A Modern View of Ukraine and an Outlook for Ukraine’s Production and Productivity of Leading Grain and Oil Crops

Tetyana Kalna-Dubinyuk*, Postdoctoral Research Associate, Center for Agricultural and Rural Development, Iowa State University, tetyankd@iastate.edu

*Corresponding Author
Published by the Center for Agricultural and Rural Development, 578 Heady Hall, Iowa State University, Ames, Iowa 50011-1070; Phone: (515) 294-1183; Fax: (515) 294-6336; Web site: www.card.iastate.edu.

© Author(s). The views expressed in this publication do not necessarily reflect the views of the Center for Agricultural and Rural Development or Iowa State University.
Executive Summary
The problems of world hunger, severe pressures on the natural environment, climate change, etc., require continuous attention. Agriculture, on which people's lives and health depend, is very important. The full-scale war started by Russia in Ukraine lead to an even greater aggravation of world problems. This article examines the production potential of Ukraine agriculture, which significantly exceeds its internal needs in pre-war and present times and strives to contribute significantly to solving the global hunger problem.
There are more than 600 million farms in the world—more than 90% are family farms and 70% have an area of less than one hectare (Franzel et al. 2015). Billions of people are malnourished. Millions of farmers live on the subsistence minimum. A huge amount of food is wasted, and our natural environment is under intense pressure.

The world entered 2023 in a hunger crisis. According to estimates by the World Food Program (WFP), the United Nations (UN) agency that coordinates the distribution of food aid, the number of people facing acute food shortages jumped from 282 million at the end of 2021 to 345 million in 2022. About 50 million people in 2023 were on the brink of starvation (Anthem 2022).

Agriculture is essential to our health and well-being. Eighty percent of those living in developing countries depend on agriculture as their main source of livelihood. Some countries, including many African countries, must double or even triple agricultural productivity to meet demand and food security (Castañeda 2018).

According to World Bank, agricultural development is one of the most powerful tools to end extreme poverty and feed the projected 9.7 billion people by 2050 (World Bank 2023). Unfortunately, the latest impacts of COVID-19, climate change, and the full-scale war in Ukraine negatively affect the world’s food systems, leading to an even greater risk of poverty, malnutrition, and food insecurity.

The world’s poorest countries are suffering the most from the war in Ukraine—Sudan, Tanzania, and Uganda imported more than 40% of their wheat from Russia and Ukraine (Chilkoti 2022). However, the whole world feels consequences of the war. World food prices have also risen because other countries, including Argentina and India, responded to the war with trade restrictions, and emergency relief efforts have come under fire, as the WFP typically buys half of all wheat in Ukraine and then distributes it (Chilkoti 2022). Ukrainian agriculture is capable of making a significant contribution to solving the global problem of hunger as its production potential significantly exceeds the needs of its domestic market.

Since 1991, Ukraine has been an independent state in Eastern Europe, bordered by Romania and Moldova to the southwest, Hungary, Slovakia, and Poland to the west, Belarus to the north, Russia to the east and northeast (Wikipedia 2023), and the Black and Azov Seas to the south. Ukraine is 603,628 km² and is one of the largest European countries (Wikipedia 2023) (figures 1–3).

Figure 1. Ukraine on the world map.
Source: ontheworldmap.com.
Ukraine’s agricultural lands occupy 42 million hectares or 70% of the total land available. Arable land and perennial crops account for 78.9% of Ukraine’s agricultural lands, 13.0% is pastures, and 8.4% is hayfields. The highest share of arable land (70%–80%) is in the steppe areas and the forest-steppe zone (Wikipedia 2023).

During the Soviet era (1922–1991), Ukraine’s economy was the second-largest in the Soviet Union. With the collapse of the Soviet system and Ukraine’s declaration of independence on August 24, 1991, Ukraine transitioned from a planned economy to a market economy. Agriculture consists of crop and animal husbandry. In terms of product value, crop production exceeds livestock production. Crop production includes the cultivation of grain, technical, fodder, vegetable, melon and potato crops, horticulture, viticulture and floriculture. The leading agricultural crops are cereals: winter and spring wheat, rye, winter and spring barley, corn, oats, buckwheat, millet and rice. Ukraine’s main grain crop is winter wheat, and its diverse technical crops include sunflower, sugar beet, flax, hops, and tobacco. Ukraine is a global supplier of food for more than 600 million people. As of 2015, Ukrainian agricultural producers supplied products to 190 countries around the world. As of 2018,
agricultural products accounted for 14.5% of Ukraine’s total export of goods and 15.8% of its workers were employed in the agricultural sector (Guita 2023).

Ukraine is the world’s largest producer of sunflower oil, a major global producer of grain, sugar, honey, eggs, and poultry, and a future global player in the meat and dairy markets. Sunflower—mainly concentrated in the Donetsk, Dnipropetrovsk, Luhansk, and Zaporizhia regions—occupies about two-thirds of Ukraine’s entire industrial crop area (2.1 million hectares).

In terms of grain production, Ukraine occupies one of the leading grain production regions. On the world grain market, on average, over the past ten years, Ukraine has ranked eleventh in wheat production and seventh in barley production. Growth of these indicators began in 2000, and, as a result, Ukraine managed to enter the top ten in wheat production and in the top seven in barley production. Comparing gross production of main agricultural crops with the countries of the European Union and Russia, Ukraine is inferior to Germany and France, as well as Russia, whose agricultural land exceeds that of Ukraine (Bogonos 2023).

Futurists believe that climate change and the structure of exports will affect farmers’ priorities—the sown area for winter wheat will decrease, and sown area for corn, soybeans, and alfalfa will increase, as will the sown areas for peas, sorghum, rapeseed, linseed, and rice. By 2050–2060, Ukraine may become the largest food producer in the world; and, while only 10% of its population will work in agriculture (Bogonos 2023), agricultural products will account for about one-third of all Ukrainian exports. Table 1 shows Ukraine’s actual and projected production of leading grain and oil crops.

Table 1. Ukraine’s Actual and Projected Production of Lead Grain and Oil Crops

<table>
<thead>
<tr>
<th>Culture</th>
<th>Production by years, million tons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2020*</td>
</tr>
<tr>
<td>Wheat</td>
<td>24.9</td>
</tr>
<tr>
<td>Corn</td>
<td>30.3</td>
</tr>
<tr>
<td>Sunflower</td>
<td>13.1</td>
</tr>
</tbody>
</table>


Table 2 presents actual and predicted yields of the leading grain and oilseed crops in Ukraine.
Table 2. Actual and Predicted Yields of Ukraine’s Leading Grain and Oil Crops

<table>
<thead>
<tr>
<th>Culture</th>
<th>Production by years, million tons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2020*</td>
</tr>
<tr>
<td>Wheat</td>
<td>3.76</td>
</tr>
<tr>
<td>Corn</td>
<td>5.62</td>
</tr>
<tr>
<td>Sunflower</td>
<td>2.02</td>
</tr>
</tbody>
</table>


The full-scale war in Ukraine began with attacks on airfields and military warehouses in Kyiv, Kharkiv, and Dnipro, as well as on Ukraine’s borders with Russia, Belarus, and occupied Crimea. The war is still ongoing. Figure 4 shows Ukrainian territories occupied by Russia as of writing.

![Russian invasion of Ukraine](image-url)

Data: Institute for the Study of War: Map: Jared Whalen/Axios

**Figure 4. Ukrainian territories occupied by Russia.**


Since the start of the war, Ukraine’s agricultural sector has suffered $40.2 billion in direct and indirect losses, as evidenced by the Kyiv School of Economics Center for Food and Land Use Research’s latest calculations (Guita 2023). Russian aggression has caused direct losses to the Ukrainian agricultural sector of $8.7 billion, which is $2.1 billion more than estimated in November 2022. Destroyed and damaged agricultural machinery and storage facilities for manufactured products account for $6 billion in damages, while the grain industry has faced
an estimated $14.3 billion in losses. The biggest agricultural losses are for wheat ($2.9 billion), sunflower ($2.5 billion), and corn ($1.7 billion) (Guita 2023).

The Kakhovska Dam explosion, which took place on June 6, 2023, caused a large-scale man-made disaster. The zone of influence covers at least 5,000 km² and will have long-term consequences (UNCG 2023). The reservoir waters covered more than 1,000 km² for the past 68 years and the area now faces exposure to the open air for at least a few years (UNCG 2023).

The Minister of Agrarian Policy and Food of Ukraine, Mykola Solsky, stated on June 9, 2023, that about 1.5 million hectares of land will not be fully usable for agricultural activities, and it will take three to seven years to restore irrigation (Glauber, McNamara, and Olivetti 2023). First Deputy Minister of Agrarian Policy and Food of Ukraine, Taras Vysotsky, believes that Ukraine may lose several million tons of crops due to flooding (UkrAgroConsult 2023). Also, in his opinion, the flooded lands require a full agroecological assessment of the condition of the soils in the future, as the fertile layer washed away.

Despite the full-scale Russian invasion, Ukrainian farmers managed to sow grain and have a 2023 harvest. The Ministry of Agrarian Policy and Food of Ukraine reports farmers in 22 oblasts have started harvesting early grain and leguminous crops.

The Ukrainian Grain Association predicts that in 2023 Ukraine will harvest 24.4 million tons of wheat in raw weight or 23.5–24 million tons after finishing (HSN 2023). The association notes that this indicator exceeds market expectations of 15.6–18 million tons. The yield increase is mainly due to compliance with technologies, application of fertilizers, etc.; however, the land bank is also important.

The survey shows that farms with a wheat area of more than 500 hectares will have a better yield and farms of less than 100 hectares will have the lowest yield (figure 5).

As Andrii Novosyolov, an oilseeds analyst at the Barva Invest trading company, said in a comment for Delo.ua, Ukraine will harvest 17.4 million tons of wheat, 4.5 million tons of barley, and 3.8 million tons of rapeseed.

**Figure 5. Average expected yield depending on area and region.**
*Source: Ukrainian Grain Association.*

On average, predictions show that the yield will reach 3–8 tons/hectare. The majority of farms (64%) expect yields to exceed 5 tons/hectare. The most optimistic economies are in the west and south of the country, and the worst expectations are in the north. The weighted average yield is 5.46 tons/hectare. In general, according to preliminary forecasts, this year’s harvest of grain and legumes will amount to 45 million tons (HSN 2023).
Table 3 shows the Ministry of Agrarian Policy and Food’s updated forecast for the gross production of grain and oil crops. This year, Ukrainian farmers will harvest about 56.4 million tons of grain, as well as 20.3 million tons of oilseeds (MAPFU 2023).

At the beginning of the spring 2023, forecasts put the total gross harvest for the current year at 63.5 million tons, 13% less than the 2022 forecast. In June, after the start of the harvest, forecasters raised their expectations to 68 million tons, 7% less than predicted in 2022. Now, thanks to favorable weather conditions, we have every reason to positively change the forecast to 76.7 million tons, 5% more than the 2022 forecast.

Although the 10,895 thousand hectares of spring and winter cereals sown this year was 980,000 hectares less than last year, weather conditions contributed to an almost record yield of grain crops (up to 51.8 tons/hectare), which allows for a significant increase in crop production.

According to preliminary estimates of the Ministry of Agrarian Policy, in 2023, Ukrainian farmers will harvest 20.9 million tons of wheat, 5.8 million tons of barley, and 28.1 million tons of corn.

Gross production of oil crops will reach 20.3 million tons. Predictions show a 12 million ton sunflower harvest, and that farmers will harvest 4 million tons of rapeseed—a record for recent years—4.2 million tons of soybeans, and 13.7 million tons of sugar beets this year.
Table 3. Main Crop Harvests, 2023 Forecast Compared to 2022*

<table>
<thead>
<tr>
<th>Culture</th>
<th>2022 fact</th>
<th>2023 forecast</th>
<th>Gross collection</th>
<th>+/- thousand tons</th>
<th>Area 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Harvesting area, thousand hectares (fact)</td>
<td>Gross collection, thousand tons</td>
<td>Harvesting area, thousand hectares (fact)</td>
<td>Gross collection, thousand tons</td>
<td>+/- thousand tons</td>
</tr>
<tr>
<td>Crops</td>
<td>11,872.9</td>
<td>55,343.6</td>
<td>10,895.8</td>
<td>56,395.5</td>
<td>+1,052</td>
</tr>
<tr>
<td>Wheat</td>
<td>5,281.5</td>
<td>20,729.2</td>
<td>4,646.4</td>
<td>20,949.1</td>
<td>+220</td>
</tr>
<tr>
<td>Barley</td>
<td>1,740.2</td>
<td>5,608.2</td>
<td>1,492.9</td>
<td>5,808.8</td>
<td>+201</td>
</tr>
<tr>
<td>Corn for grain</td>
<td>4,224.5</td>
<td>27,670.5</td>
<td>4,055.2</td>
<td>28,062.0</td>
<td>+392</td>
</tr>
<tr>
<td>Oilseeds</td>
<td>8,971.4</td>
<td>20,840.2</td>
<td>8,596.3</td>
<td>20,291.2</td>
<td>-549</td>
</tr>
<tr>
<td>Turnip</td>
<td>1,256.2</td>
<td>3,601.9</td>
<td>1,425.6</td>
<td>4,022.4</td>
<td>+421</td>
</tr>
<tr>
<td>Soy</td>
<td>1,877.2</td>
<td>4,336.3</td>
<td>1,811.0</td>
<td>4,246.2</td>
<td>-90</td>
</tr>
<tr>
<td>Sunflower</td>
<td>5,838.0</td>
<td>12,902.0</td>
<td>5,359.7</td>
<td>12,022.6</td>
<td>-879</td>
</tr>
<tr>
<td>Sugar beet</td>
<td>183.8</td>
<td>9,941.5</td>
<td>249.9</td>
<td>13,727.5</td>
<td>3,786</td>
</tr>
</tbody>
</table>

The European Union’s import of all products from Ukraine, including wheat, corn, rapeseed, and sunflower, will continue without restrictions. Moldovan railways agreed to provide a 27% discount to the existing tariffs for the transportation of Ukrainian agricultural products through the Republic of Moldova in the direction of the ports of Reni, Giurgiulesti and Galati. The new tariff conditions are effective from July 15, 2023 (Tridge.com 2023).

Russian missile attacks on Ukraine’s Black Sea coast have destroyed 60,000 metric tons of grain and damaged storage infrastructure (Kirby 2023). Agriculture Minister Mykola Solskyi said a “considerable amount” of export infrastructure was out of operation (Kirby 2023). Furthermore, Russia pulled out of a deal guaranteeing safe passage for exports across the Black Sea. Russia, Ukraine, and Türkiye, signed the agreement, facilitated by the UN, in Istanbul in July 2022. The agreement permits Ukrainian exporters to resume shipping corn, wheat, sunflower oil, and other goods from three ports around the city of Odesa—Chornomorsk, Odessa, and Yuzhny/Pivdennyi (figure 6).

**Black Sea Grain Initiative shipping route**

![Map of Black Sea Grain Initiative shipping route](image)

*Figure 6. Black Sea Grain Initiative shipping route.*

Russia’s assault on Ukraine could again threaten global food security. Ukraine is one of the world’s largest wheat, corn, and sunflower oil suppliers.
The Russia/Ukraine war is one of a series of global shocks, which also include the COVID-19 pandemic and severe weather resulting from climate change, that pushed 122 million people into hunger between 2019 and 2022, according to a report by U.N. agencies published in July 2023.

Ukraine has exported more than 32 million tons of food products since shipments resumed in August 2022 (Kirby 2023). The WFP bought more than 80% of its wheat this year from Ukraine through the Black Sea Initiative and has used the deal to charter ships carrying grain for crisis-hit countries such as Sudan, Somalia, and Afghanistan (Kirby 2023).

U.S. Secretary of State Antony Blinken said Ukraine’s partners would likely look to alternative, more expensive delivery routes (Kirby 2023). However, Russia said that food products could not leave Ukraine unimpeded, even if there are other options, which would have a profound chilling effect on the ability to pursue them.
Conclusion
Ukraine is the fifth most populous European state and a growing market economy that aspires to become a full member of the European and Euro-Atlantic community. It is the world’s largest sunflower oil producer and a major global producer of grain, sugar, honey, eggs, and poultry meat. Prior to the Russian invasion, Ukrainian agricultural production was on track to make Ukraine one of the world’s largest food producers by 2050–2060.

The Russia invasion and war in Ukraine has caused and continues to inflict significant damage to the economy, agriculture, and other industries, destroys cities and villages, destroys fields, and kills children, the elderly, and will substantially impact future generations.

The agricultural sector of Ukraine suffered direct and indirect losses of 40.2 billion dollars. The destruction at the Kakhovskaya dam will have long-term consequences for production recovery.

But the people of Ukraine continue to work amidst such difficult conditions.

In 2023, Ukrainian farmers have already threshed 33.7 million tons of grain and oil crops, and it is expected to produce 68 million tons.

A major concern to both Ukraine and the world’s import markets is what will happen to grain exports from Ukraine after Russia resumes its blockade and attacks on port infrastructure?

Seaports are of primary importance for Ukrainian exports. The largest share of exports goes to Odessa ports, followed by Danube ports. The Danube ports are particularly important for transporting goods to the Romanian seaport of Constanta and Turkey. Russian missile attacks and drone attacks on Ukrainian ports have caused significant damage to transport logistics. Without the ports, it is extremely important to ensure the full functioning and optimal use of the EU’s railway and road "solidarity routes" if any sort of “normal” exports are to be maintained.
References


