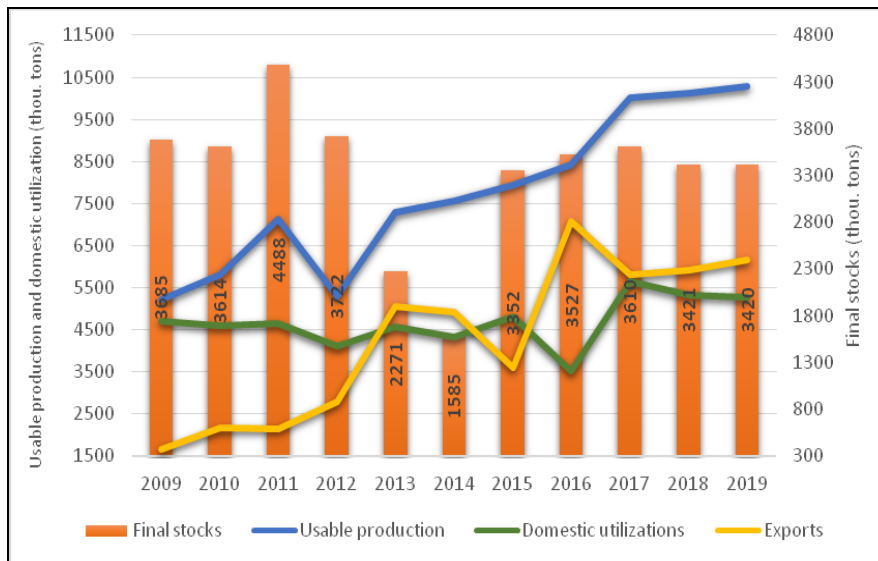
Figure 8. Self-sufficiency in cereal production

The COVID-19 pandemic in Romania has also induced disruptions in the economic flows of cereal production, yet the effects have been limited. The lack of restrictions on the movement of labour force, the high degree of mechanization of the activities specific to grain production have mitigated the possible effects on production. The pandemic crisis has affected other agricultural sectors much more significantly (i.e. the wine sector or livestock farming) than the crop production sector.

Food and supply balance sheets for cereals in Romania. With the exception of the year 2007, when the lowest cereal productions were recorded in Romania, it can be noticed that in terms of total cereal production, our country produces more than what is needed for consumption.

Domestic consumption availabilities had an upward trend in the period 2007–2019, by 27.5% higher than the average at the end of the period; this was mainly due to the increase of cereal production, imports accounting for 12% of the usable production. Cereal exports had an upward trend, averaging 37% of total usable production. Intermediate consumption had a downward trend, mainly due to the decrease in feed consumption.

Usable production for wheat had an increasing trend in 2009–2019, the average annual growth index being 8%. In the case of final stocks, the volatility was high, with a stabilization tendency around 3.5 million tons in the last five years. In Figure 9, it can be noticed that the increasing trend in usable production is more pronounced than in domestic utilizations.



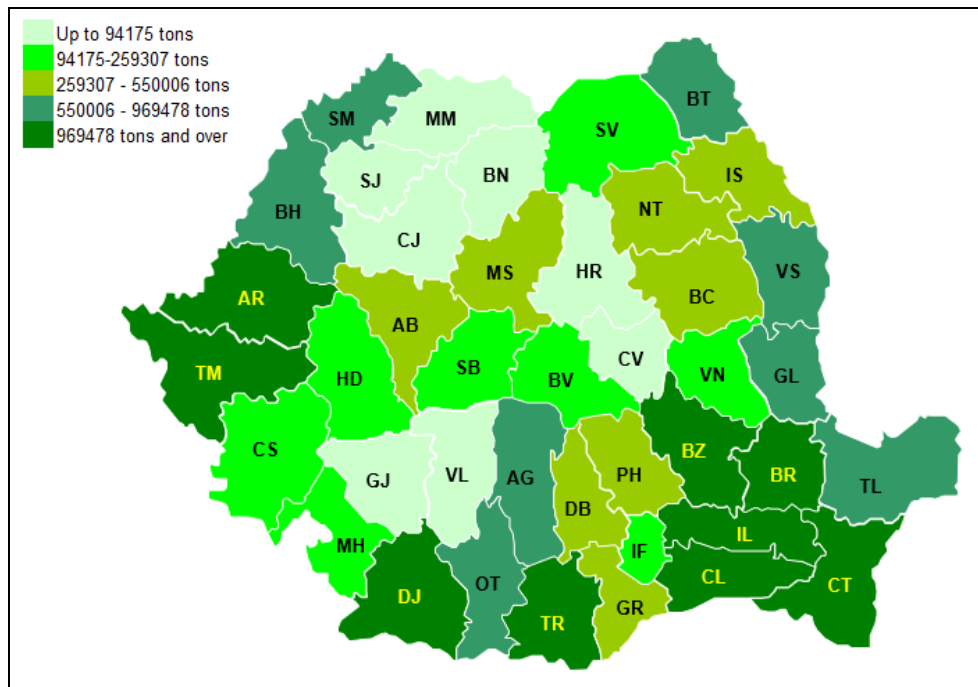
Source: Supply Balance data, NIS

Figure 9. Production, Utilization and Final stocks in wheat, in Romania (mil. tons)

The wheat quantity destined for export in the last four years was higher than domestic utilization, which leads to the conclusion that Romania has significant reserves in terms of food security in this product. The wheat quantities in final stocks in the year 2009, post-food crisis of 2008 and 2011–2012 lead to the conclusion that wheat production in Romania has not been affected by the global disturbances induced by these crises. The current increase in world prices can represent an additional source of income for cereal farmers, mainly in the context of the existence of surplus production storage capacities.

In the case of maize, Romania also has significant reserves to mitigate possible global disruptions.

Cereal storage capacity. Another indicator for the analysis of the ability to mitigate cereal production disturbances and their effects is represented by the grain storage capacity. According to the latest MARD data, in the year 2020, Romania had a cereal storage capacity of 27.9 million tons, representing about 89% of the total maximum cereal production of the last 10 years of 31.3 million tons. Out of this storage capacity, 13.6 million tons can be stored in silos (49%) and 14.4 million tons in warehouses (51%). In the next map (Figure 10) it can be seen that the largest storage facilities are found in the southern and south-eastern areas, as well as in the western and north-western areas of Romania.



Source: author's processing based on MARD data, 2021 (<https://www.madr.ro/>)

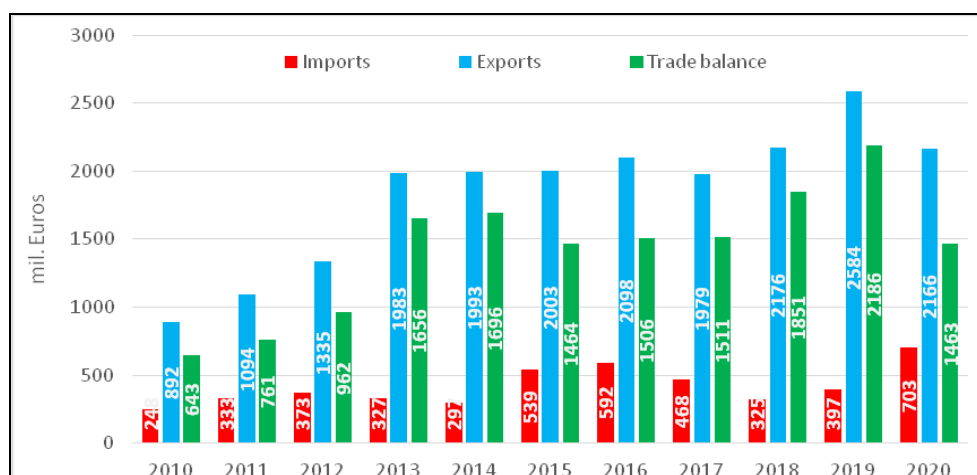
Figure 10. Regional distribution of cereal storage facilities in the year 2020

The top 5 counties where cereal storage facilities can be found sum up 45.2% of the total storage capacity at national level. These counties are Constanța (3.81 mil. tons), Timiș (3.79 mil. tons), Călărași (2.14 mil. tons), Ialomița (1.55 mil. tons) and Teleorman (1.34 mil. tons).

3.2. FOREIGN TRADE

Cereal trade in Romania. Cereal trade flows have intensified, Romania being a net exporter of cereals, with a positive cereal trade balance in the last 10 years. The value of exports totalled 2.16 billion euros in 2020, slightly down from the maximum value of 2.58 billion euros in 2019. The foreign trade balance in the year 2020 was lower than in 2019 because the production of cereals in the year 2020 was by 36% lower than in 2019 and, as a consequence, exports decreased while imports increased (Figure 11). Almost half of the value of imports in the year 2020 of 703 million tons was represented by the imports of maize of 321 million tons.

In the year 2020, 93.8% of total cereal imports have EU countries as partners, while 68.2% of cereal exports are based on partners outside the EU-27.



Source: Author's processing of COMEXT data

Figure 11. Balance of foreign trade in cereals

The main ten partner EU countries that are cereal importers account for 98.9% of total imports in the EU-27. Hungary is the main EU partner in terms of cereal imports, with a value of 366.7 million euros, followed by Bulgaria and France with 178.4 million euros and 49.158 million tons respectively.

The main partners in Romania's cereal imports with countries outside the European Union are Serbia with 19.86 million euros, Ukraine (6 million euros) and the Republic of Moldova with 5 million euros, the first ten accounting for 98.5% of total Romania's exports to countries outside the EU-27.

Romania's cereal exports account for 78% of total trade, the top ten EU-27 partners representing 94.7% of total intra-EU-27 exports, with a value of 689.2 million euros in the year 2020.

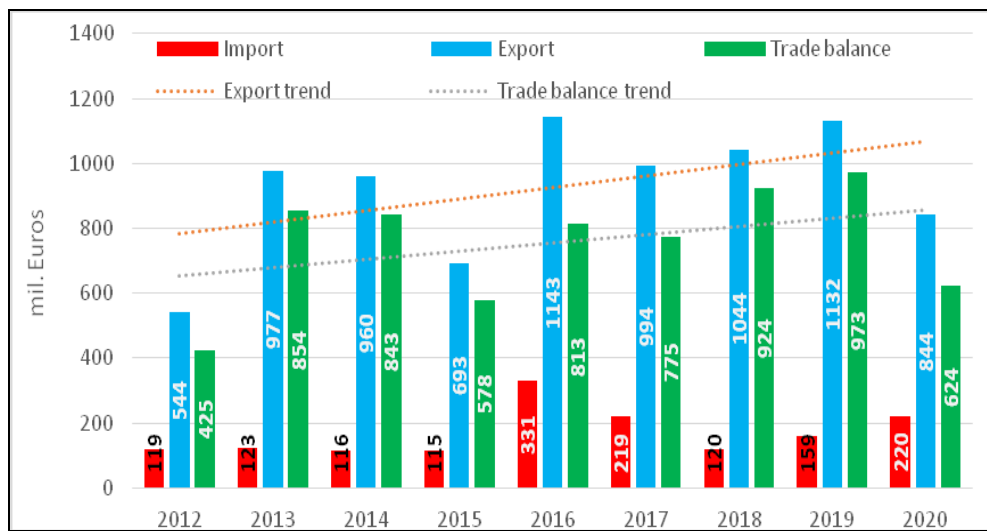
Spain is the main intra-EU export partner, with 167.6 million euros, followed by Italy with 118 million euros and the Netherlands with 92.6 million euros.

Romania's cereal exports to extra-EU-27 countries totalled 1477 million euros in 2020. The main export partners are Egypt (210 million euros), Jordan (144.4 million euros) and Saudi Arabia (142.1 million euros), according to COMEXT data.

From the analysis of Romania's trade trend in the period 2009–2020, we can draw the conclusion that global disturbances (food and/or financial crises, the COVID-19 pandemic, cereal price increases on the world markets) have had at most marginal influences, the trade flows being rather dictated by the production obtained, the Pearson correlation coefficient between export and production being 87.9%.

Romania's wheat trade. The wheat trade balance is positive, with an increasing trend. Imports averaged 15% of total foreign trade with wheat. The

highest value of imports was recorded in the year 2016, although wheat production was good (21.7 million tons of wheat), above the 2007–2021 average of 20.56 million tons, the variation of stocks was low (-56 thousand tons) and exports had the highest value in the analysed period. A possible explanation could be that part of the exported wheat production was re-imported. The average difference between imports and exports is 756 million euros, representing 69% of total trade flows.



Source: Author's processing of COMEXT data

Figure 12. Wheat foreign trade balance

In the year 2020, the value of Romania's wheat imports totalled 220 million euros, 98.4% of imports coming from EU countries. The first three partners sum up 97.9% of total intra-EU imports. These are Hungary with 139 million euros, Bulgaria with 68.7 million euros and Slovakia with a value of imports of 4 million euros. Romania imported wheat from extra-EU countries with a total value of 3.6 million euros, with Serbia having the largest share in imports, 74% of total imports, followed by the Republic of Moldova, with 26%. The value of wheat exports in 2020 totalled 844 million euros, 87.2% of exports going to extra-EU countries. The value of Romania's wheat exports to intra-EU countries totalled 108 million euros, the main three partners being Italy (30.9 million euros), Spain (29 million euros) and France (14.9 million euros), these three partners accounting for 69.2% of total exports to the EU-27. Exports to extra EU countries totalled 735.8 million euros, the first three partners being Jordan with 131 million euros, Egypt with 120.6 million euros and Philippines with 112.9 million euros, accounting for 49.6% of total imports.

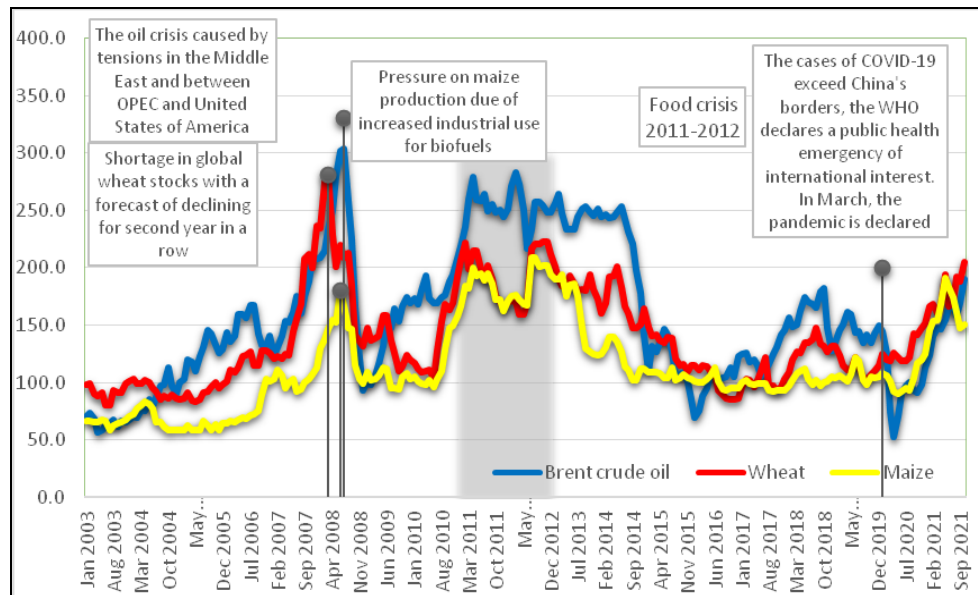
3.3. PRICES

Cereal prices on the world market are volatile and can have a significant influence on producers, warehouses or processors in this sector. These influences may be positive, in the sense that they can bring important profits, or negative, if the production is sold at a price close to the production price, and in this case the profit margin is significantly reduced, and there is even a risk that the selling price falls below the production price

The price volatility causes can be objective: adverse weather events that can result in a crisis of production in relation to utilizations, or on the contrary, favourable, in which case a surplus of production can occur, which, in the absence of storage capacities may force producers to sell part of their production at lower prices. As the utilizations are generally relatively inelastic, especially due to their predictability (human consumption does not vary greatly as eating habits do not change radically over short periods of time, feed consumption can be forecast both from historical data and from market research, seed consumption is also known, based on a mix between the crop rotation plan, the business plans that take into account the current market trend, the previous production for a certain crop type and the level of stocks), the value of production and of existing stocks are elements that dictate the prices. On the global market, any imbalance in terms of production and stocks at regional level can result in significant price fluctuations. This high volatility of prices produces effects in the countries with deficit of production and storage facilities, due to the increase in the price of processed commodities and of the seed material needed for the next harvest. It is worth mentioning that the seasonality of productions can represent a mitigating factor on price volatility as the production and marketing cycle takes place in the course of a calendar year, the level of future productions playing a determining role in the evolution of prices.

Besides the objective factors leading to high price volatility, there are also a number of subjective factors. In specific market conditions and under the action of disruptive economic phenomena (the 2008 financial crisis, the COVID-19 pandemic crisis), the interest of large stock market investors can change from one type of investment (shares, bonds, contracts for difference) to the commodity market (precious metals, steel, fuels or cereals). Understanding the context of the determinants of cereal price volatility can contribute to better forecast the duration and amplitude of this volatility, with all the effects that stem from these and can provide clues to measures to mitigate these effects in the future.

As it can be seen from Figure 13 (where spot prices are presented for: crude oil – Brent, FOB U.K., USD per barrel; wheat – Hard Red Winter, Kansas City, USD per metric ton and maize – U.S. No. 2 Yellow, FOB Gulf of Mexico, USD per metric ton), global events are immediately reflected in stock market prices. 2008 was the year of deep crises, which overlapped.



Source: International Monetary Fund, Price system of primary commodities

Figure 13. Spot prices for crude oil, wheat and maize in a global context, (USD/barrel, USD/ton)

On the one hand the effects of the decrease in wheat stocks worldwide and the perspective of their decrease in the year 2008 for the second consecutive year generated an increase in prices, even though speculative, for this product. Although in the year 2007 production was higher by 4.2% than in the previous year, despite the unfavourable conditions in Australia and Eastern Europe, the stock replenishment forecasts that envisaged more than one growing season led to the increase in wheat prices. Once the forecasts were revised favourably in early 2008, these prices fell sharply, in October 2008 approaching their level from 2006.

Another cause of the increase in cereal prices, in wheat implicitly, was the increased demand for biofuel production. FAO mentions that the determinants of price increase in maize were the increase of industrial utilization for biofuels, even by exceeding, sometimes unexpectedly, of the processed quantities, which overlapped the stock crisis and put pressure on the availability for human consumption and feedstuffs (<https://www.fao.org/>). The increase in the prices of crude oil, of fuels in general, had the effect of increasing the appetite of biofuel processors for additional quantities of maize for processing, which was estimated at 95 million tons in 2008, equivalent to 12% of the use at worldwide level (FAO, 2008).

The drop in the price of conventional fuels as a result of both the administrative measures of the US government to lift the order to suspend offshore drilling and the shift of attention to a crisis with much more dramatic effects, such as the financial crisis of 2008, also reduced the pressure on biofuels and consequently, on

the price of maize. A direct relationship can be noticed between the fuel and cereal prices, the Pearson correlation coefficient being 0.79 for wheat and 0.77 for maize.

The year 2020, which globally represented the beginning of the COVID-19 pandemic, with all its consequences, such as: imposing movement restrictions, imposing quarantine measures, temporary unavailability of workforce either as a result of illness or as impossibility of actually working, have produced only marginal effects on cereal prices. In the year 2021, an increase in the prices of cereals can be noticed in the second half of the year, although the decrease in stocks compared to the previous year would not justify such price volatility, being 6 million tons in the case of wheat. A possible explanation would be the lower production quality in Australia due to drought and increased export intensity from Argentina, Brazil and Ukraine (FAO, 2021).

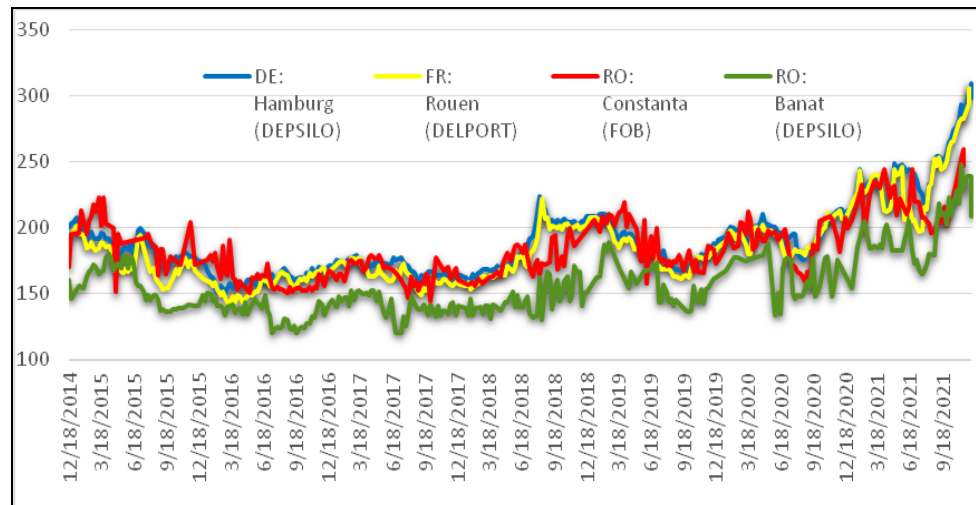
At the same time, it is also possible to have an imbalance of stocks across regions, with excess quantities in certain regions and major deficits in others. During the food crisis of 2011–2012, an increase in the cereal prices can be also noticed, although not to the magnitude of those in 2008. It can be also noticed that in this context, the drop in fuel prices as an effect of measures limiting the movement of people, the movement of goods being affected only to a limited extent in time and intensity, mainly in the year 2020, have not produced significant variations of cereal prices.

Prices on the major trading markets in Europe. In Europe, the trends of prices practiced in various main markets are correlated with the spot prices practiced on the main stock markets. Figure 14 presents the prices of wheat on the main European markets, expressed in euros/ton for:

- DEPSILO – goods at the exit from the silo, loaded in a truck or other means of transport. Similar to FOB but without the obligation of the seller to transport the goods to another place of loading.
- DELPORT – goods delivered to port silos by train, truck or barge
- FOB – Free on Board (INCOTERMS) – goods delivered and loaded on board of the ship, from that moment, the insurance of goods is the responsibility of the buyer.

It can be noticed that Constanța FOB prices are higher than those of DEPSILO Banat because these include the additional costs of transportation to port warehouses, temporary storage and loading on board of ship.

Due to different commercial clauses, which add various costs to the basic price of goods, no direct comparison between the values of these prices can be made. However, the various fees and costs of transport, of temporary storage and loading activity do not show significant variations, so that price volatility is mainly given by the intrinsic value of goods.



Source: European Commission, Cereals Statistics

Figure 14. Wheat prices on the main European markets, euros/ton

Calculating the Pearson correlation coefficient for the applied prices, a close correlation of prices can be noticed, regardless of the reference market. Thus, the prices of wheat with delivery in Hamburg strongly correlate with prices in France, with pickup from the port of Rouen, the correlation coefficient being 0.97. The prices practiced in Romania, in absolute values, are lower than those practiced in Germany with delivery in Hamburg, in the same commercial conditions (DEPSILO). The differences are the result of distances to the actual cultivation area, higher hourly labour costs in Germany than in Romania, and transport and storage costs. The price correlation coefficient between Constanța and Banat is 0.8, which reveals a strong correlation of prices. The increasing trend of prices at EU level also determined an alignment of prices in Romania in early 2019, when the price per ton of wheat reached 218 euros, the values then falling to previous levels through the combined effects of the European trend and of very good cereal production forecasts for the year 2019.

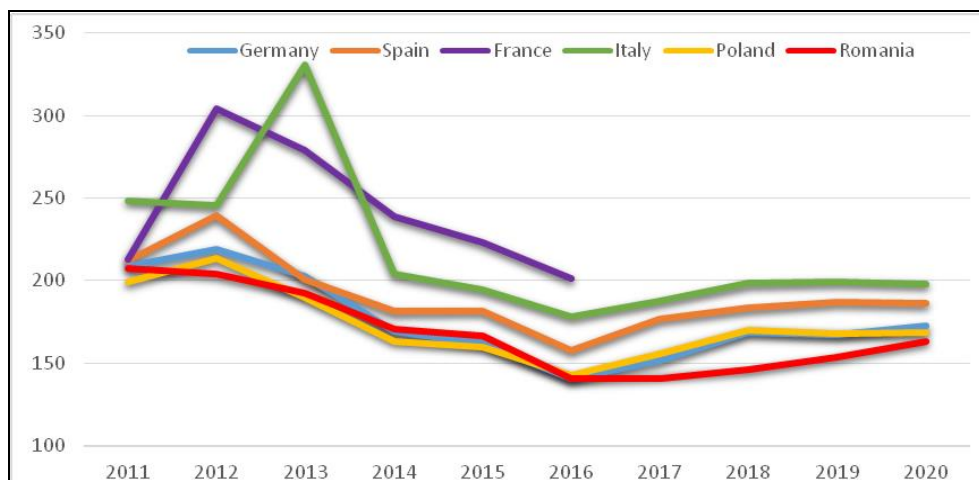
It is worth noting that cereal production in Romania totalled 30.3 million tons in 2019, out of which 10.2 million tons of wheat and 17.4 million tons of maize. Wheat harvest was significantly affected by drought in the year 2020 and production was down by 36% from the previous year; the effects of the COVID-19 pandemic were limited compared to those caused by drought. Prices remained low in the first 10 months of the year, to get aligned to EU prices in the second part of the year, a trend that will continue in the year 2021 as well.

High volatility significantly affects countries with a deficit in agricultural production and stocks, which are forced to cover their consumption needs from imports. The connection to international markets of cereals and inputs for growing

cereals have also resulted in price variations in Romania, yet these variations are attenuated, on the one hand, by the existing stocks the level of which guarantees food security, Romania being a net cereal exporter and on the other hand, by the EU membership and benefiting from the economic measures that are taken at EU level to mitigate such shocks.

For a direct comparison between the prices of the main products, wheat and maize, we use absolute prices, from the Eurostat reports. These are the average prices obtained by farmers on the commodity markets, over a 12-month period, expressed as farm gate prices, and therefore they do not cover transport and processing costs.

From Figure 15 it can be noticed that wheat prices, although showing relatively important absolute differences (in the year 2020 wheat farm gate price was by 13.7% higher in Spain than in Romania and by 21.3% in Italy, France not reporting farm gate prices since 2017), maintain the same trends. Wheat farm gate prices are similar for Germany, Poland and Romania being on average by 11% below the average of countries from the analysed group in the period 2011–2020, and 4% compared to the average of all EU member states.



Source: Author's processing of Eurostat data [apri_ap_crpouta]

Figure 15. Average farm gate wheat prices (euros/ton)

As the prices presented are expressed in various commercial conditions and only those included in the same commercial conditions, like the DEPSILO prices, have been used for comparison, the trends of these prices can provide a picture of the evolution of prices in the European Union. It can be noticed that, in the context of the global food crisis of the years 2011–2012, there was a price level around an average value of 220 euros/ton that represents a 24% increase compared to the price average of 2020. In the year 2018, which globally was marked as a cereal price peak, not as pronounced as the prices of 2008 or 2011–2012, cereal prices in Europe had moderate increases, within the usual yearly variations.

An important inverse correlation can be noticed between wheat production and farm gate prices, the Pearson correlation coefficient between wheat production and prices practiced being -0.78 . Low cereal prices correlated with important productions help maintain food security and easy access to food resources, yet at the same time can mean lower profit margins for farmers. Hence, the balance between maintaining food security and a business environment that encourages farmers to make investments to ensure future sustainable production is essential, and the European Union, through the measures adopted in the CAP and in turn, the member states, through their own measures, are responsible for achieving and maintaining this balance.

4. CONCLUSIONS

Agriculture is affected by a multitude of factors. Disturbances in cereal production have multiple causes. The objective factors that can induce disturbances in production flows are added to a series of subjective factors, such as the existing commercial market sentiment (stock markets being strongly affected for relatively short periods by certain trends that do not necessarily have objective causes but rather speculative motivations).

The political and economic factors play also an important role in stability, or on the contrary, in potential crises. Policies to limit or relax exports, to concentrate resources in areas that are of interest in a certain economic context, such as biofuel industry, can generate imbalances on the global cereal market. The compensatory measures, the development and application of mechanisms to prevent or mitigate the possible effects at national or regional level are aimed at reducing the impact of possible disruptions induced by the global context and ensuring sustainable resources.

The world cereal production is relatively stable: even though in certain regions adverse climate factors (drought, frost or floods) may occur, in other regions climate factors may be extremely favourable, which leads to a compensation of losses.

In general, the utilizations are not very volatile, the consumption habits of the population being relatively inelastic. More important fluctuations may occur in terms of redirecting significant shares of cereal stocks to biofuel industry, in a context where the price of conventional fuels is increasing, while the industrial processing has a relatively constant and moderate growth trend.

The increase of input prices in the agricultural sector is of particular importance, as by combining them (increase of fossil fuel prices – crude oil and natural gas – with direct effects on the costs of transporting products and operation of agricultural machinery, increase in the production cost of fertilizers – share of gas consumption being about 60%–80% of the price of fertilizers), there will be repercussions on future harvests.

Obtaining sustainable productions at competitive prices is important for food security, and the political and economic measures must mitigate any inherent disruptions arising from natural, environmental, political or economic causes worldwide.

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