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The crisis in Ukraine and its impact on global food security

Abstract. Ukraine has been playing an increasing role on the world agricultural market. Only two decades ago Ukraine's grain exports were equivalent to feeding 40 million people, and already more than 400 million today. In 2019–2021 Ukraine accounted for nearly 10% of global wheat and 15% of corn exports, 15% of barley exports and nearly 50% of sunflower oil exports. Russia's invasion of Ukraine amplified the role of Ukraine in ensuring global food security. Blocked exports and endangered current planting campaign in Ukraine surged world market prices and risked not only to undermine country's agri-food sector and overall economy, but also to starve hundreds of millions globally. In this article, the authors tried to provide an assessment of the importance of Ukraine as a world producer of agricultural products and the main losses and problems in connection with Russia's invasion, both for Ukraine and for the world.

Key words: food security, war in Ukraine, agriculture, exports

Introduction

Food security, as defined by the United Nations' Committee on World Food Security, means that all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their food preferences and dietary needs for an active and healthy life (Food security, 2022). The war in Ukraine is battering a global food system weakened by Covid-19, climate change and an energy shock. Ukraine's exports of grain and oilseeds have mostly stopped and Russia's are threatened. Together, the two countries supply 12% of traded calories. The prospect of a Russian war in Ukraine has rattled global markets. Russia is a top producer of commodities from grains to diamonds. The concern about Ukraine has mostly revolved around the country's large agriculture sector. In 2021, the nation of 41.1 million was the world's fourth biggest cereals exporter, behind only the U.S., Argentina and India, according to Trade Data Monitor, the world's premier source of trade statistics. Those exports were split almost 50–50 between corn (5.9 billion USD, up 21%) and wheat and meslin (5.1 billion USD, up 41%). With food prices already increasing 30% in 2021, and inflation biting sound

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the globe, there's good reason to worry. Despite Ukraine's vast agricultural production potential, the war does not only severely impact the global food security, but the domestic food security as well.

Literature review

The latest State of Food Security and Nutrition report shows the world is moving backwards in efforts to eliminate hunger and malnutrition. The number of people affected by hunger globally rose to as many as 828 million in 2021, an increase of about 46 million since 2020 and 150 million since the outbreak of the COVID-19 pandemic, according to a United Nations report that provides fresh evidence that the world is moving further away from its goal of ending hunger, food insecurity and malnutrition in all its forms by 2030 (FAO, 2022).

Problems of food security and COVID-19 risk in low- and middle-income countries were discussed by V. Mueller, K.A. Grepin et al. (2022). Authors using longitudinal data from Bangladesh, Kenya, and Nigeria covering a period from October 2020 to April 2021, assessed whether knowledge of a person infected with COVID-19 were associated with food insecurity, job loss and business closures, and coping strategies to smooth consumption (Mueller et al., 2022).

T. Tscharnkte et al. (2012) pointed out that under the current scenario of rapid human population increase, achieving efficient and productive agricultural land use while conserving biodiversity is a global challenge. There is an ongoing debate whether land for nature and for production should be segregated (land sparing) or integrated on the same land (land sharing, wildlife-friendly farming; Tscharnkte et al., 2012).

There are many other works of scientists on the issues of food security and the development of agriculture in the world. However, the war in Ukraine created new challenges for providing food security not only for the domestic needs of the country, but also for the world.

Russia's invasion of Ukraine amplified the role of Ukraine in ensuring global food security. Blocked exports and endangered current planting campaign in Ukraine surged world market prices and risked not only to undermine country's agri-food sector and overall economy, but also to starve hundreds of millions globally. That is why the issues of the crisis in Ukraine and its impact on global food security are urgent and require further research.

Research methods

During the study, general scientific and applied methods and techniques were used, in particular: dialectical method of cognition, analysis and synthesis, systematic approach, indexes, method of comparison, Time Series.

The main results of the study were carried out as a sequence of certain steps. Step 1: Evaluation the role of Ukraine in the world production and export of agricultural products using coefficient analysis, indices, time series. Step 2: Assessment of the importance of Ukraine in ensuring food security in the world and the possible consequ-

ences of military actions in the country. Step 3: Identifying possible ways out of a crisis situation.

The study was conducted on the data of FAO Statistics, State Statistics Service of Ukraine, Trade Data Monitor, USDA WASDE for the period from 2016 until 2022 years.

Research results

Ukraine has been playing an increasing role on the world agricultural market. Only two decades ago Ukraine's grain exports were equivalent to feeding 40 million people, and already more than 400 million today (Russian invasion..., 2022). The products of the agricultural sector have been one of the key business cards of Ukraine for several years. This is confirmed not only by high production indicators, but also by no less significant export indicators. According to the results of 2021, the Ukrainian agricultural sector formed 18% of Ukraine's GDP (approximately 33 USD billion), and the export of agricultural products in monetary terms reached 22.2 USD billion. In Ukrainian agriculture, in 2021, were employed 2721,2 thousands persons, employment aged 15–70 (17.1% of all employed persons in the country); 469 383 UAH millions of fixed assets were involved in agricultural production (4.9% of all fixed assets; State Statistics Service of Ukraine, 2021).

Considering the data of FAO Statistics (Table 1) and place of Ukraine in Global food production, it should be noted that Ukraine ranks 3d place in sunflower productions (19.3% in world production); 4th place in buckwheat production (3.4% in world harvested area in ha; 4.2% in world production in tonnes); 6th place in maize production; 9th place in wheat, rapeseed, rye production.

Ukraine is normally the world's top producer of sunflower meal, oil, and seed and the world's top exporter of sunflower meal and oil. Ukrainian products are exported to 175 countries around the world (USDA WASDE, 2022). Ukraine normally produces one-third of the world's sunflower oil and accounts for nearly half of global exports; however, in marketing year 2022/2023 Ukraine's share in global oil production and exports

Table 1. Ukrainian agricultural sector's role in the world economy, 2021

Maine agricul- tural crops	% in world harvested area [ha]	Rank in world harvested area	% in world production [tonnes]	Rank in world production
Maize	2.2	#9	2.1	#6
Wheat	17.6	#13	2.8	#9
Rapeseed	2.6	#8	2.9	#9
Buckwheat	3.4	#4	4.2	#4
Oats	2.0	#12	2.0	#15
Rye	3.0	#10	2.9	#9
Sunflower	20.4	#3	19.3	#3

Source: author's computation on the base of FAO Statistics Data.

is projected to shrink to 21 and 35 percent, respectively. In 2021 (Fig. 1) Ukraine exported 10,000 MT of wheat and had an eighth position among Global exporters (share of 4.9% of world exports); 9,000 MT of corn and had fourth position among Global exporters (share of 4.9% of world exports); 3,600 MT of sunflower oil and had a first position among Global exporters (share of 34.7% of world exports); 2,750 MT of rapeseed and had a third position among Global exporters (share of 16.6% of world exports); 2,700 MT of sunflower meal and had a first position among Global exporters (share of 39.8% of world exports); 1,800 MT of barley and had a sixth position among Global exporters (share of 5.9% of world exports); 750 MT of sunflower and had a first position among Global exporters (share of 20.7% of world exports; USDA WASDE, 2022).

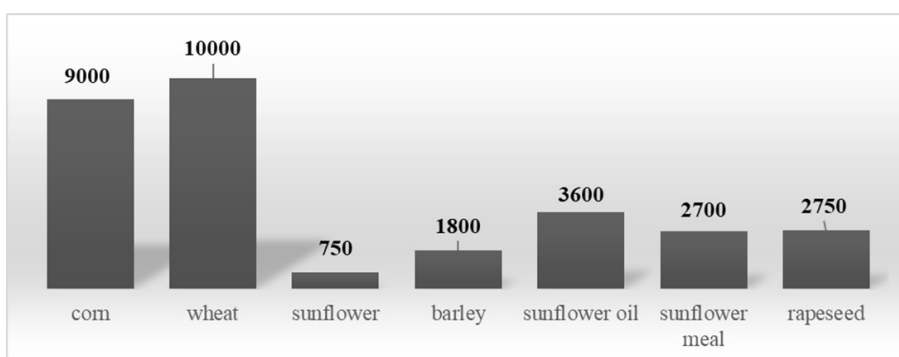


Figure 1. Ukrainian agricultural export, 2021 (1,000 MT)

Source: author's computation on the base of USDA WASDE (2022).

In 2021, the nation of 41.1 million was the world's fourth biggest cereals exporter, behind only the U.S., Argentina, and India, according to Trade Data Monitor, the world's premier source of trade statistics. Top markets in of Ukrainian export 2021 were India (31%), the European Union (30%), and China (15%; Trade Data Monitor, 2022) – Table 2.

Table 2 shows that the largest importer of Ukrainian agricultural products in 2021 was the EU, total amount of exported agricultural commodities was 7.7 USD billion. Second position belongs to China, total amount of export to this country in 2021 was 4.2 USD billion. Third top market was India, total amount of export to it was 2.0 USD billion. In 2021, Ukrainian wheat exports were valued at 5.1 USD billion, with Egypt (0.9 USD billion), Indonesia (0.7 USD billion), Turkey (0.4 USD billion), Pakistan, and Bangladesh as the primary destinations.

Ukraine normally supplies nearly two-thirds of the world's sunflower meal, with exports valued at 1.2 USD billion in 2021. Top markets in 2021 were China (48%), the European Union (25%), and Turkey (7%). Ukraine was a producer of one-third of the world's sunflower oil and accounts for nearly half of global exports. Top markets in 2021 were India (31%), the European Union (30%), and China (15%).

Table 2. Ukrainian agricultural exports (2021)

Product	Value [USD billion]	Top Markets [USD billion]		
Total	27.8	EU 7.7	China 4.2	India 2.0
Sunflower oil	6.4	India 1.9	EU 1.9	China 0.9
Corn	5.9	China 1.9	EU 1.8	Egypt 0.9
Wheat	5.1	Egypt 0.9	Indonesia 0.7	Turkey 0.4
Rapeseed	1.7	EU 1.1	Pakistan 0.2	UK 0.2
Barley	1.3	China 0.8	Turkey 0.2	S. Arabia 0.1
Sunflower oilcake	1.2	China 0.6	EU 0.3	Belarus 0.1

Source: author's computation on the base of Trade Data Monitor (2022).

In 2021, Ukraine's corn exports were valued at 5.9 USD billion, with 32% of shipments destined for China and another 30% to the EU. Other key destinations include Egypt, Iran, and Turkey. Corn production occurs in the country's central to northern regions.

Rapeseed amounted a 1.7 USD billion of exports totally, top markets were EU (1.1 USD billion); Pakistan (0.2 USD billion); UK (0.2 USD billion). Considering export of barley, it should be noted, that top exporters in 2021 were China, Turkey, S. Arabia (State Statistics Service of Ukraine, 2022).

So, Ukraine exported a lot of its crop in 2021 before Russia's invasion, including a lot of its wheat, but some of that, and products like corn, are still in storage. Exporters are struggling to get what's left out, because Ukrainian ports on the Black Sea, like the key city of Odesa, are under blockade. Russian fleets are blocking the route, and the area is heavily mined. These agricultural commodities can't be replaced on the global market. Thus, military actions in Ukraine threaten food security, not only in the EU, but in the world. United Nations food agencies warn that a record 49 million people, in 46 countries, are at risk of falling into famine conditions this year (Kirby, 2022).

According to the data of World Food Programme (Conflict..., 2022) as many as 828 million people go to bed hungry every night, the number of those facing acute food insecurity has soared – from 135 million to 345 million – since 2019. A total of 50 million people in 45 countries are teetering on the edge of famine. This seismic hunger crisis has been caused by a deadly combination of four factors:

- conflict is still the biggest driver of hunger, with 60 percent of the world's hungry living in areas afflicted by war and violence. Events unfolding in Ukraine are further proof of how conflict feeds hunger, forcing people out of their homes and wiping out their sources of income;
- climate shocks destroy lives, crops and livelihoods, and undermine people's ability to feed themselves;
- the economic consequences of the COVID-19 pandemic are driving hunger to unprecedented levels;

- costs are also at an all-time high: WFP’s monthly operating costs are 73.6 USD million above their 2019 average – a staggering 44% rise. The extra now spent on operating costs would have previously fed 4 million people for one month (Conflict..., 2022).

Today, Ukraine has faced the most powerful problem of the seismic hunger crisis – war. After three months of Russia’s full-scale war against Ukraine, the damage toll to Ukraine’s agriculture reached 4.3 USD billion, or nearly 15% of its capital stock. Agricultural War Damages Review regularly provides details on the structure and estimates of damages. The additional expected economic losses from the war in 2022 are estimated at about 22 USD billion (Agricultural War..., 2022).

One of the most pressing problems today for Ukraine and the agricultural sector is blocking the exits to the seaports of the Black and Azov seas. Of course, that the enemy uses hybrid tools of warfare, by attempting disruption sowing campaign, conducting hostilities on a large territory, destruction economic infrastructure and blocking basic industries for the economy of Ukraine. The export of agricultural products from Ukraine has been one of the strategic areas of the economy. About 60% of the produced agricultural products in Ukraine exports to world markets, often to countries that cannot support themselves provide food products. Average monthly export volumes of agricultural products amounted to more than 4 million tons due to the marine infrastructure southern regions. According to the data of Food and Agriculture Organization of the United Nations, the War in Ukraine threatens Global Food Security (The State of Food..., 2022) – Figure 2.

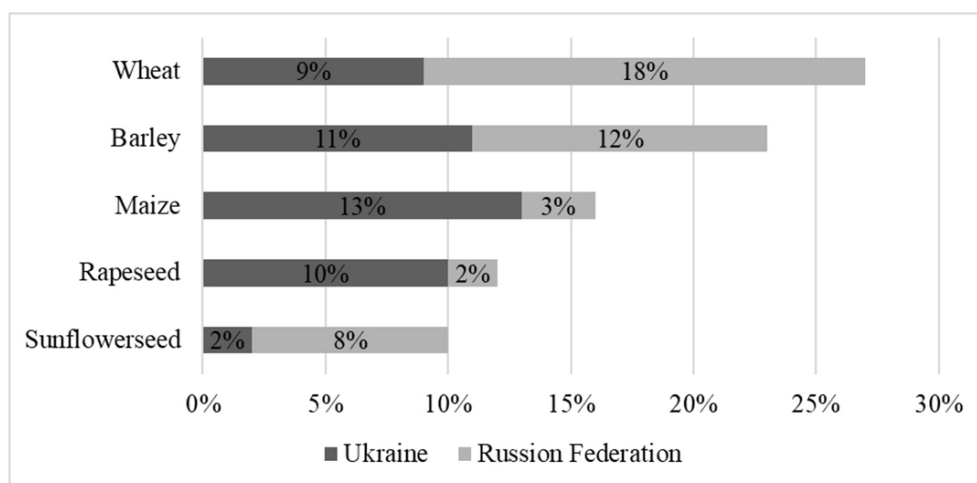


Figure 2. Ukraine’s and Russia’s share in global exports of selected crops 2016–2020, average

Source: Author’s computation on the base of data of The State of Food Security and Nutrition in the World 2022.

According to the data of Figure 2, the share of the export of Russia and Ukraine of the main grain crops in the world export for the period 2016–2020 was significant. Ukraine and Russia together supply 30% of globally traded wheat, 20% of maize and 70% of sunflower supplies. Seaborn export accounted for 98% of Ukrainian food export. But for today, sea ports are blocked and 6 million t of wheat and 15 million t of corn are yet to be exported. Commercial vessels are under attack of Russia. Sea mines are deployed. A shortfall in export supplies is driving prices up, leaving import-dependent countries with higher food import bills – or less food to eat.

Disruption of the export of agricultural products from Ukraine is a threat to food security world scale. Already on the second day after the invasion of the Russian army in Ukraine, the prices for food wheat on world stock exchanges increased by almost two times as of April 10, September wheat futures are 425 USD/tonnes, which speaks of traders' lack of confidence in quickly solving export problems from Ukraine.

Russia's invasion of Ukraine surged substantially the prices of the main food commodities in Ukraine and its regions. The main reasons behind such growth of the prices were growing world market food and energy prices, precipitated by large-scale destruction of infrastructure, increased logistics costs, business disruptions and breakdowns of supplies and overall supply chains.

Conclusions

The only effective way to solve the problem is to stop the war and unlock sea ports. In the long term, it is necessary to work harder perfect security system in Europe, with effective prevention tools aggressive behavior of individual countries. It is nationwide and interstate politics beyond review. If we talk about agrarian policy foreign economic opportunities, it is obviously necessary to expand opportunities and directions of logistics flows – unification of infrastructure railway connection with European partners, investments in Danube ports, for critical situations, to have the infrastructural capabilities of launching “grains express trains”, joint investments in dry ports on the territory of European countries, unification with European partners of document circulation regarding customs registration, permit system, agricultural product safety system, etc.

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