

RESEARCH:
IMPACT OF THE WAR
ON THE GLOBAL
FOOD SECURITY

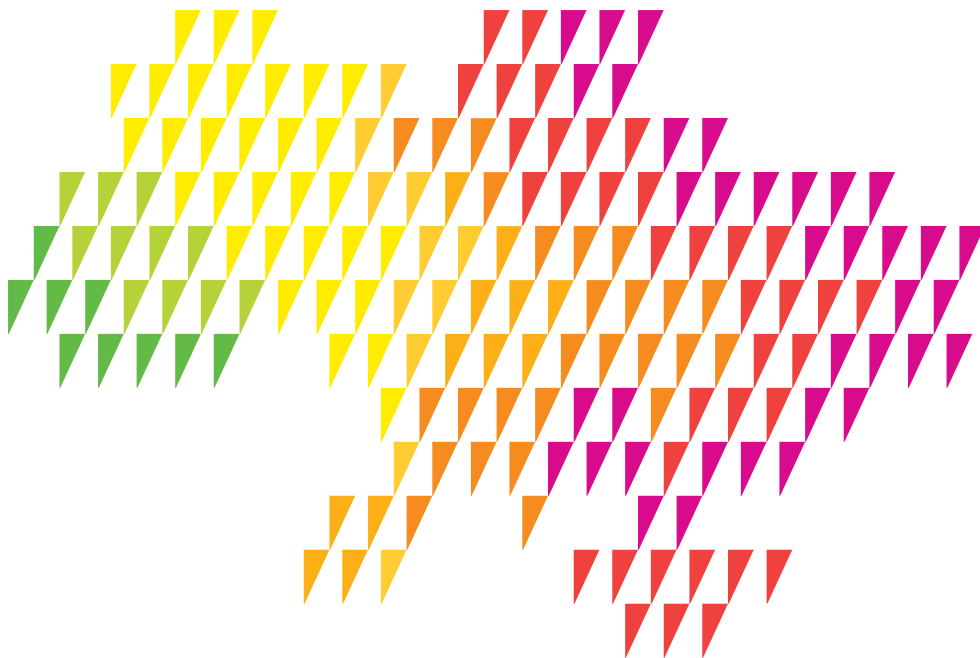
FOOD SECURITY 2024



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PART I

REDUCTION OF CROP AREAS IN UKRAINE DUE TO THE WAR



- The impact of the war on agricultural land in Ukraine (causes and consequences):
 - Crop areas in 2022
 - Unharvested crop in 2023
- Changes in crop areas in Ukraine as a result of the war (including the annexation of the Crimea)
- Profitability of agricultural production in Ukraine
- Recovery prospects: challenges and limitations in the context of a full-scale war

CROP AREAS IN 2022

The success of 2021 (high yields and prices for agricultural products, low prices for inputs) **created a resource for sustainability in 2022.**

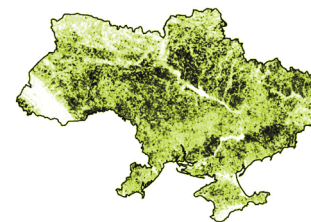
However, the total **amount of losses** caused by the occupation of territories, mining, port blockades, hryvnia devaluation and rising prices for fertilizers, plant protection agents and other components is difficult to offset.

Agricultural products worth **\$1.97 billion** were stolen/destroyed.

The losses, which include lost income of agricultural producers and an increase in production costs, amounted to **\$69.8 billion.**

The total losses due to lower crop production amount to **\$35.1 billion**, additional losses due to lower livestock production amount to **\$5.6 billion**, losses caused by lower domestic prices are estimated at **\$24.1 billion**, and losses due to higher production costs amount to **\$4.4 billion.**

CORN



WHEAT



SUNFLOWER



RAPESEEDS

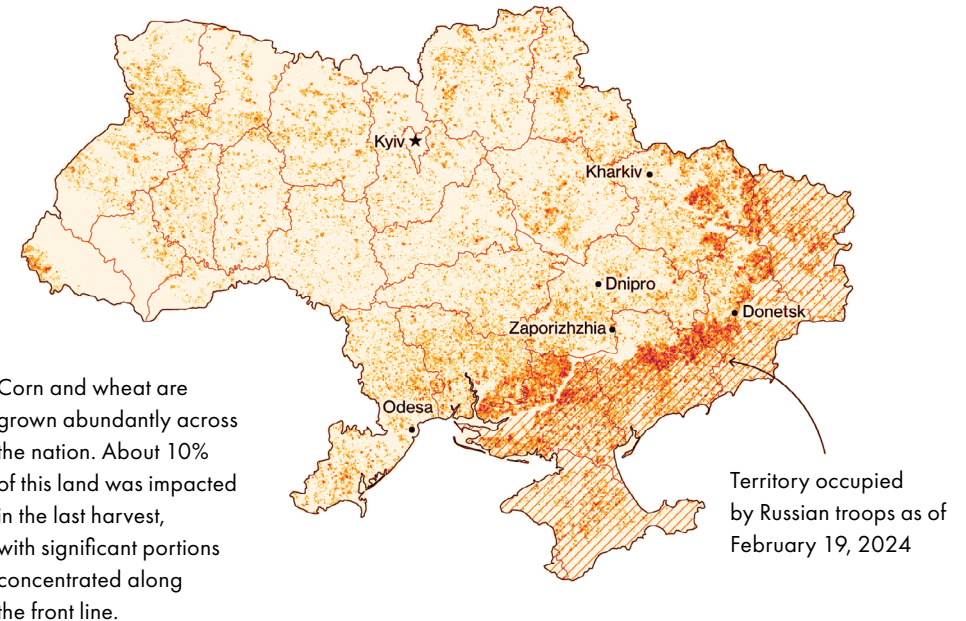


BARLEY



UNHARVESTED CROP IN 2023

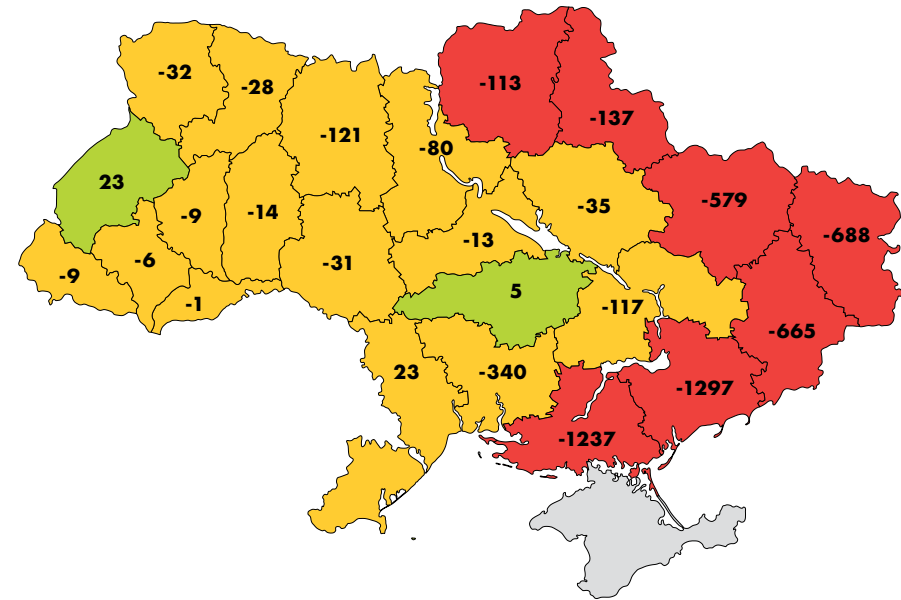
- Farmers across the country continue production activities while dealing **with damaged land and infrastructure and staying under Russian occupation.**
- They were forced to **abandon large swaths of arable land** as shelling and thousands of landmines made it too dangerous to harvest.
- The areas directly affected by the hostilities accounted for **about 36% of** pre-war grain production.
- **44% of producers report a catastrophic increase in production costs**, and every fourth respondent mentions a reduction or suspension of production due to the war.
- **1/3 of agricultural companies left the market. Another 10–20% may leave in 2023/24 MY**, given the current working conditions. About 2,653 agricultural enterprises suffered losses. Over 90% of small farmers suffer losses.



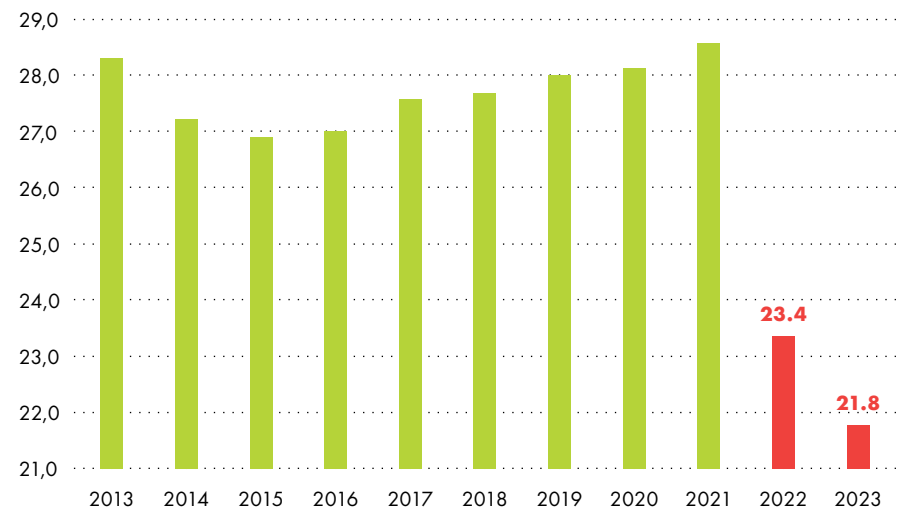
CHANGES IN CROP AREAS IN UKRAINE AS A RESULT OF THE WAR (INCLUDING THE ANNEXATION OF THE CRIMEA)

The area of temporarily occupied agricultural land in Ukraine reaches **8.0 million hectares** (6.2 million hectares excluding the Crimea), including **6.3 million hectares of arable** land (5.0 million hectares excluding the Crimea).

CHANGE IN THE CROP AREAS OF SIX MAJOR CROPS IN 2023 COMPARED TO 2021, thousand hectares



AGRICULTURAL CROP AREAS IN UKRAINE, million hectares



AVERAGE PROFITABILITY OF GRAINS AND OILSEEDS PRODUCTION IN UKRAINE

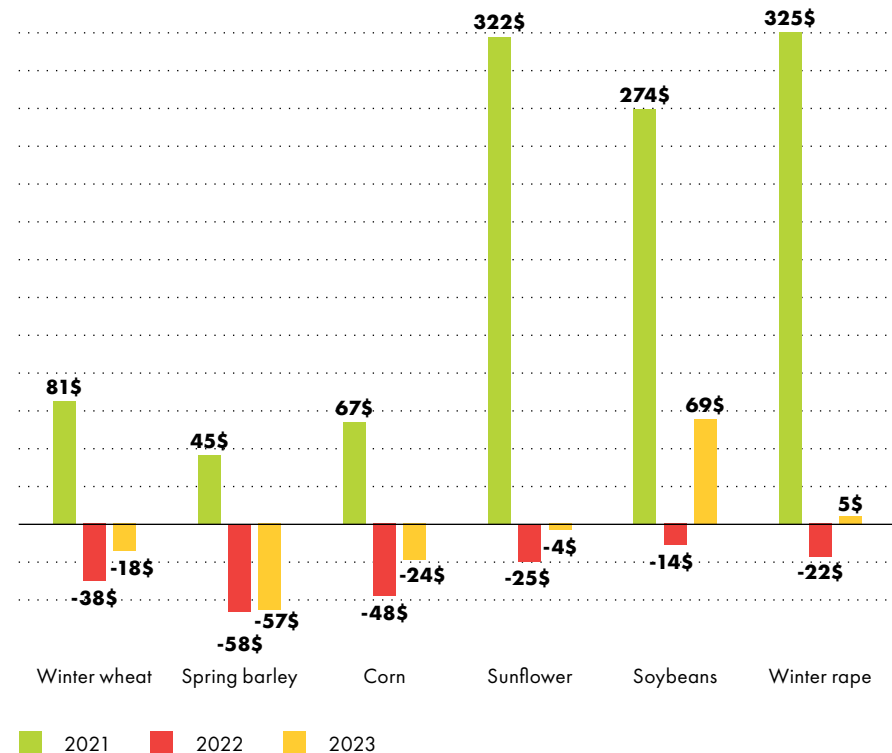
In 2022, **production of all grains and oilseeds in Ukraine was unprofitable.**

In 2023, the situation remains challenging. Only soybean and rapeseed cultivation showed minimal profitability, while sunflower cultivation showed minimal losses. **Grain production remains unprofitable.**

Some factors contributed to a slight improvement in 2023 compared to 2022:

- Reduced production costs;
- Optimization of logistics costs.

However, the margin of safety for producers is shrinking with each harvest. **Bankruptcies, changes in business activities, cutting costs due to the size of the harvest — the longer the war lasts, the more serious the consequences for Ukrainian agriculture and global food security will be.**



RECOVERY PROSPECTS: CHALLENGES AND LIMITATIONS IN THE CONTEXT OF A FULL-SCALE WAR

- **Lack of financial resources for stable business operations, inter alia, due to rising production costs.**

In 2022, 21% of agricultural, forest and fishing enterprises made a net loss (11% in 2021). The profitability of all activities in 2022 was 14.1% (37.8% in 2021). Capital investments in agriculture, forestry, and fisheries amounted to UAH 51.44 billion in 2022, which is 26.1% less than in 2021.

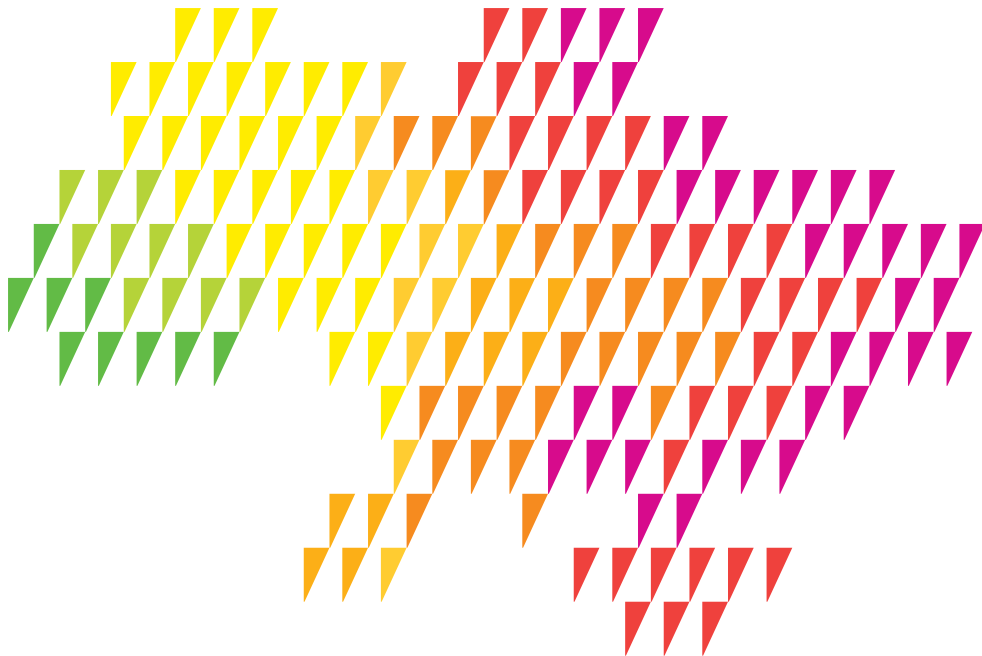
- **Simplification of agricultural production processes, which reduces yields and worsens the quality of land.**

Lack of funding and the need for significant savings led to a 50–60% reduction in the amount of fertilizer applied. Large and medium-sized manufacturers are ready to apply them in full. Fertilizer application is expected to be half the agronomic requirement (47%). The level of expected use of plant protection agents for the winter crop in 2024 is predicted at the level of 56% of the demand. Only 10% of respondents are ready to use fertilizers at 100% of the required level, while 18% are ready to use protective agents.

- **Shortage of labor resources in agricultural production.** More than 150,000 farmers/food system workers have been directly affected by the war and/or forced to migrate. Small-scale producers are in a difficult situation. The forced displacement of the population and the conscription of men into the Armed Forces of Ukraine lead to a shortage of labor and an increased workload for women. 48% of respondents noted a shortage of personnel in related agricultural activities: drivers, tractor drivers, mechanics, agronomists, etc.
- **Destruction of the infrastructure for the production, processing, and storage of agricultural products and food.** Russia is deliberately destroying granaries, food storages, and logistics infrastructure, as well as complicating export supplies of Ukrainian grain, which reduces the income of agricultural producers. The lack of electricity in the autumn-winter period of 2022–2023 led to the spoilage of agricultural products and even the loss of some of them. The total capacity of the destroyed granaries has already reached 8.2 million tons, and the capacity of the damaged granaries is 3.25 million tons of simultaneous storage capacity.
- **Environmental challenges.** Due to hostilities and mining in 2022, farmers could not use up to 30% of their fields for sowing (which reached 5 million hectares), and in 2023, 25% of the area was unusable. The destruction of the Kakhovka HPP also caused significant losses to land resources and the agricultural sector.

PART II

THE IMPACT OF THE KAKHOVKA DAM DESTRUCTION ON THE AGRICULTURAL MARKET



- Ukraine's total losses caused by Russia's blowing up the Kakhovka HPP
- Ukraine's total losses by sector
- Ukraine's direct and indirect losses (including agriculture and infrastructure)
- Irrigation system

90% OF THE
CANALS HAVE
DRIED UP AS A
RESULT OF THE
DESTRUCTION,
AS WELL AS THE
RESERVOIR



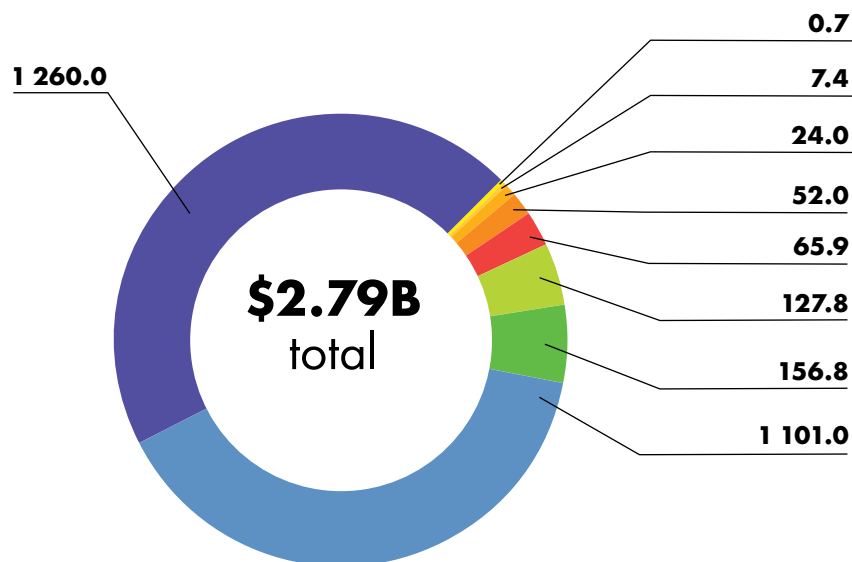
Source: Copernicus Sentinel 2 data collected from 2021 to 2024 and processed in Google Earth Engine, European Union Crop Type Map 2022 from the European Commission Joint Research Center, Institute for the Study of War, bloomberg.com

UKRAINE'S TOTAL LOSSES BY SECTOR

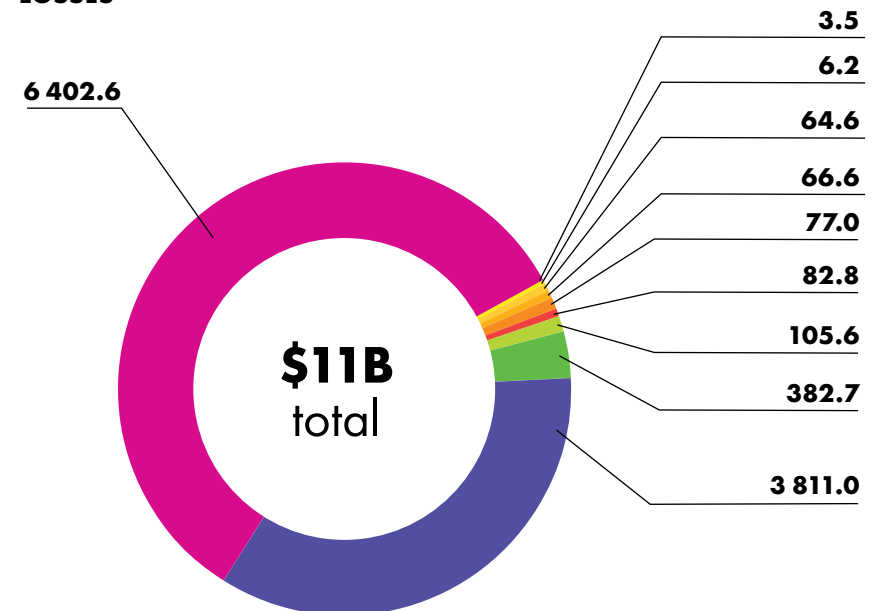
- Russia's destruction of the Kakhovka dam caused Ukraine losses worth almost \$14 billion.
- According to calculations, direct damage caused to infrastructure and assets amounts to \$2.79 billion, and losses exceed \$11 billion. The biggest problem is the long-term impact of the disaster on the environment.



DIRECT DAMAGE



LOSSES



Source: Government of Ukraine, UN, public research

UKRAINE'S DIRECT AND INDIRECT LOSSES (INCLUDING AGRICULTURE AND INFRASTRUCTURE)

- The amount of direct damage to Ukraine's infrastructure is at least **\$2 billion**, and indirect losses to agriculture will amount to **more than \$220 million annually**.
- The Ukrainian budget has already allocated **\$41 million** to eliminate the **consequences of** the HPP destruction and to build main water lines to supply water to the regions that were supplied from the Kakhovka reservoir.
- The loss of the 343.2 MW station itself is preliminarily estimated at **\$1.2 billion**.
- More than **290 km of roads** were affected by flood, and **damage to the transport infrastructure** reached \$311 million.
- At least 28 large industrial facilities on both banks of the Dnipro River were flooded. Businesses also suffered losses and were forced to relocate or shut down. **Total losses for the industry** are preliminary estimated at **\$105 million**.
- **Damage from the destruction of crops, livestock and fish** amounted to **\$25 million**. The relatively small amount is explained by the less active use of agricultural land due to constant shelling and the small area of flooding of the land in use.
- At the same time, the **loss of irrigation possibility** from the Kakhovka Reservoir **caused indirect losses of up to \$182 million/year in crop production** and up to \$49 million/year in other sectors of the industry.
- The full restoration of navigation on the Dnipro River will only be possible after the region is de-occupied and with significant investment.
- The ecology of the region was significantly **affected**, including due to the leakage of 150 tons of oil and desalination of the Black Sea. The estimated amount of losses is \$1.5 billion. In addition, a regional landscape park and nature reserve areas were in the flood zone.

IRRIGATION SYSTEM: GENERAL CONSEQUENCES

Water supply to **31 irrigation systems** in Dnipro, Kherson and Zaporizhzhia regions was stopped. In 2021, they **provided irrigation for 584,000 hectares**, from which they harvested about **4 million tons of grain and oil crops** worth **\$1.5 billion**.

Most of the irrigation systems are currently located in the temporarily occupied territories and, therefore, it is impossible to assess their condition. This year, **only 13 irrigation systems are operating** on the right bank of the Dnipro River. As a result of the HPP destruction, **94% of irrigation systems in Kherson, 74% in Zaporizhzhia, and 30% in Dnipro regions were left without water**.

Irrigation in Kherson region will not be possible for two-three years. Kakhovka HPP destruction led to flooding, damage, and a complete shutdown of the reclamation infrastructure in the areas adjacent to the Kakhovka reservoir. For example, the main pumping station of the Lymanets irrigation system supplied water to 1,500 hectares of irrigated land.

Vegetable and horticultural production in the region may disappear altogether, given that more than 35% of borscht vegetables were supplied to the domestic market of Ukraine from this particular region before the war. Water from this irrigation system was used to grow up to 80% of all vegetables in Ukraine and a significant share of fruits and grapes. Besides, this also affected land traditionally used to grow grains and oilseeds. On the right bank of the Kherson region alone, about 10,000 hectares of agricultural land could be flooded, and on the left bank it could be several times larger.

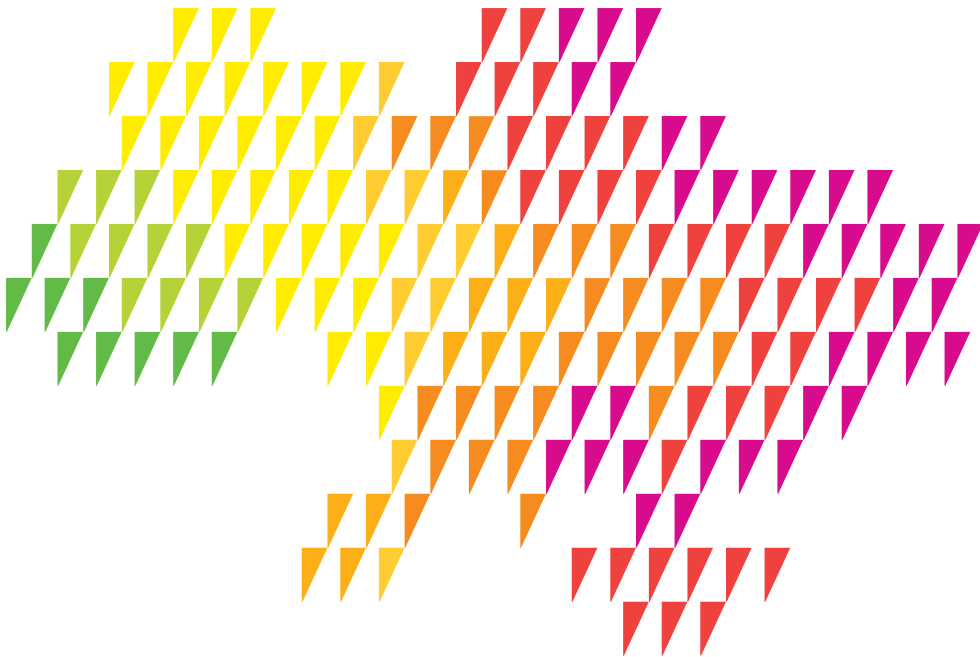
Southern farmers will not be able to fully use 1–1.5 million hectares of land. At the same time, the lack of irrigation means a decrease in yield. In particular, **the yield of oilseeds** with irrigation is about **two times** higher than the yield per hectare without irrigation, and **that of grain is 2.5 times higher**. Due to the lack of reclamation, Ukraine may lose 0.5–1 million tons of grain.

Zaporizhzhia, Kherson and Dnipro regions will be able to grow crops that do not require much moisture, such as wheat, barley, winter crops and peas, while vegetables and industrial crops will not be an option.

PART III

MINING OR CONTAMINATION OF TERRITORIES WITH EXPLOSIVES

- Ukraine is the most mined country in the world
- Demining progress and impact assessment



UKRAINE IS THE MOST MINED COUNTRY IN THE WORLD

- **174 thousand km²** of Ukraine's territory (almost 30%) was assessed as potentially contaminated with mines and explosive remnants of war. **This is the total area of such countries as Belgium, the Netherlands, Switzerland, Slovenia, and Denmark!**
- **In different regions, 5–10% of contaminated land** (13,000 km²) needs technical inspection, and 2–8% needs demining (9,000 km²).
- **About 20% of agricultural land has become inaccessible for cultivation** due to the war compared to 2021.
- **About 4 million hectares** of agricultural land is currently unusable due to mines, contamination with explosive remnants, or ongoing hostilities.
- **In rough terms of wheat, this is about 13 million tons of lost harvest.**
- Currently, **Ukraine is the largest minefield in the world.** This not only hampers the movement of people, but also causes serious disruptions in agriculture.



“The scale of mining in Ukraine is much more serious than in Afghanistan or Somalia, and it will take years to clear the entire territory.”

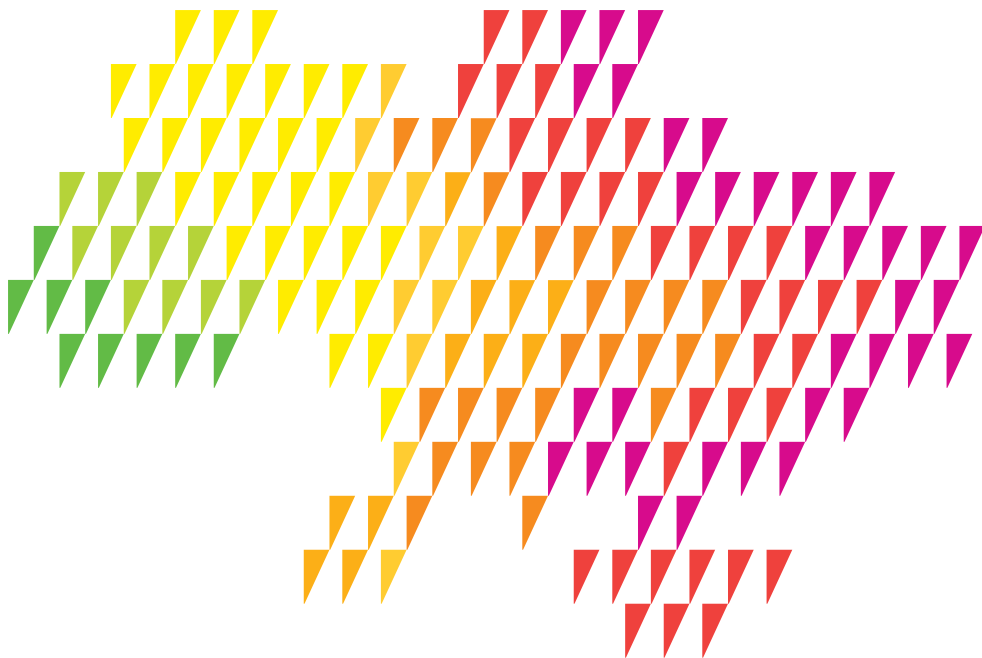
Paul Heslop

Head of the UN Mine Action Program in Ukraine

DEMINING PROGRESS AND IMPACT ASSESSMENT

- In Ukraine, **18,000 km² of land** was returned to the economy during the year thanks to demining. The assessment of potentially contaminated land has been reduced to **156 thousand km²**.
 - In 2023, **more than 257 thousand hectares of land** was surveyed as part of the priority demining of agricultural land. Almost **195 thousand hectares** have been returned to farmers for economic use.
 - Since March 2013, SES units have surveyed more than **1.2 thousand km² of agricultural land**, of which **more than 70 km² have already been cleared of mines**. This work involves all available designated units of the SES and the Armed Forces, the National Guard, the State Special Transport Service, the National Police, mine action operators, totaling more than 2,500 people and more than 600 pieces of equipment, of which about 30 pieces are special mechanized demining vehicles.
 - In 2024, Ukraine plans to demine more than **5,000 km² of agricultural land**.
- **All the necessary infrastructure** is now in place. Over the past month, the number of humanitarian demining operators has increased from 26 to 29, and another 48 potential humanitarian demining operators are undergoing certification.
 - With the support of the Food and Agriculture Organization of the United Nations and the World Food Programme, the UN Development Programme, and the Swiss Government, the SES, together with the NGO Society of Researchers of Ukraine, is implementing a **project to study agricultural land using remote sensing**.
 - The World Bank has estimated Ukraine's reconstruction needs, including humanitarian demining, at **\$486 billion**.
 - **The most difficult thing is to estimate the duration of the demining process: according to the most pessimistic estimates, it may take 757 years!**

PART IV



LOSS OF AGRICULTURAL MACHINERY AND DAMAGE TO AGRICULTURAL INFRASTRUCTURE DUE TO THE WAR

- Damages, losses and needs of agriculture due to the full-scale war
- Agricultural losses due to the war by type of agricultural machinery

DAMAGES, LOSSES AND NEEDS OF AGRICULTURE DUE TO THE FULL-SCALE WAR

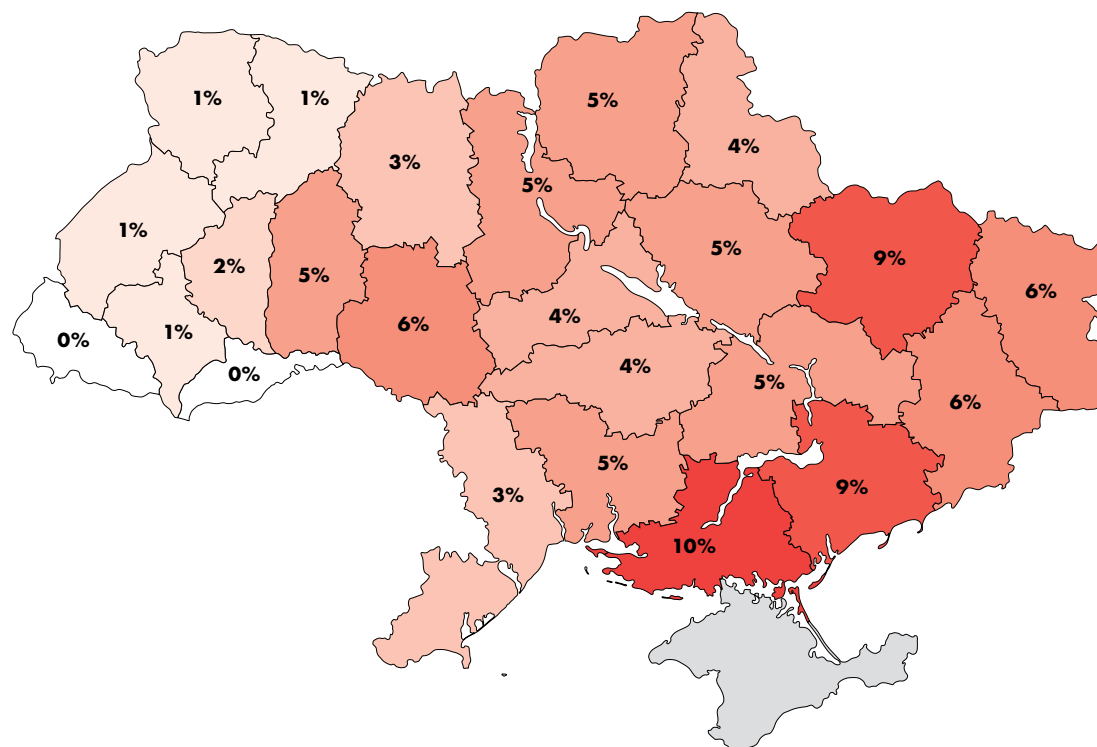
Ukraine's agricultural sector has suffered more than **\$80 billion** of **direct losses and damage** as a result of the full-scale invasion.

The total value of the destroyed assets is **\$10.3 billion**, which is 18% higher than the estimate in April 2023.

The largest category of losses is **damaged and destroyed agricultural machinery**, accounting for **56.7% of all losses**.

In total, about **181,000 pieces of agricultural machinery and equipment** were partially or completely damaged as a result of the invasion.

REGIONAL BREAKDOWN OF LOSSES AND DAMAGES



AGRICULTURAL LOSSES DUE TO THE WAR BY TYPE OF AGRICULTURAL MACHINERY

Damaged and destroyed agricultural machinery makes the largest category of losses totaling \$5.8 billion.

On average, 18.6% of the available machinery was at least partially damaged due to Russian aggression, depending on the specific type of agricultural machinery and equipment.

The largest source of damage in this category is tractors, with approximately 18,200 destroyed and 6,800 damaged (but still repairable). The cost of replacing the destroyed and damaged tractors is \$1.6 billion.

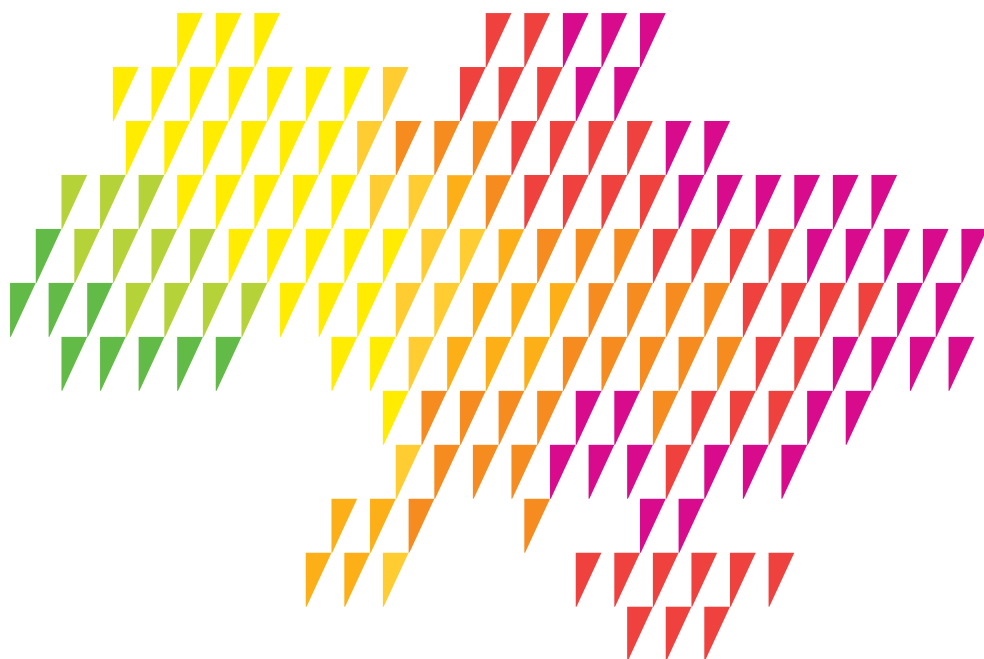
The confiscation of Russian state assets aimed at restoring the agricultural sector can revive the agricultural sector.

	Completely destroyed	Partially destroyed	Losses, \$ mln
Tractors	130,529	18,184	1,611.3
Trucks	78,678	9,899	511.0
Grain harvesters	31,588	4,663	978.7
Machines for harvesting vegetables and melons	447	118	9.8
Agricultural trailers, semi-trailers	64,800	8,474	185.3
Plows	51,447	6,612	146.3
Cultivators	71,633	11,590	282.6
Harrows	160,004	19,496	403.9
Planters (except fertilizer planters)	66,511	10,917	882.6
Mowers	10,196	1,356	8.2
Ripper-dozers	16,862	2,385	69.9
Balers, including baling presses	8,226	1,039	40.1
Manure and fertilizer spreaders (including fertilizer drills)	23,878	2,683	52.9
Grain cleaners	21,591	3,016	63.9
Milking and dairy machines	3,016	400	7.1
Milk purifiers, milk coolers	63.9	209	3.6
Feed preparation machines	4,046	420	7.4
Feed dispensers	5,040	472	13.3
Manure conveyors	11,958	1,094	3.3
Tractors (Households)	180,078	25,407	453.1
Grain harvesters (Households)	14,586	2,168	97.6

PART V

THE STRUCTURE OF UKRAINIAN GRAIN PRODUCTION

- Dynamics of sown areas under major crops
- Dynamics of the Ukrainian harvest in the context of the full-scale invasion
- Sowing and harvest prospects in 2024



DYNAMICS OF SOWN AREAS UNDER MAJOR CROPS

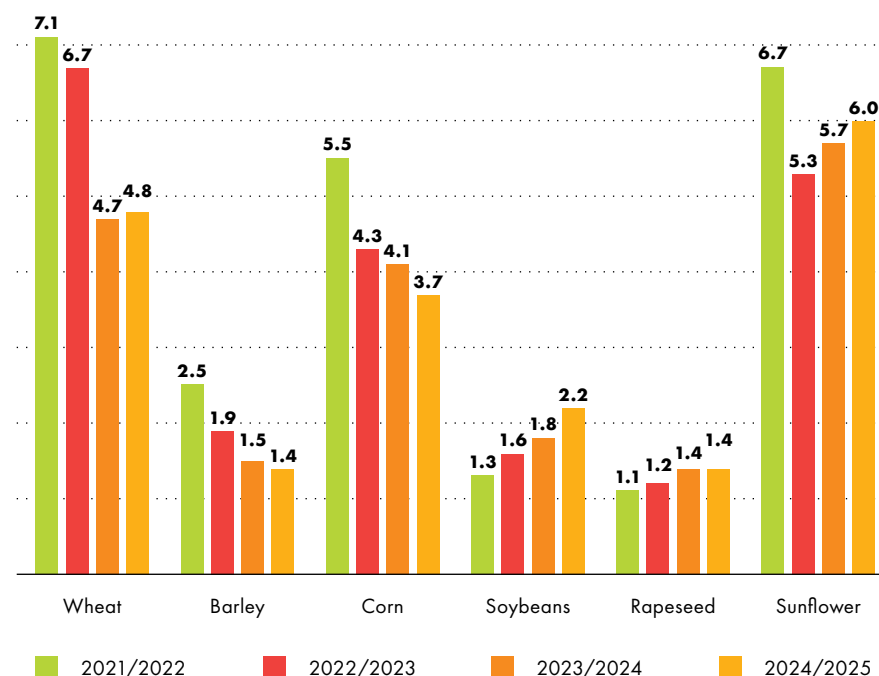
Since the beginning of the full-scale invasion, the accuracy of statistics in Ukraine has deteriorated, with strong discrepancies between initial estimates and results and indicators from separate sources (the Ministry of Agrarian Policy and the State Statistics Service).

As an example, the fieldwork progress showed that in the fall of 2022 (for the 2023–2024 harvest), 3.8 million hectares were sown, and another 0.1 million hectares were sown in the spring. But then, only 4.7 million hectares was harvested.

So, despite the available data, it needs to be adjusted and we have to wait for the final results. However, the preliminary forecast made by Barva Invest shows that in addition to wheat, the area under grains should decrease, while oilseeds producers can plant more soybeans and sunflower — fieldwork will continue in spring 2024.

The total area under six crops remained almost unchanged compared to the previous season (19.4 vs. 19.2 mln hectares)

CROP AREAS, mln hectares



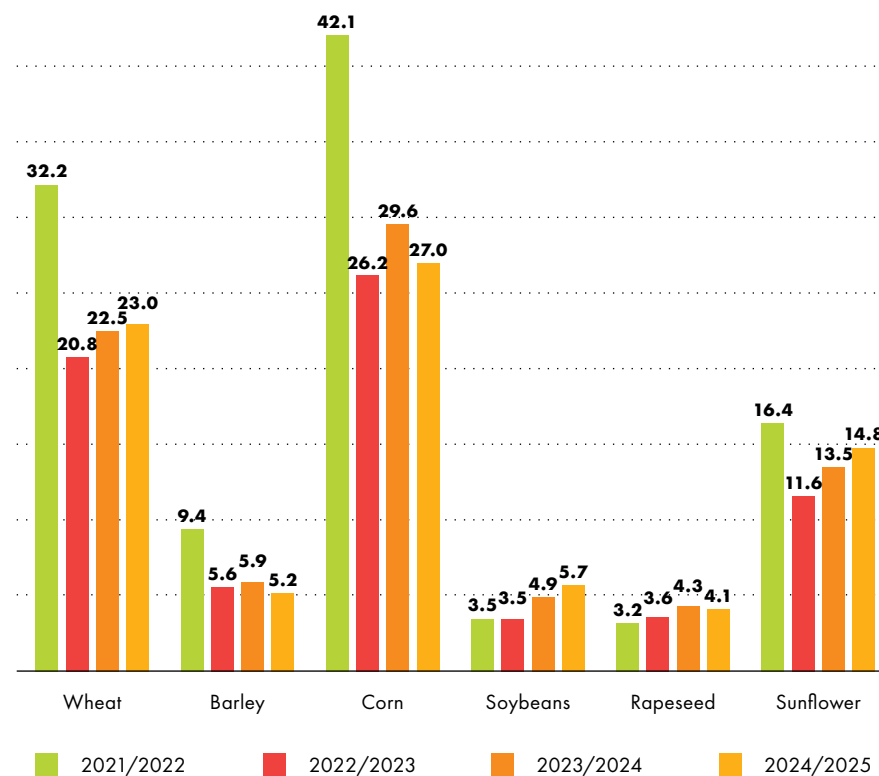
DYNAMICS OF UKRAINIAN HARVEST

In the absence of weather problems and subject to reaching the average yield, the production of these six crops in 2024 could reach 79.8 million tons, which is only 900 thousand tons less than in 2023. But this is a significantly lower production rate compared to the period before the full-scale invasion (season 2021–2022).

When choosing crops for sowing, producers, in addition to purely agronomic requirements and meeting their own needs, also base their decisions on forecasting price prospects. However, it is currently impossible to fully realize their strategic vision of selling the harvest.

Since the beginning of the full-scale invasion, Ukrainian producers have suffered a significant deterioration of their ability to enter into contracts for the sale of unproduced crops (forward market), which means that even if they expect prices to fall next season, producers have limited tools to fix acceptable price levels.

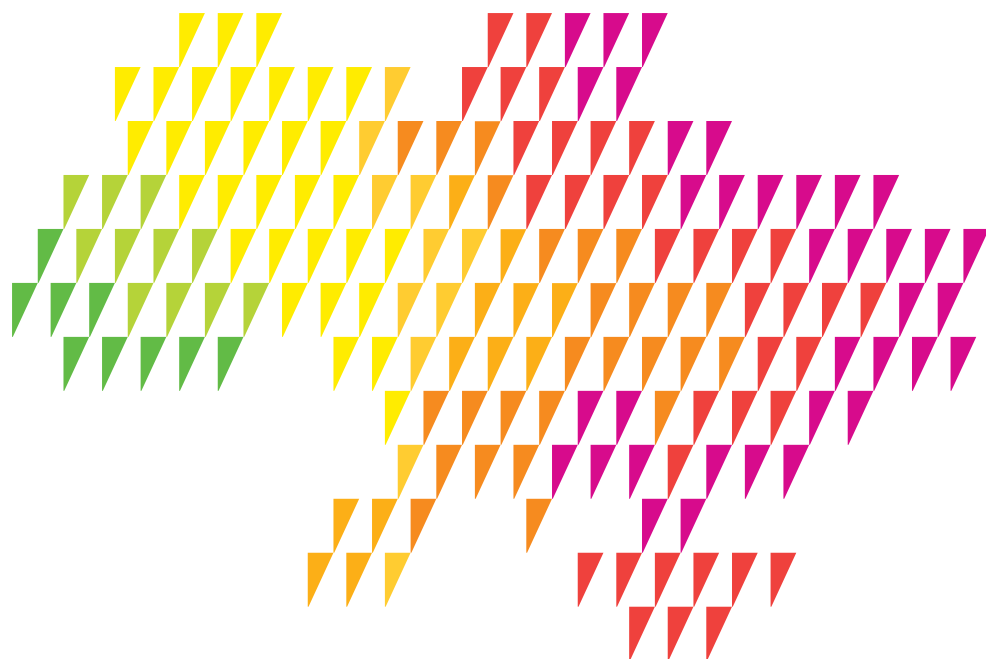
HARVEST, mln tons



PART VI

LOGISTICS OF UKRAINE

- Exports by mode of transportation
- The cost of logistics and its impact on producer prices
- The impact of the protests in Poland on Ukraine's export opportunities



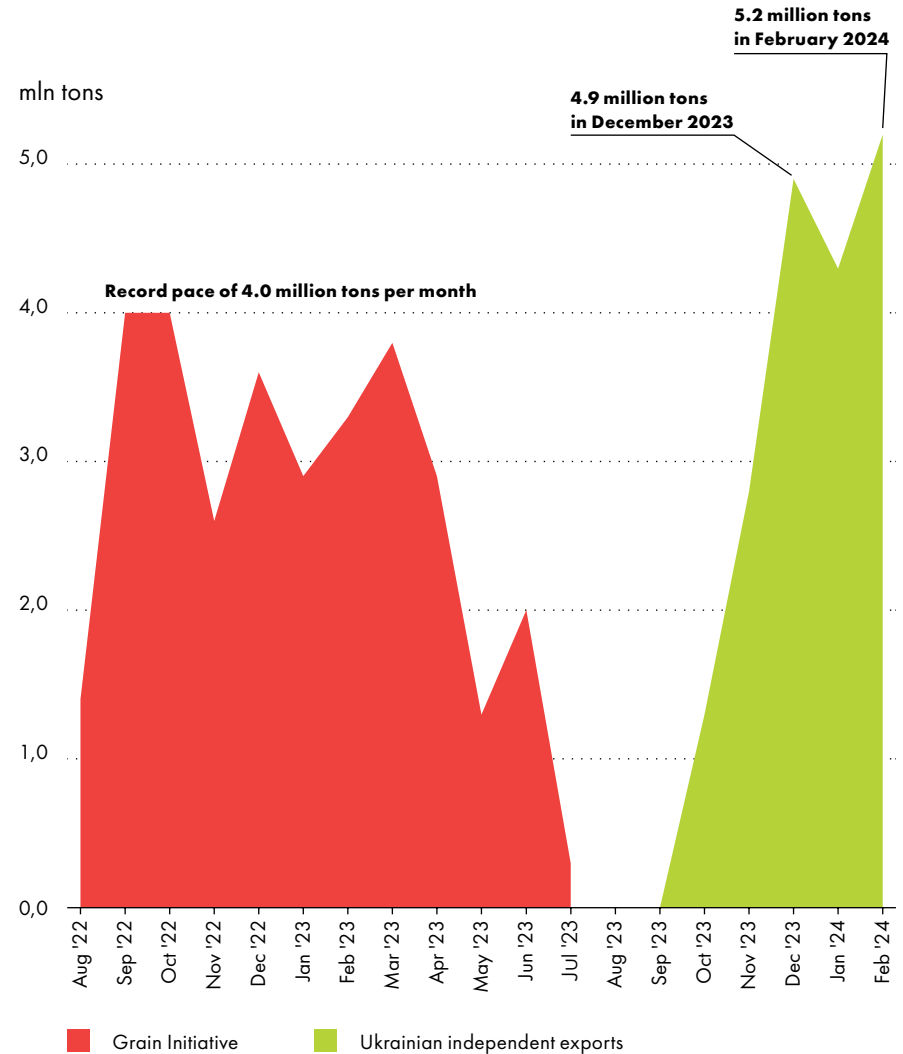
UKRAINIAN EXPORTS BY SEA

Thanks to the Grain Initiative, Ukraine was able to export 32.1 million tons of grains, oilseeds and processed products by sea within 12 months. This agreement allowed Ukraine to support the agricultural sector and the economy.

However, ship traffic was subject to regular targeted acts of sabotage by Russia:

1. Long periods of uncertainty due to the need to “re-sign” the Agreement. The drop in exports at these moments can be seen in the diagram, especially in November 2022.
2. Inspection of ships in the Bosphorus: Russia resorted to direct and indirect actions aimed at delaying the inspection, reducing the number of inspection teams, disrupting the passage procedure, etc.

This affected not only the pace of exports but also the length of vessel downtime, which forced trading companies to build in potential costs and reduce the purchase price from farmers.



UKRAINIAN EXPORTS BY SEA

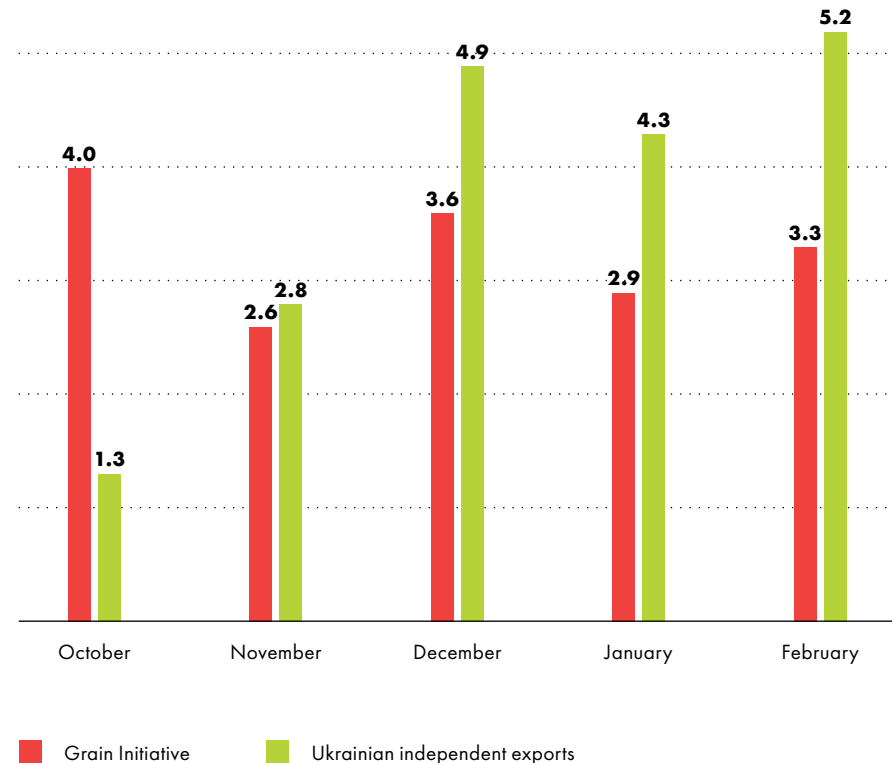
In the early summer of 2023, Russia did not extend the Grain Initiative, apparently believing that it was in a position of strength and could thus cut off Ukrainian exports. This also took place against the backdrop of a ban on exports of some Ukrainian grain to the EU-5 (Poland, Slovakia, Hungary, Romania, and Bulgaria).

However, the successes of the Ukrainian Armed Forces on land and especially at sea against the Russian navy allowed Ukraine to resume its exports by sea without the involvement of other parties.

In September, a few ships left the ports, but three months later, Ukrainian exports by sea surpassed the Grain Initiative record (4.9 vs. 4.0 million tons).

The diagram shows a month-to-month comparison (October 2022 vs. October 2023).

mln tons



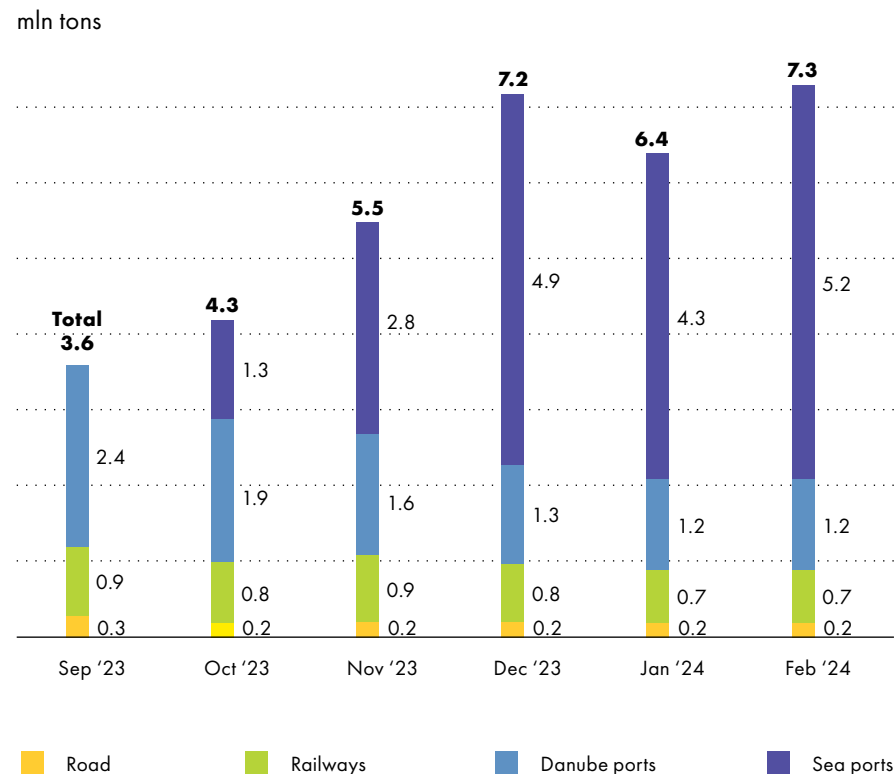
UKRAINIAN EXPORTS BY MODE OF TRANSPORTATION

Since the launch of independent Ukrainian exports in September 2023, we have seen several trends.

1. Exports via the Danube River have lost their attractiveness for some market participants: the logistics leverage is greater than to Odesa ports, and the geography of exports is limited because coaster vessels mainly operate within the Mediterranean Sea.
2. Overland exports are also losing their attractiveness, but in this case, the protests in Poland and other EU countries play a bigger role. They lead to the blocking of traffic routes, reduced demand, etc.

From September 2023 to February 2024, exports amounted to:

- **1.3 million tons by road;**
- **4.8 million tons by rail;**
- **9.6 million tons through the Danube ports;**
- **18.5 million tons through seaports.**

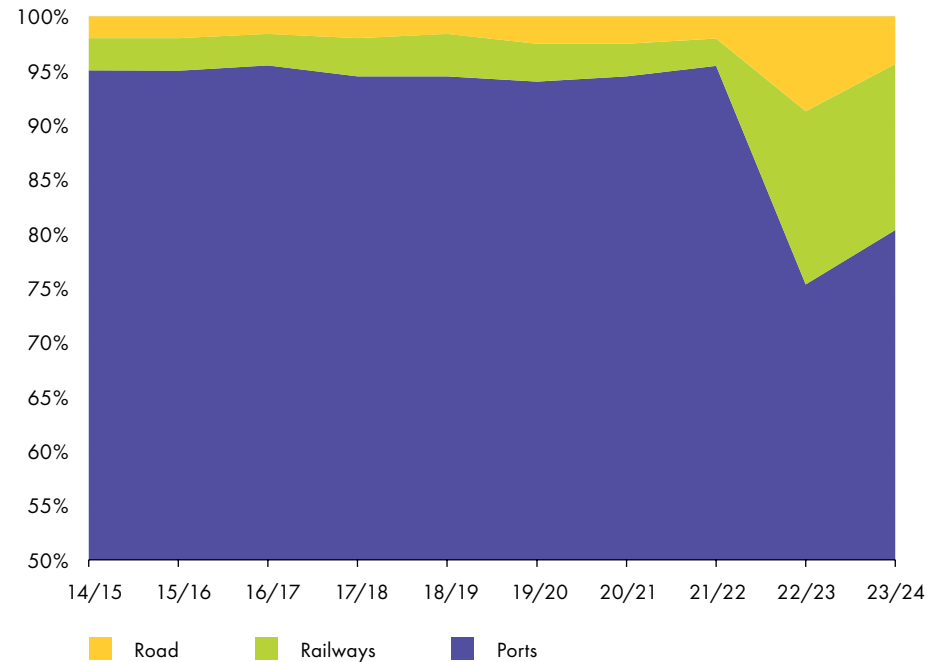


METHOD OF EXPORTING GRAIN CROPS AND VEGETABLE OILS

Before the full-scale invasion, almost all of Ukraine's agricultural products (bulk and liquid) were exported through deepwater ports. The share of exports by land was insignificant due to limited demand from neighboring countries and expensive logistics in transit through these countries.

The full-scale invasion did not make these destinations cheaper, but Ukrainian producers had no other choice. But over time, not only the Ukrainian side of logistics was being built, the work of neighboring countries was becoming more and more coordinated and set up to handle large quantities of products.

Given the resumption of sea exports and protests of European neighbors, the share of land exports began to decline.



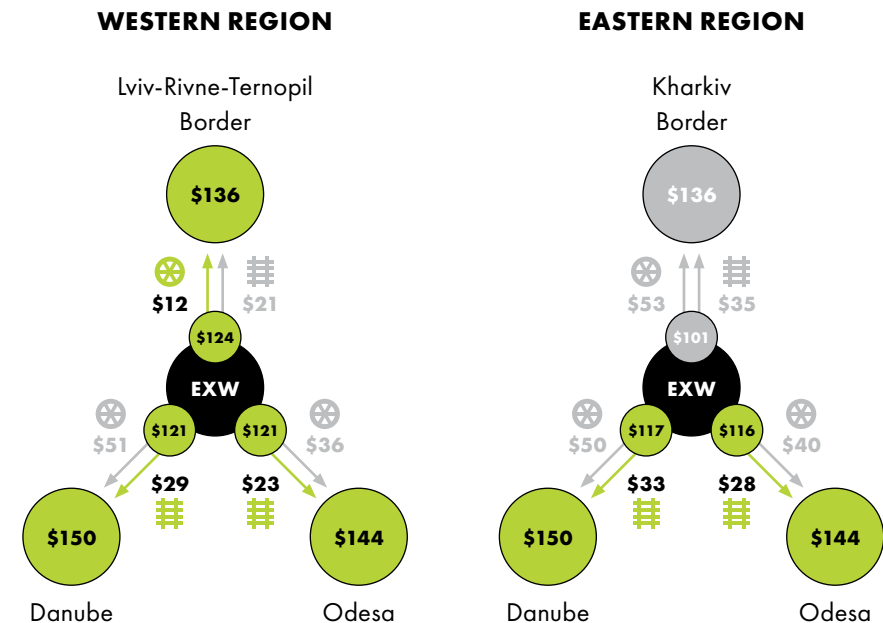
PRICES AND LOGISTICS IN UKRAINE

This diagram shows how the price of corn is approximately formed for a producer (EXW) who chooses between three export destinations (Border-Danube-Odesa) and two delivery methods (rail and road).

For example, for a manufacturer in the west of Ukraine, all three export destinations are currently attractive, despite the fact that the price at the border is \$14 lower than in the ports of Greater Odesa, and the cost of logistics is lower.

But the farther away from the EU border, the less profitable this destination is for sales. Given the same export prices, a producer in the east of Ukraine will lose \$10–15 per ton.

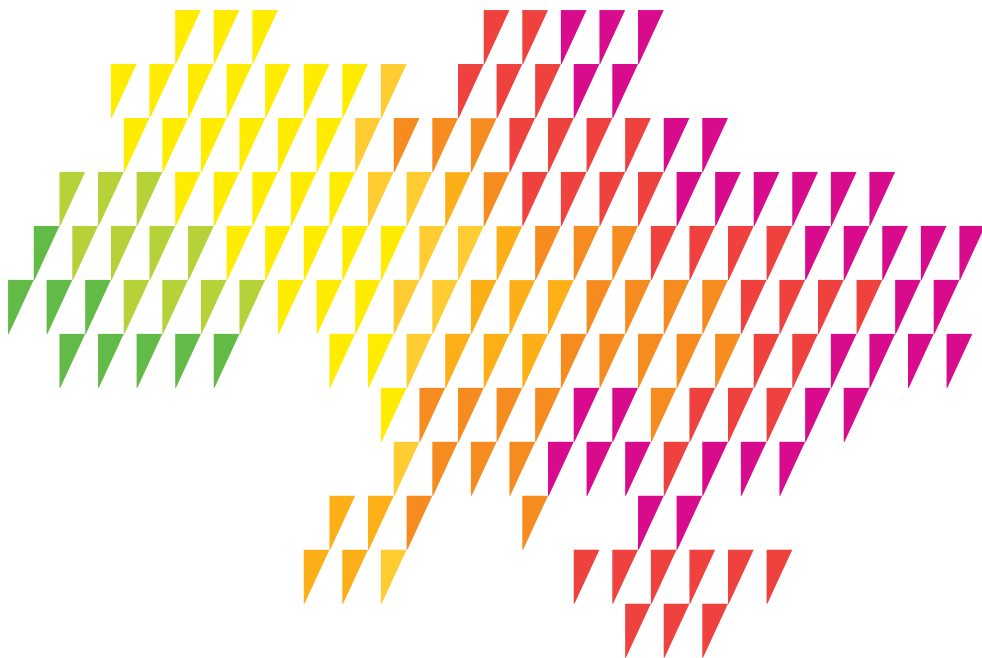
These are estimated prices, since the geography of exports, availability of own transport, proximity to the border, delivery terms and other factors make the calculation unique for each producer.



PART VII

THE STRUCTURE OF UKRAINE'S AGRICULTURAL EXPORTS

- Exports of major grains and oilseeds
- Export trends
- Export geography
- Problems and challenges of exporting the current harvest



EXPORTS OF MAJOR CROPS

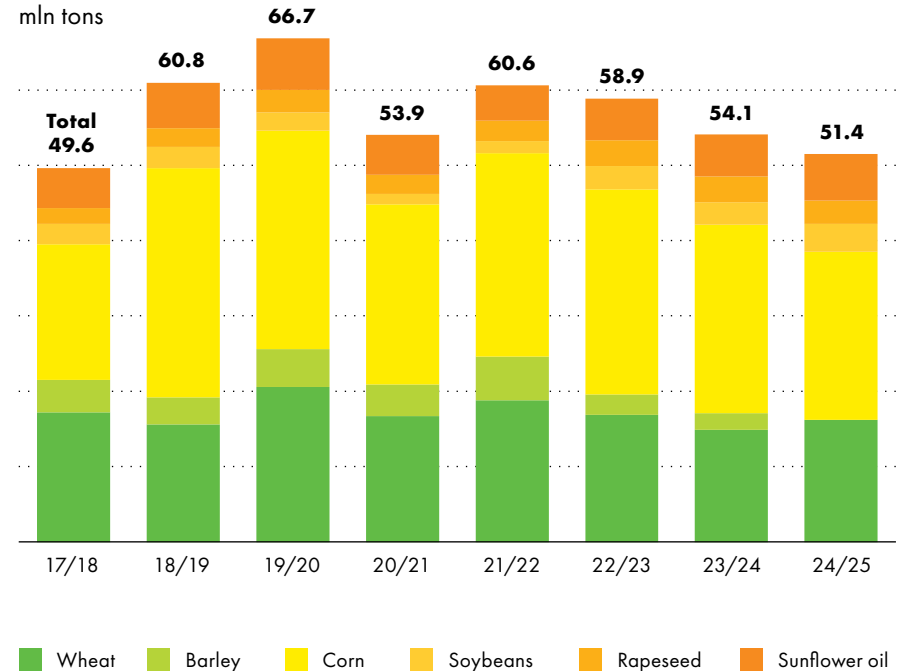
Export figures depend on the production volume. Thus, in the season of 2020–2021, there was a decline due to a poor harvest of wheat, barley, soybeans, and rapeseed.

In the season of 2021–2022, Ukrainian farmers harvested a record-breaking (at that time) crop of wheat, barley, corn, and sunflower.

This gave impetus to increasing export potential, including sunflower oil.

However, in February of the 2021–2022 season, Russia's full-scale invasion began, followed by the occupation of some regions, the temporary shutdown of maritime exports, and other consequences for agricultural exports.

In the next seasons, the area under grains began to decline, which limited the harvest and export potential. However, oilseeds and, in particular, processed products (meal/oil) showed recovery and, in some cases, reached historical records.

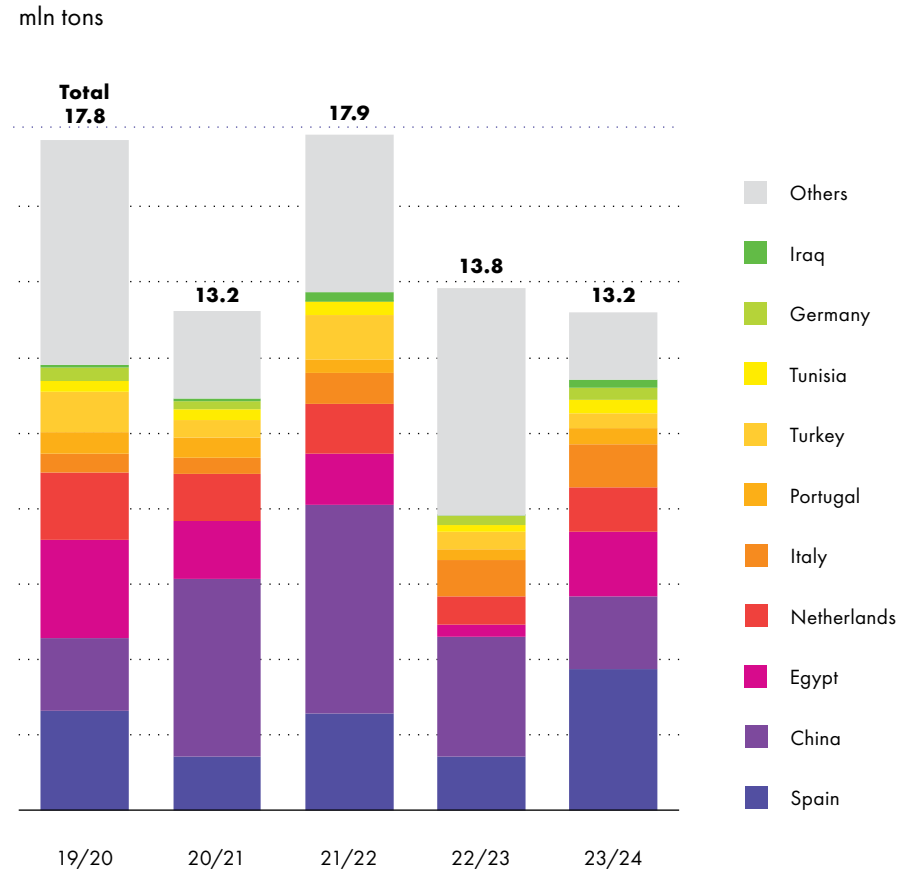


CORN EXPORTS FROM OCTOBER TO FEBRUARY

The **2023–2024 corn season** is at its active stage. For a proper comparison, we display the geography of exports for the same period (October–February) for the rest of the seasons.

In the current **season of 2023–2024**, Ukraine owes a lot to the strong demand from Spain. Although this country is a traditional importer of Ukrainian corn (competing with Brazil), in 2023, Spain got a smaller harvest of wheat and corn and, therefore, needs to import grain to supply its growing livestock sector.

While this allows Ukraine to find export destinations this season, the trends in many other countries, including China, are threatening. The decline in purchases particularly from Ukraine, as well as the decline in export destinations, is shown in the “other” gray column: unlike previous seasons, Ukraine has significantly lost its markets.



WHEAT EXPORTS FROM JULY TO FEBRUARY

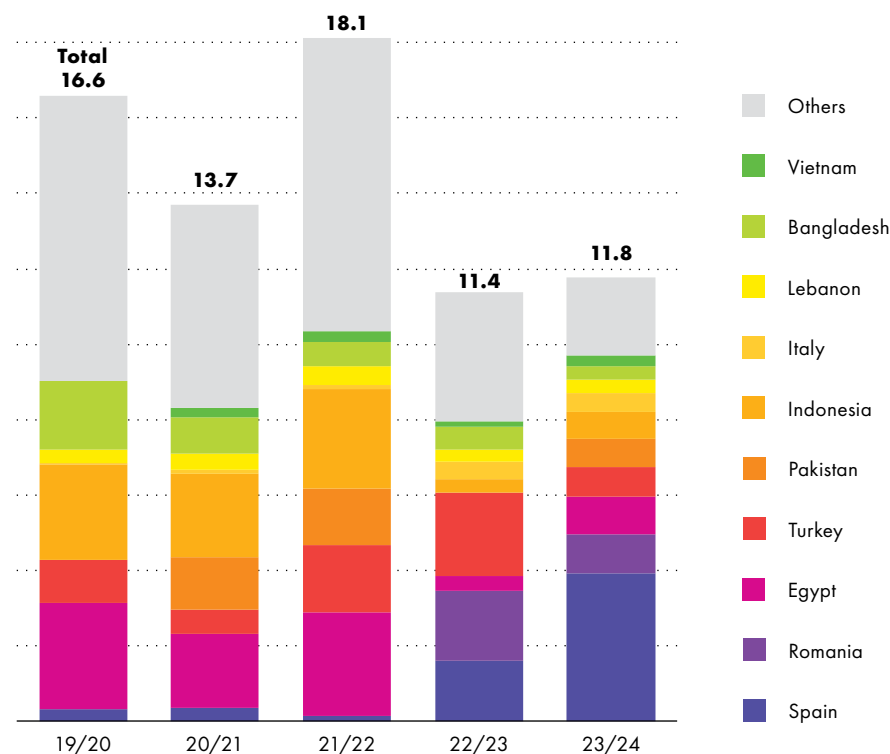
The **2023–2024 wheat season** is at its final stage. However, for a proper comparison, we show the geography of exports for the same period (July–February) for the rest of the seasons.

As with corn, Ukraine increased the share of exports to Spain, which needs feed grain.

At the same time, the pace slowed down in two key destinations for Ukraine:

1. Indonesia (which buys feed wheat) usually buys in the first months after the harvest, i.e. from July to September. At that moment, Ukraine had neither the Grain Initiative nor independent sea exports. The situation should improve in the summer of 2024.
2. Egypt (which buys milling wheat) has increased its share of imports from Russia. Our enemy has a huge harvest, exports stolen Ukrainian grain, and for almost the entire **2023–2024 season** offered the cheapest wheat among competitors.

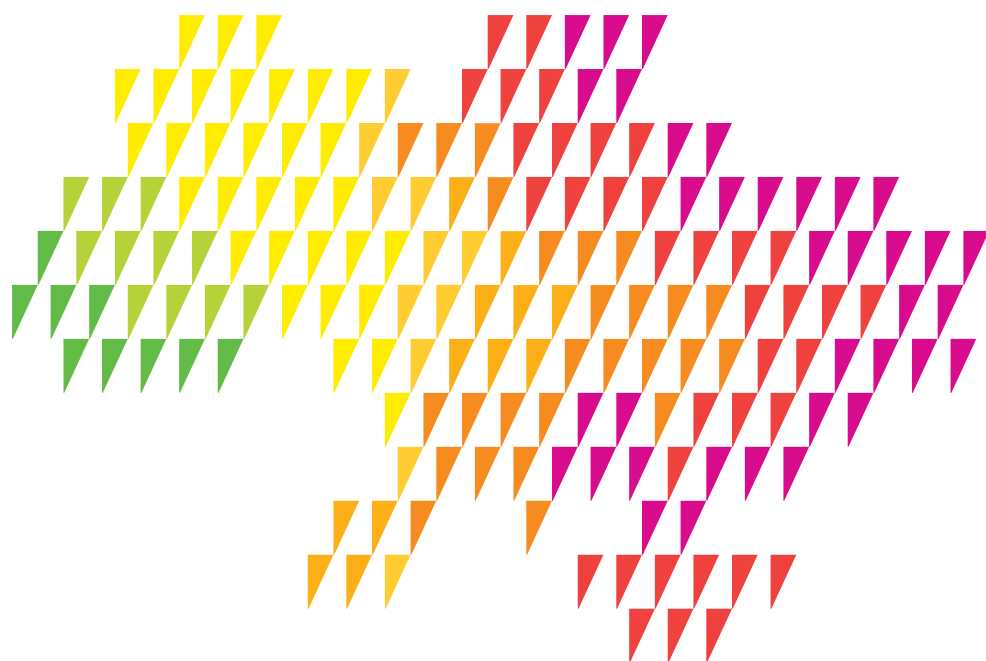
mln tons



PART VIII

PRICE TRENDS IN THE AGRICULTURAL MARKET

- Analysis of world price trends since the beginning of the full-scale invasion
- Final price at importers
- Export price structure
- Soybean market situation and prospects

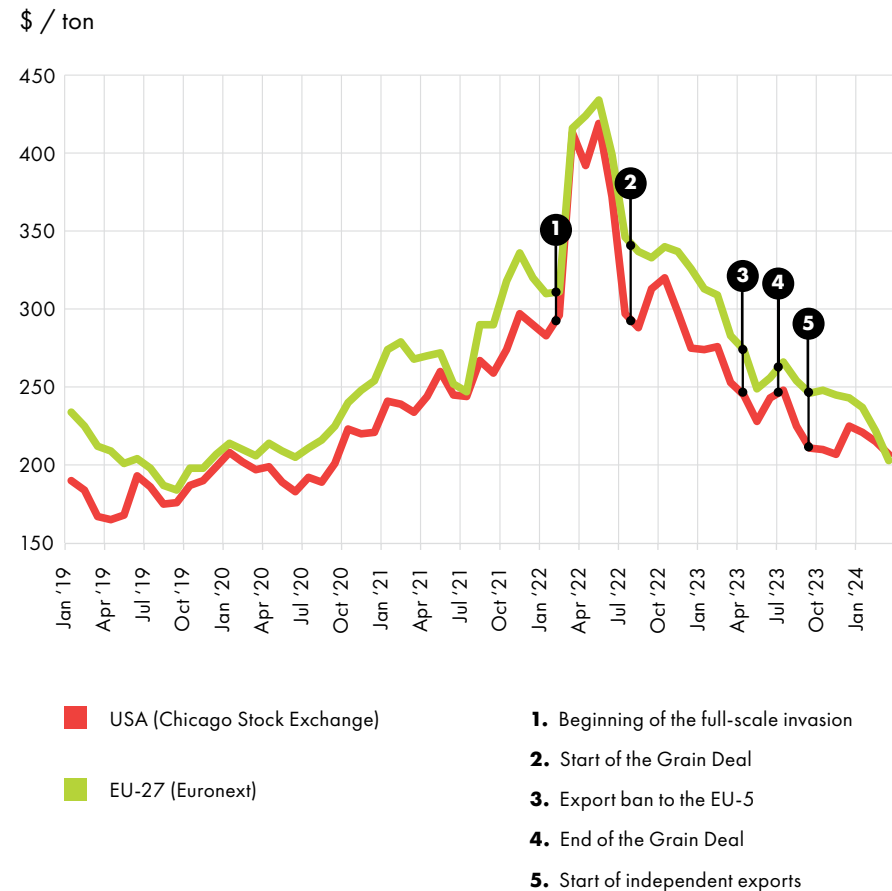


WHEAT PRICE TRENDS ON WORLD COMMODITY MARKETS

Since 2020, global commodity prices have been rising rapidly, driven by disrupted supply chains due to COVID lockdowns. This growing market was hit by Russia's full-scale invasion of Ukraine, which led to an extraordinary price spike.

But this spike was leveled in the summer of 2022, when a new wheat crop appeared in the Northern Hemisphere, and Ukraine demonstrated that it could still export grain via alternative routes.

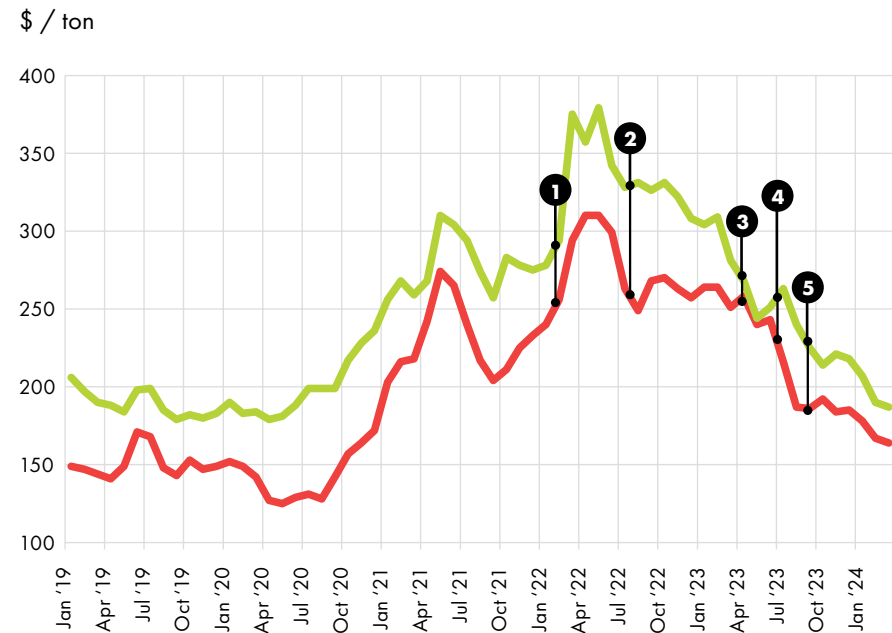
Since August 2023, vessels under the Grain Initiative have left Ukraine. From that point on, the war had less of an impact on grain prices and more of a global problem, oversupply of the feed market. The milling wheat market was under strong pressure due to the Russian wheat stocks. And globally, the success of central banks in reducing inflation.



CORN PRICE TRENDS ON WORLD COMMODITY MARKETS

The situation on the corn market was even less favorable for growth, as the world's two largest exporters (the US and Brazil) produced a huge harvest that still cannot find enough demand.

Therefore, neither protests nor official bans helped Polish farmers see higher prices, as the fall was not caused by Ukraine, but by a fundamental shift in the balance of global supply and consumption and lower inflation, which affected all commodities.



■ USA (Chicago Stock Exchange)

■ EU-27 (Euronext)

1. Beginning of the full-scale invasion
2. Start of the Grain Deal
3. Export ban to the EU-5
4. End of the Grain Deal
5. Start of independent exports

CORN PRICES FOR DELIVERY TO THE IMPORTER'S PORT

Exporters have their own pricing mathematics: the price at which the crop can be bought from farmers, the cost of logistics, and other related costs (including insurance). Therefore, the price they can offer to a particular importing country can vary greatly. The tables show examples of prices with delivery to the Mediterranean ports of Spain and to ports in northern China. As you can see, Ukraine offers the most attractive prices in the current environment and this gives us the expected demand. As an example, as of March 8, 2024, there is evidence that China has bought more than 600 thousand tons (most likely more than 1 million tons) from Ukraine to be delivered in March-May.

At the same time, the US offers much higher prices, which is why there are almost no exports to China, and recent rumors of a purchase have not been confirmed.

Romania successfully competes with Ukraine in the closer Spanish market, but slightly lower prices and the availability of much larger export volumes allow Ukraine to retain its leadership. The appearance of the Brazilian harvest in the summer will enhance competition.

\$ / ton (C&F price)

Importer: Spain	Mar '24	Apr '24	May '24	Jun '24
Ukraine	201	202	–	–
Romania	204	207	208	–
USA	222	222	223	228

Importer: China	Mar '24	Apr '24	May '24	Jun '24
Ukraine	234	234	–	–
USA	256	255	255	259

WHEAT PRICES FOR DELIVERY TO THE IMPORTER'S PORT

The same principle applies to wheat or any other crop.

The main trend in the wheat market is the dominance of Black Sea wheat in the Mediterranean market. Ukrainian, Russian, and Romanian wheat are actively competing with each other, and prices in this destination are lower than those of other competitors.

We also cite the example of the Asian market: in Indonesia, Ukraine also holds leading positions. At the same time, such countries as the US have expensive wheat, so they could nominally earn more, and local farmers would see higher purchase prices. But at such high levels, the US simply cannot find demand.

\$ / ton (C&F price)

Importer: Egypt	Mar '24	Apr '24	May '24	Jun '24
Ukraine	229	229	–	–
Russia	223	221	223	–
Romania	217	220	224	–

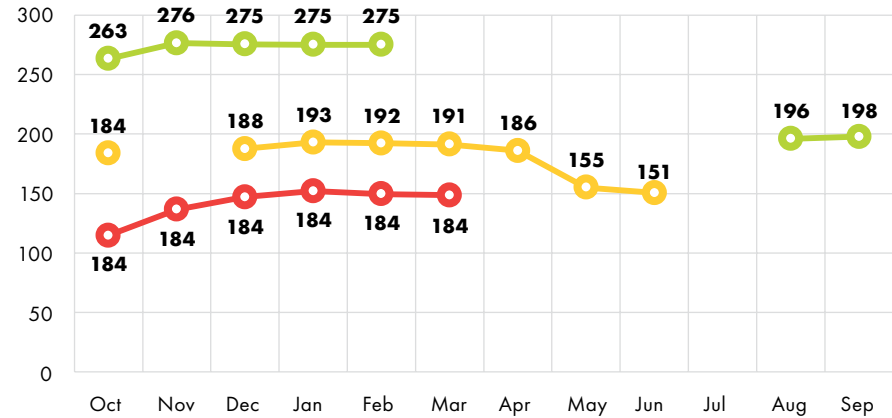
Importer: Indonesia	Mar '24	Apr '24	May '24	Jun '24
Ukraine	250	250	–	–
Australia	290	293	295	–
Argentina	262	269	–	–
USA	330	318	316	314

PRICES IN ODESA PORTS

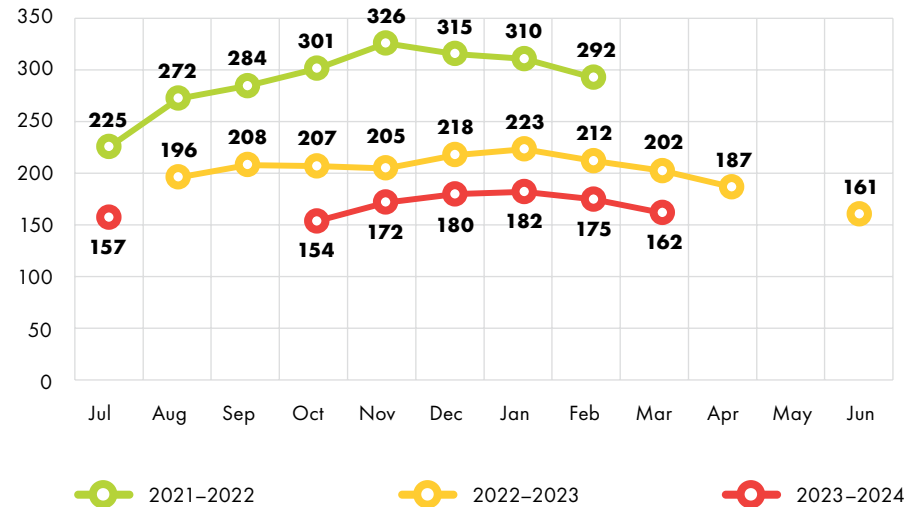
Just like global prices, Ukrainian domestic prices remain under significant pressure. The seasonal charts above demonstrate a particularly strong contrast: prices for the same month in different years differ by USD 40–80/ton.

At the same time, while grain prices have been falling rapidly, inter alia, due to a slowdown in consumer inflation, core inflation has been declining much more slowly. Prices for some other goods and services are linked to it. As a result, farmers still have relatively high costs that are falling gradually, while the grain that generates the company's profits is losing its value.

CORN PRICES IN ODESA PORTS, \$ / ton



WHEAT PRICES IN ODESA PORTS, \$ / ton



ANALYSIS OF THE GLOBAL SOYBEAN MARKET

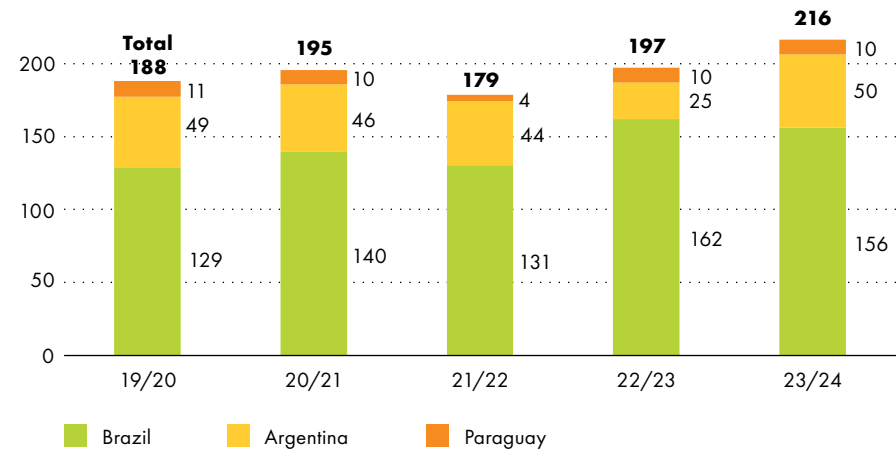
Global balances on the world soybean market show an excess of supply vs. consumption.

The 2023–2024 harvest season is underway in Brazil. Dry weather conditions led to a decrease in gross harvest estimates, with market participants operating in a wide range of 145–156 million tons. This is significantly lower than the record-breaking last season, but this season's initial stocks are 10 million tons higher, so the overall supply will not decline as much.

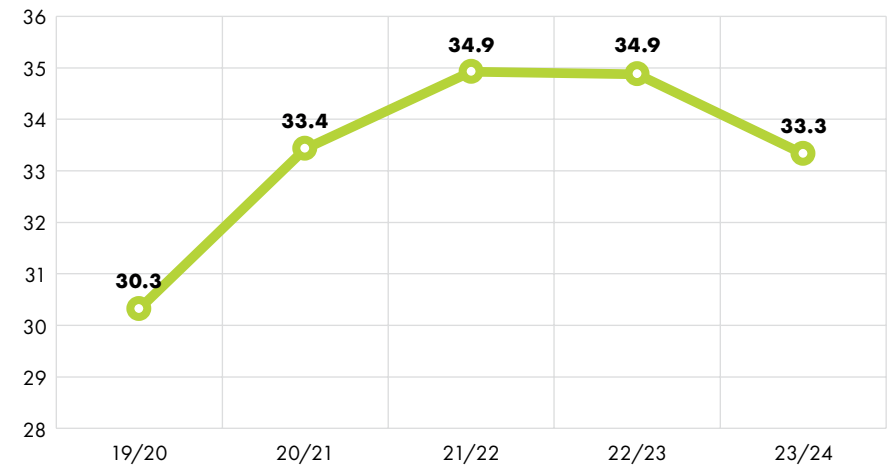
In Argentina, the harvest will start in late March. After a poor harvest season in 2022–2023, the weather conditions were favorable for the new crop. In addition, producers were increasing their areas. Harvest estimates remain in the range of 48–53 million tons. In general, South America has all chances to harvest 210 mln tons, compared to 197 mln tons last season.

In the U.S., the soybean acreage is expected to increase in the season of 2024–2025. The first (unofficial) estimate of the USDA showed an increase in the crop area by 1.7 million hectares, with an average yield of 3.5 tons per hectare. This will potentially bring 6 million tons of additional supply. Ukraine is directly affected by global trends, as it is a small player in the soybean market.

SOYBEAN HARVEST, mln tons



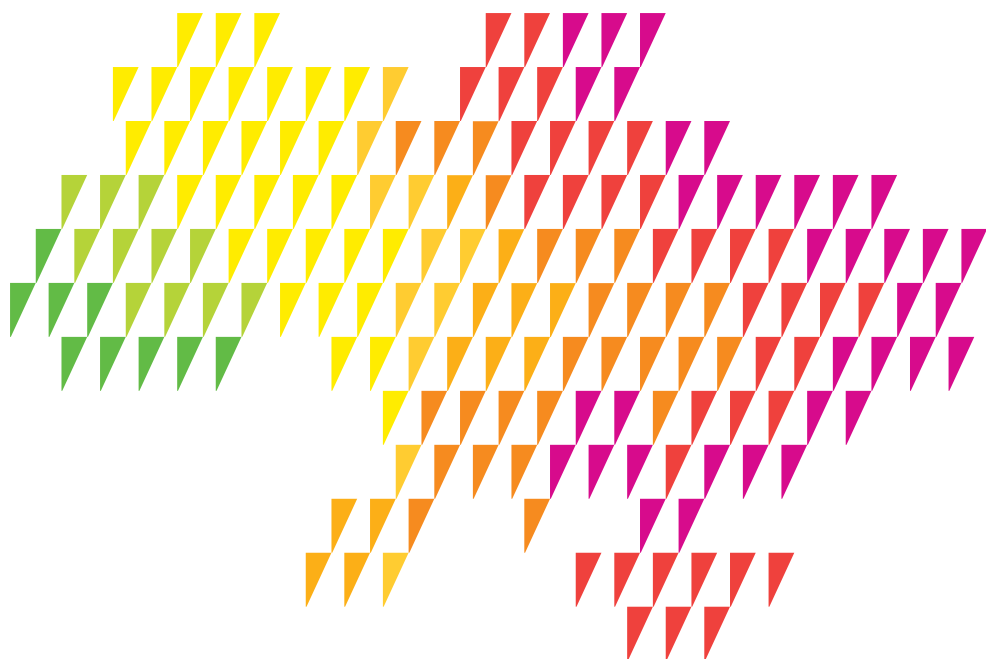
SOYBEAN ACREAGE IN THE US, mln ha



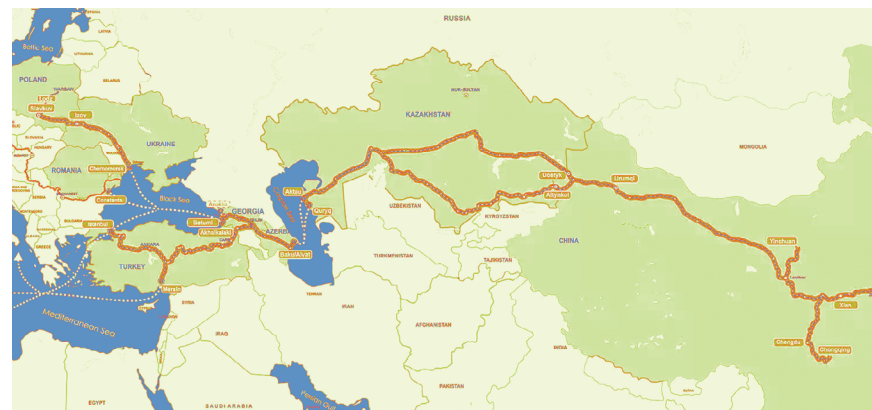
PART IX

THE IMPACT OF THE BLACK SEA MILITARIZATION

- Activity of the Russian Armed Forces in the Black Sea
- Middle way — an alternative for global trade



MIDDLE CORRIDOR — TRANS-CASPIAN INTERNATIONAL TRANSPORT ROUTE



Current situation

In the context of globalization and toughening sanctions in response to Russia's aggressive actions, Central Asian countries and China are actively seeking new ways for exports to Europe. This led to the growing popularity of the Middle Corridor as an alternative to the Northern Corridor.

The use of the Baku-Tbilisi-Kars railway reduces the delivery time from Asia to Turkey to 15 days, which makes this route particularly attractive. Since 2023, oil from Kazakhstan has also been transported via this route.

Azerbaijan, playing a key role in the development of the Middle Corridor, has adopted a 2024–2024 action plan to expand its transit potential, aimed at modernizing and expanding infrastructure to increase throughput and reduce delivery times.

Prospects

According to forecasts, by 2030, the volume of cargo transportation along the Middle Corridor could triple, reaching 11 million tons, and container traffic could grow to 4 million tons. The development of this route will not only boost trade between China and the EU, but also the economic development of countries in the region, including Azerbaijan, Georgia, and Kazakhstan.

However, in order to achieve these ambitious goals, it is necessary to address existing challenges, such as problems with railway throughput capacity in Turkey, which requires additional investment and infrastructure modernization.

MOVEMENT OF RUSSIAN UAVS AND MISSILES DURING THE SHELLING OF UKRAINE



Despite the fact that the Ukrainian Armed Forces regularly hits the Russian navy, the Black Sea continues to be a route for UAVs (usually combat UAVS) and missiles.

As can be seen from the map, which includes attacks within just two months, a significant number of strikes go along Ukraine's shipping routes, as well as towards the seaports of Greater Odesa and the Danube river ports.

Port infrastructure continues to be hit. However, due to the lack of public information about the massive disruption of logistics connections important for maritime exports, market participants have now adjusted to the situation. Importers are ready to buy Ukrainian grain, the only thing is that they usually avoid planning several months in advance. However, some exporters take the risk and avoid additional "war" insurance. And by now this tactic has brought additional profit and allowed them to remain more competitive in the market.

We note that we should not take the current export conditions for granted: the war with Russia continues and grain exports remain under **attack**.

For Ukraine to ensure that its maritime exports can function and importers can rely on affordable Ukrainian grain, western partners must **support and strengthen its air defense capabilities and provide long-range means of hitting enemy missile carriers.**

~~HOW TO HELP UKRAINE'S AGRICULTURAL SECTOR.~~ HOW TO GUARANTEE THE FOOD SECURITY OF THE PLANET?

FINANCIAL ASSISTANCE

European politicians have repeatedly emphasized that assistance to Ukraine means security for the whole of Europe

Therefore, it is logical that the allocation of funds to strengthen Ukraine should be taken as (or even more) seriously than their own defense budget. Since Russia is the only threat in the region, the problem can be solved by enabling Ukraine to break the Russian military machine.

Confiscation of Russian assets

Not all governments want to solve the problem of Russia here and now. Another option is to use frozen Russian assets to the benefit of Ukraine. Concerns about the implications for international law and the creation of a precedent seem weak, given that this will send a clear signal of consequences to any potential aggressor. The world has once again seen that the policy of “appeasement” of the aggressor only inflates its ambitions.

Strengthening control over existing sanctions

Since 2022, the world has significantly tightened sanctions against Russia. But it is not the fact of imposing sanctions that is burdensome for the aggressor, but the cost of their circumvention. As recent years have shown, Russia is adapting — and although it incurs additional costs, on paper, large-scale sanctions have not become an effective tool for suppressing its military and economic potential. As practice has shown, the world was not ready to fight even the most obvious and oldest way to circumvent sanctions, i.e. imports via neighboring countries.

~~HOW TO HELP UKRAINE'S AGRICULTURAL SECTOR.~~ HOW TO GUARANTEE THE FOOD SECURITY OF THE PLANET?

MILITARY ASSISTANCE

Strengthening the front line

In the third year of the full-scale invasion, Russia, with the help of its few autocratic allies, has a 6:1 artillery advantage. Ukraine has the support of half of the democratic world — some of the most developed economies. Despite this, the same basic problem has been voiced for all three years, that is the lack of ammunition and artillery. The lack of ammunition means not only the loss of territory and lives, but also an inability to conduct counterbattery activities against Russia, which is freely ruining entire towns with its artillery.

Strengthening air defense

Due to limited coverage of the Ukrainian sky and the lack of missiles, Russia is striking both military and civilian targets. Ukrainian ports are within range of both UAVs and ballistic and cruise missiles. Air defense should also be placed within the range of these weapons. Thus, there should be enough air defense and ammunition to make it difficult to deplete it with regular attacks and eventually destroy it. Without this, the future of global food security remains in Russia's hands as a bargaining chip.

Strategic opportunities

It is possible to reduce the effectiveness of the Russian military machine not only in passive defense, but also by being able to destroy it on the Russian territory. To protect ports, the Black Sea, transportation hubs, as well as farms and grain storage facilities, Ukraine needs long-range missiles, including German Taurus and American ATACMs, air defense systems, including German Iris-T and American Patriot, as well as F-16 aircraft to protect infrastructure.

The research was conducted
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