# GRAINS MARKET IN THE COUNTRIES IN THE BLACK SEA, CASPIAN SEA BASINS AND IN COUNTRIES WITH INDIRECT ACCESS TO THE BLACK SEA THROUGH THE DANUBE – RECENT DEVELOPMENTS

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**Abstract:** *The current context generated by the armed conflict between Ukraine and Russia brings to the foreground an important issue concerning the international trade in cereals, mainly the transit of cereals from/to Ukraine via the Black Sea to/from Ukraine's trading partners. While the transit of cereals from/to Ukraine is mainly via the Black Sea, the cereal trade from Russia can be done both through the Black Sea and the Caspian Sea, given Russia's position with direct access to the two seas. In this context, the present study aims to carry out an analysis of the evolution of the cereal market in the countries bordering the Black Sea and the Caspian Sea, as well as in some countries with indirect access to the Black Sea, through the Danube, the analysis focusing on the main cereals, namely wheat and maize.*

**Key words**: *piața cerealelor, producție, cerere, comerț exterior.*

**JEL Classification**: Q10, Q11, Q17.

## INTRODUCTION

Located between Europe and Asia, the **Black Sea** is part of the Atlantic Basin, being directly surrounded by 6 riparian states, namely Bulgaria, Georgia, Romania, Russia, Turkey and Ukraine. Located between Europe and Asia, the **Caspian Sea** borders five countries, namely Russia, Azerbaijan, Iran, Kazakhstan and Turkmenistan.

For some countries, the access to the Black Sea is also possible via the Danube, respectively via the countries bordering the Danube that have no other direct access to the sea or for which the transport distance is much too long for transport on the Danube, in this case Moldova, Serbia, Hungary, Austria, Slovakia.

Given Romania's geostrategic position, grain trade has acquired increased importance in the current international context.

## MATERIAL AND METHOD

The present study is based on information provided by FAOSTAT database. The investigated period of time is 2015-2019, also 2020, depending on the data available. The analysis is based on established statistical methods such as comparisons, structures and dynamics, the indicators analyzed for the two types of cereals (wheat and maize) being the following: physical production, domestic demand, demand for food consumption, consumption/capita/year, producer price, as well as foreign trade indicators, respectively import and export, both in quantitative and value terms.

## OBTAINED RESULTS

### *Recent developments on the wheat market*

One of the oldest cultivated crops in the world, ***wheat*** is considered the most important cereal, due to its multiple uses, both in population's consumption and for animal feed. In the year 2020, wheat rank first in the world in terms of cultivated area, with 219,006,893 ha.

In the context of the objective of the current approach, it should be specified that the latest statistical information on the balance of wheat and wheat products is limited to the level of the year 2019. However, from the analysis of the available statistical information, the following issues are worth noting. The countries bordering the Black Sea had a total production of wheat and wheat products of 138,544 thousand tons in the year 2019, representing 18.1% of the world wheat production, up by 1.4 percentage points compared to 2015. Russia ranks first, with the greatest wheat production in the year 2019 (53.7% of total production obtained in the six riparian countries bordering the Black Sea), followed by Ukraine (20.5%) and Turkey (13.7%); Romania ranks fourth, with 7.4% of total production (Table no. 1).

**Table no. 1. Evolution of the production of wheat and wheat products (thousand tons)**

| | **2015** | **2016** | **2017** | **2018** | **2019** |
|---|---|---|---|---|---|
| | **Black Sea riparian states** | | | | |
| Bulgaria | 5014 | 5665 | 6135 | 5834 | 6322 |
| Georgia | 126 | 127 | 98 | 107 | 101 |
| Romania | 7964 | 8432 | 10036 | 10145 | 10298 |
| Russia | 61786 | 73346 | 86003 | 72136 | 74453 |
| Turkey | 22600 | 20600 | 21500 | 20000 | 19000 |
| Ukraine | 26532 | 26099 | 26209 | 24653 | 28370 |
| | **Caspian Sea riparian states** | | | | |
| Azerbaijan | 1640 | 1800 | 1770 | 1992 | 2114 |
| Iran | 11542 | 14609 | 12723 | 14521 | 16819 |
| Kazakhstan | 13747 | 14985 | 14803 | 13944 | 11297 |
| Turkmenistan | 1406 | 1600 | 1000 | 1000 | 1500 |
| | **Countries with indirect access to the Black Sea** | | | | |
| Austria | 1726 | 1970 | 1437 | 1371 | 1597 |
| Hungary | 5331 | 5603 | 5246 | 5246 | 5378 |
| Serbia | 2428 | 2885 | 2276 | 2942 | 2535 |
| Slovakia | 2082 | 2434 | 1771 | 1928 | 1939 |
| Moldova | 922 | 1293 | 1251 | 1163 | 1147 |

Source: authors' own calculations based on FAOSTAT data, 2022

In the Caspian Sea Basin, except for Russia that has direct access both to the Black Sea and the Caspian Sea, the other four riparian states bordering the Caspian Sea obtained a total production of wheat and wheat products of 31,730 thousand tons in 2019, accounting for 4.1% of world total production. It should be specified that 53% of the wheat production of these countries was obtained in Iran, a production greater by 45.7% than in 2015. As regards the production of wheat and wheat products obtained in the countries with indirect access to the Black Sea, via the Danube River, it should be noted that in the year 2019, their production cumulated 12,596 thousand tons, accounting for only 1.6% of the world production, down slightly compared to 2015 by 0.1 percentage points. Out of the five countries, Hungary and Serbia obtained no less than 62.8% of the total wheat production of the five countries.

At the level of the balance of resources necessary to cover the domestic demand, determined as the sum of domestic production and imports, it is worth noting that in the investigated period, the share of imports in usable resources varied significantly at the level of each country and mainly across the three basins, on comparative basis. Thus, while in Georgia, for instance, the share of imports in total resources represents more than 80%, up compared to 2015, Ukraine ranks first, with the lowest share of imports, practically covering a significant percentage of its resources from domestic production. As regards the Caspian Sea Basin and the countries with direct access to the Danube, the

significant share of imports in Azerbaijan and Austria is worth noting, the remaining countries covering the necessary of their resources mainly by domestic production.

At the level of uses, except for a few states where no relevant information was identified, the share of exports in total uses ranges from 0.11% (Georgia) to 88.09% (Bulgaria), so that in Kazakhstan, wheat exports represent no less than 73.2%, up by about 4 percentage points compared to 2015. In the countries with indirect access to the Black Sea via the Danube, it is worth noting a higher capitalization through export of domestic production, with Hungary and Serbia on top positions in the year 2019.

As regards domestic demand, it should be mentioned that the six riparian states bordering the Black Sea had a total domestic demand of wheat and wheat products of 77452 thousand tons, accounting for 10.7% of global domestic demand, down by one percentage point compared to the domestic demand in the year 2015. With the exception of Russia, where domestic demand increased by 3.9%, in the other five countries domestic demand decreased by percentages ranging from -35.2% (Ukraine) to -3.8% (Turkey). In the year 2019, out of the total domestic demand, 55.1% (42675 thousand tons) was intended for food consumption in the six countries, slightly increasing by 1.4 percentage points compared to 2015. By countries, in the year 2019, the quantity of wheat and wheat products for human consumption in total domestic demand ranged from -1.56% (Bulgaria) to 12.75% (Ukraine).

The annual consumption of wheat and wheat products, expressed in kg/capita/year, in the period 2015-2019, is characterized by a decreasing trend, with an oscillation range between -16% (Ukraine) and -2% (Turkey). However, it should be noted that, compared to the annual world consumption per capita, all six Black Sea riparian states significantly exceeded the world average of 65.94 kg/capita/year. The evolution of the domestic demand of wheat and wheat products, of the quantity of domestic demand intended for food consumption as well as of the consumption/per capita/year is summarized in the table below.

In the case of the Caspian Sea riparian states, the same increasing trend can be noticed in the period 2015-2019, in terms of domestic demand, quantity of domestic demand intended for food consumption, as well as annual consumption of wheat and wheat products per capita. Thus, in the reference period, the domestic demand increased by percentages oscillating from 2.4% (Kazakhstan) to 16.5% (Austria). It is worth noting that from the group of the Caspian Sea riparian countries and of those with indirect access to the sea, Iran, Hungary and Slovakia are on a downward trend in terms of annual consumption, domestic demand and food consumption demand.

As regards producer prices, international statistics provides information up to the level of 2020. From this perspective, it can be noticed that the producer price for wheat increased in five of the six Black Sea riparian states by percentages ranging from 0.8% (Romania) to 45.4% (Ukraine), the only exception being Turkey, where the wheat producer price decreased by almost 25 percent in six years. It is also worth noting that Georgia and Ukraine have the highest producer price (over 200 euros/ton), Romania being on the 4$^{th}$ position in the ranking of the six states.

Similarly, to the Black Sea riparian states, there was an increasing trend in wheat producer prices in the Caspian Sea riparian states and in the countries with indirect access to the Black Sea, with different intensities between countries. Except for Azerbaijan, where the price decreased by almost 42 percent, significant price increases were noticed in Iran and Kazakhstan, while in the countries with indirect access to the Black Sea the highest price increase was noticed in Moldova.

Regardless of the geographical location of the analyzed countries, the increase in producer prices can be justified by the high input values, as well as, in some cases, by the extensive farming practices, with low productivity. Producer price is also a relevant indicator by comparison with the average import and export price. From this perspective, from the analysis of available data referring to the trade balance, the following aspects must be highlighted:

- In two of the Black Sea riparian states, namely Georgia and Turkey, there was a decreasing trend in both the imported quantities and the value of imports. In Georgia, the value of imports had a greater decline than the imported quantities, which means a diminution of the average

import price, while in Russia the imported quantities decreased by about 53%, while the value of imports decreased by about 13%;

- In the other four Black Sea riparian states, in the period 2015-2020, we can notice a significant increase of imports, in both quantitative and value terms, the most significant increase being noticed in Ukraine, followed at a short distance by Turkey;
- Unlike the Black Sea riparian states, the countries from the Caspian Sea basin had a significant increase of their imports in the six years in Kazakhstan and Turkmenistan, the latter having a particular situation, increasing its imports from 20 tons (2015) to 70278 tons (2020);
- A divergent trend is also specific to countries with indirect access to the Black Sea, via the Danube, where, with the exception of Slovakia and Hungary, wheat imports increased both in quantitative and value terms.
- As regards wheat exports, it is worth noting that these increased significantly, both in quantitative and value terms in most analyzed countries. Georgia is an exception, where both the exported quantities and their value decreased by over 90%, being followed by Moldova and Austria.
- Compared to the Black Sea riparian states, in Turkmenistan wheat exports increased almost three times over the six years and consequently the export value also increased.

Speaking about the economic performance and the better valorization of wheat production through export, we must bring to discussion a comparison between the producer price, the average import and export prices. Thus, for instance, in Romania's case, in the first two years of the reference period, the average import price exceeded the producer price by percentages ranging from 6.3% (2015) to 9.4% (2016), Romania ranking second next to Turkey, where the import price was lower than the producer price by percentages that oscillated between -11.1% (2015) and -20.5% (2016). After 2016, although there was a change in these percentages, Romania has continued to be placed in the first two positions in the ranking, depending on the year, in terms of average import prices compared to producer prices.

Yet a different situation could be noticed in terms of average export prices, compared to producer prices. From this perspective, for instance, compared to the other riparian states from the Black Sea basin, Romania exported wheat at an average price higher than the producer price by percentages ranging from 16.4% (2016) to 21.5% (2018), being surpassed from this point of view by most other countries. Unlike the Black Sea riparian states, import and export price variation compared to producer price had significant oscillations and intensities, both from year to year and from country to country. Influenced by the exported quantities and by the marketing period of the year, the average import and export prices are significantly higher than producer prices, with the exception of Iran, where these prices are mostly lower than producer prices.

In the context of the above, i.e. of the evolution of producer, import and export prices, their coefficient of variation is also important, as an element of price volatility, as well as of their possible convergence. From this perspective, the existence of a high and increasing coefficient of variation of producer prices is worth mentioning, mainly in the Caspian Sea riparian countries. Compared to producer prices, the variation of import and export prices tend to diminish mainly in the countries from the Black Sea basin, followed by the countries with direct access to the Danube.

The Caspian Sea riparian countries maintain a high variability level, mainly in the case of average export prices, which is also a noticeable trend in the average import prices in the countries with direct access to the Danube (Table no. 2).

**Table no. 2. Evolution of the coefficient of variation in the prices of wheat and wheat products in the three analyzed basins (%)**

| | 2015 | 2016 | 2017 | 2018 | 2019 | 2019/2015 (percentage points) |
|---|---|---|---|---|---|---|
| | Producer price | | | | | |
| Black Sea basin | 29.9 | 30.0 | 23.6 | 12.2 | 12.0 | -17.9 |
| Caspian Sea basin | 82.8 | 100.1 | 98.6 | 89.7 | 92.9 | 10.0 |
| Countries with direct access to the Danube | 11.4 | 10.2 | 11.2 | 8.9 | 8.3 | -3.1 |
| | Average import price | | | | | |
| Black Sea basin | 56.9 | 85.5 | 83.9 | 66.4 | 14.1 | -42.8 |
| Caspian Sea basin | 8.4 | 103.8 | 88.3 | 25.1 | 18.8 | 10.3 |
| Countries with direct access to the Danube | 51.0 | 66.9 | 74.2 | 67.5 | 53.1 | 2.1 |
| | Average export price | | | | | |
| Black Sea basin | 46.2 | 48.9 | 32.8 | 26.1 | 25.6 | -20.6 |
| Caspian Sea basin | 73.4 | 48.9 | 72.4 | 77.2 | 115.9 | 42.4 |
| Countries with direct access to the Danube | 20.4 | 24.0 | 21.1 | 20.8 | 16.3 | -4.0 |

Source: authors' own calculations based on FAOSTAT data, 2022

### *Recent development on the maize market*

Next to wheat, maize is one of the essential cereals, ranking second in the world in the year 2020, in terms of cultivated area, with 201,983,645 ha. In the year 2019, the world production of maize and maize products totalled 1,148,688 thousand tons, up by 9.4% compared to its level in 2015. The maize production in the six Black Sea riparian states was 77,861 thousand tons in the year 2020, which represents 6.8% of the world production, up by 1.6 percentage points compared to the production of the year 2015. 86.8% of the total production of 77,861 thousand tons was obtained in three of the six states, namely Ukraine (46.1%), Romania (22.4%) and Russia (18.3%). In dynamics, the production of maize and maize products had a noticeable increasing trend, Romania ranking first with a production increase by 93.2% compared to the year 2015, followed by Bulgaria and Ukraine (Table no. 3).

**Table no.3. Evolution of maize production in the period 2015-2019 (thousand tons)**

| | 2015 | 2016 | 2017 | 2018 | 2019 | 2019/2015 (%) |
|---|---|---|---|---|---|---|
| | ***Black Sea riparian states*** | | | | | |
| Bulgaria | 2697 | 2226 | 2563 | 3478 | 4060 | 50.5 |
| Georgia | 185 | 244 | 143 | 194 | 207 | 11.9 |
| Romania | 9021 | 10746 | 14326 | 18664 | 17432 | 93.2 |
| Russia | 13173 | 15282 | 13208 | 11419 | 14282 | 8.4 |
| Turkey | 6400 | 6400 | 5900 | 5700 | 6000 | -6.3 |
| Ukraine | 23328 | 28075 | 24669 | 35801 | 35880 | 53.8 |
| | ***Caspian Sea riparian states*** | | | | | |
| Azerbaijan | 214 | 224 | 236 | 248 | 284 | 32.7 |
| Iran | 1169 | 1171 | 694 | 607 | 1400 | 19.8 |
| Kazakhstan | 734 | 762 | 785 | 862 | 896 | 22.1 |
| Turkmenistan | 51 | 50 | 50 | 40 | 40 | -21.6 |
| | ***Countries with indirect access to the Black Sea*** | | | | | |
| Austria | 1638 | 2180 | 2076 | 2130 | 2299 | 40.4 |
| Hungary | 6633 | 8730 | 6739 | 7963 | 8230 | 24.1 |

| | 2015 | 2016 | 2017 | 2018 | 2019 | 2019/2015 (%) |
|---|---|---|---|---|---|---|
| Serbia | 5455 | 7377 | 4018 | 6965 | 7345 | 34.6 |
| Slovakia | 929 | 1710 | 1066 | 1516 | 1445 | 55.5 |
| Moldova | 1077 | 1392 | 1773 | 2074 | 2130 | 97.8 |
| **World total** | **1052254** | **1127106** | **1138583** | **1125415** | **1148688** | **9.2** |

Source: authors' own calculations based on FAOSTAT data, 2022

The four countries from the Caspian Sea basin, with the exception of Russia, which is included in the Black Sea riparian states, obtained a total production of maize and maize products of 2620 thousand tons in 2019, which represents only 0.23% of the world production, up by 0.02 percentage points from the production of the year 2015. Like in the case of countries from the Black Sea basin, the production of maize and maize products also increased in the Caspian Sea riparian countries, yet the increases were significantly lower, both quantitatively and in percentage, than those in the Black sea riparian countries.

Among the countries with indirect access to the Black Sea via the Danube, Hungary and Serbia hold the first two positions in terms of the production of maize and maize products obtained in 2019. The five countries with indirect access to the Black Sea actually achieved 1.9% of world production, up 0.4 percent from the level of 2015. Although in 2019, Hungary and Serbia held the top two positions in terms of production, in terms of dynamics, Moldova and Slovakia recorded the highest increases in the production of maize and maize products, i.e. by 97.8% (Moldova) and by 55.5% (Slovakia), compared to the level of 2015.

At the level of the balance of resources needed to cover domestic demand, it should be noted that in the investigated period, the share of imports in usable resources varied significantly both at the level of each country, but mainly across the three analyzed basins. Among the countries of the Black Sea basin, Turkey ranks first in terms of supplementing domestic resources through imports, with 42.01% of resources basically coming from imports. The Caspian Sea basin is "dominated" by Iran, where 84% of the internal resources come from imports, this country recording significant peaks in imports in the period 2017-2018.

In terms of uses, the significant share of exports in total uses is worth noting, which reached 97.1% in Russia, followed at short distance by Ukraine, Bulgaria and Romania. The important position held by the Black Sea riparian states in the export of maize and maize products is also strengthened by the valorization of maize production from the countries with access to the Black Sea via the Danube. Actually, the Danube – Black Sea corridor is an asset for Romania not only in terms of foreign trade, but also from the perspective of the Danube river as an import means of transporting grains to Constanța port.

While the production of maize and maize products increased in all investigated countries, with different percentages and intensities, in terms of domestic demand, the quantity intended for food consumption and the annual consumption, the situation is different at the level of each indicator and country. Thus, for instance, in Ukraine the domestic demand decreased by about 37% in the year 2019 compared to 2015, while the domestic demand intended for food consumption increased by no less than 62.9%. By a relatively similar percentage (66.2%), in the year 2019, Ukraine increased its annual consumption of maize and maize products per capita as compared to the year 2015. In Romania, in the period 2015-2019, an increase in all the three indicators could be noticed, the annual consumption of maize and maize products increasing by about one third in the year 2019 compared to the annual consumption in the year 2015. The same tends can be also noticed in the Caspian Sea riparian states; in Turkmenistan, for instance, the annual consumption of maize and maize products increased by 133.3% compared to its level in 2015.

Unlike the Black Sea and Caspian Sea riparian states, in the countries with indirect access to the Black Sea via the Danube, the situation is different. Even though the domestic demand increased, except for Serbia, by percentages ranging from 12.8% (Slovakia) to 61.8% (Hungary), the quantity of maize and maize products and the annual consumption increased very little. Thus, for instance, the annual consumption increased by percentages ranging from 1.6% (Serbia) to 5.4% (Austria).

As an expression of economic efficiency, the producer prices for maize and maize products followed an upward trend in most analyzed countries in the period 2015-2020, with five exceptions, namely Georgia, Turkey, Azerbaijan, Austria and Slovakia. It must be noted that in the year 2020, Romania ranked 2nd among the six Black sea riparian states, with the second highest producer price in maize, namely 190.9 USD/ton, up by 0.6% compared to the price recorded in 2015. Actually, out of the 13 states for which statistical information is available, Romania ranks 4th in terms of the highest producer prices, these being on an upward trend.

As regards the foreign trade in maize, it is worth mentioning that out of the 15 states for which relevant statistical information is available, Turkey had the largest increase in maize exports, both quantitatively and in value, followed by Austria, Moldova, Serbia and Ukraine.Although Romania's maize production is on the rise, the country could not best valorize its production through exports, which increased by only 10.3% (quantitatively and in value) in six years, while imports increased by 92.4% (in quantitative terms) and by 12.1% (in value).

As it has been mentioned before, when we speak about economic performance and better valorization of maize production through exports, we must also refer to a comparison between producer prices, average import prices and average export prices. As a general observation, in the year 2020, the average import prices were clearly higher than producer prices, while the average export prices had higher values than producer prices, with the exception of Iran and Moldova, by percentages oscillating between 0.9% (Ukraine) and 439.1% (Georgia). Romania's maize exports had average prices by 14.4% higher than producer prices in the year 2020, which is a relatively low percentage compared to that of Austria, Turkey, Hungary and Slovakia.

As in the case of wheat, the price variation is significant in the three analyzed basins. In the case of producer price, most variations and increases are found in the countries from the Caspian Sea basin, while the oscillations of average import prices are significant in all three basins, being on an upward trend of volatility again in the Caspian Sea basin. While the variations of producer prices and average import prices are different as intensity and dynamics, the variation of average export prices tend to increase in all three basins, by no less than 41.5 percentage points (the Black Sea) and by 50.4 percentage points (the Caspian Sea) (Table no. 4).

**Table no. 4. Evolution of the variation coefficient of prices in maize and maize products in the three analyzed basins (%)**

| | **2015** | **2016** | **2017** | **2018** | **2019** | **2019/2015 (percentage points)** |
|---|---|---|---|---|---|---|
| | ***Producer price*** | | | | | |
| Black Sea basin | 25.0 | 21.3 | 19.9 | 14.3 | 14.1 | -11.0 |
| Caspian Sea basin | 76.6 | 97.2 | 93.3 | 93.9 | 97.7 | 21.1 |
| Countries with direct access to the Danube | 6.2 | 4.9 | 7.7 | 10.1 | 7.8 | 1.6 |
| | ***Average import price*** | | | | | |
| Black Sea basin | 104.0 | 102.9 | 115.1 | 91.8 | 88.1 | -15.9 |
| Caspian Sea basin | 20.0 | 127.6 | 139.0 | 90.1 | 61.3 | 41.4 |
| Countries with direct access to the Danube | 97.7 | 92.8 | 98.8 | 79.4 | 102.1 | 4.4 |
| | ***Average export price*** | | | | | |
| Black Sea basin | 67.1 | 39.9 | 68.9 | 69.6 | 108.6 | 41.5 |
| Caspian Sea basin | 127.0 | 183.0 | 134.4 | 106.0 | 177.4 | 50.4 |
| Countries with direct access to the Danube | 7.7 | 39.9 | 43.7 | 47.9 | 55.6 | 47.9 |

Source: authors' own calculations based on FAOSTAT data, 2022

## CONCLUSIONS

As essential cereals in food consumption, as well as with multiple other uses, given the biological and nutritional characteristics, wheat and maize occupy the first two positions in terms of cultivated area in 2020. Recent international developments bring to the foreground the issue of meeting the necessary domestic consumption needs, from import inclusively, as well as the valorization of domestic production through export in the two groups of cereals. Although on the horizon of the year 2020 there were still no signals about possible bottlenecks of the commodity traffic through the Black Sea, the position and importance of countries from the Black Sea basin in foreign trade should not be overlooked. The Caspian Sea basin also adds to this, Russia being the country with direct access both to the Black Sea and the Caspian Sea. At the same time, the access of some of these countries to the Black Sea via the Danube gives Romania a geostrategic position in the trade with cereals.

Although the production of the two cereals is on an upward trend in the countries that were the object of this study, it should be noted that Romania could not best valorize the obtained production through export, producer prices being much higher than those practiced by other countries. It is also worth noting the high consumption of the two cereals, which generally continues to increase year by year, with a few exceptions.

In the context of the above, we consider that the two types of cereals will continue to play an important role in the agriculture of the Black Sea and Caspian Sea riparian states, as well as in the agriculture of countries with indirect access to the Black Sea, through the Danube. Although the only maritime port in Romania is the port of Constanța, we consider that it can ensure the commercialization of wheat and maize from the Black Sea riparian states, through an optimization of the port activity, in compliance with the legal provisions from the Customs Code or other legal regulations applicable to non-EU states.

## REFERENCES

*** (2022): FAOSTAT database, 2022.