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Agriculture and the War in Ukraine One Year Later

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Ukrainian agriculture and the world food system have been remarkably resilient in the face of continuing tragedy. Ukraine has continued to supply domestic and world consumers with food staples as governments and markets have rapidly adjusted supply chains to support the world's most vulnerable.

Field damage caused by Russian artillery.
Photo Credit: Ukrainian Grain Association.

More than 16 months have passed since Russia's invasion of Ukraine on February 24, 2022. The war continues, disrupting Ukraine's farming, processing, and marketing. Our *ARE Update* article published last June summarized the situation then and reviewed likely impacts of the war on agriculture, including in California. The Russian invasion disrupted the Ukrainian 2022 summer harvest of the wheat, barley, and rapeseed crops that were planted in the fall of 2021. The invasion also disrupted the planting, production, and harvest of spring-planted barley (about 60% of barley acreage), which is harvested in the summer, as well as sunflowers, corn, and other crops harvested in the fall.

Over the past year, the war disrupted the fall planting of wheat, winter barley, and rapeseed, and the harvests of all of these crops and spring barley in the early summer of 2023. It also disrupted the 2023 planting of spring barley, sunflowers, corn, and other crops that will be harvested in the fall of 2023. Here we update the situation and outlook and consider implications for food and agriculture in Ukraine and globally. Impacts for California agriculture and consumers continue to be small and focused on sunflowers.

Situation and Outlook for Ukraine's Agriculture After 16 Months of War

Table 1 shows the recent pattern of harvested acreage and projections for the four major annual crops in Ukraine. For all crops, the 2021 harvest was prior to the Russian invasion. Fall-planted wheat and rapeseed and both winter and spring barley were

Table 1. Harvested Acreage of Major Ukrainian Crops

	2021	2022	2023 (June 9 Projection)	Percentage Change (2023 from 2021)
Crop		**Million Acres**		**Percent**
Wheat	18.3	13.1	10.6	-42
Sunflower Seeds	17.5	12.8	14.1	-20
Corn	13.6	10.1	8.4	-38
Barley	6.7	4.7	4.4	-33

Source: World Agricultural Production Foreign Agricultural Service, Circular Series WAP 6-23, June 2023. Available at: https://apps.fas.usda.gov/psdonline/circulars/production.pdf.

Table 2. Production of Major Ukrainian Crops

	5-Year Average 2017–2021	2022	2023 (June 9 Projection)	Percentage Change (2023 from 5-Year Average)
Crop		**Thousand Tons**		**Percent**
Wheat	26,927	20,900	17,500	-35
Sunflower Seeds	15,360	11,200	11,800	-23
Corn	34,646	27,000	24,500	-29
Barley	8,739	6,180	5,900	-32

Source: USDA, FAS. Available at: https://bit.ly/3pyckNP; Sambucci and Sumner, 2022. Available at: https://bit.ly/3udgR7w.

Table 3. Export Value of Major Ukrainian Crops, 2021 and 2022

	2021	2022	Percentage Change
Crop	**$ Billions**		**Percent**
Sunflower Oil	6.3	5.5	-13
Sunflower Seeds	~0	1.3	—
Corn	5.9	6.1	3
Wheat	4.8	2.7	-43
Barley	1.2	0.5	-63
Walnuts	0.1	0.1	~1
Sum	**18.3**	**16.2**	**-11.5**

Source: UN Comtrade database. Available at: https://comtrade.un.org/data/.

harvested in the summer of 2022, a few months after the war started. For wheat and barley, harvested acreage was down by almost 30%, in part because some acreage was in the conflict zone or occupied by Russian invaders. The 2023 harvested acreage is projected to decline even further. Wheat acreage is expected to be down by 42% and barley acreage by 33% from 2021 to 2023.

War disrupted planting of the fall-harvested crops in the spring of 2022 and farming activities and harvest in the fall of 2022. Sunflowers and corn both saw declines in acreage from 2021 to 2022 and further declines are projected for 2023. Harvested acres declined by 20% from 2021 to the projected harvested acreage in 2023 for sunflowers and by 38% for corn.

No reliable acreage or production information is available in the part of Ukraine that is in active conflict zones or has been occupied by Russian forces. Therefore, this area, about 20% of potentially cropped area overall, is not included in the harvested area data for 2022 and 2023.

Crop production is affected by harvested acreage and yield, which even in normal times varies from year to year in response to weather, pest pressure, and other conditions. The war has put additional pressure on Ukrainian farm practices and access to inputs. Table 2 compares crop production and projected production in 2022 and 2023 to the average of the five years before the conflict—2017 through 2021. Wheat production fell by 23% in 2022 and is projected to be down by 35% in 2023. Sunflower production is projected to be higher in 2023 than the severely depressed 2022 production because acreage is up by a few percent. In 2022, sunflower production turned out to be about 18% higher than had been projected last June. Both corn and barley production in 2023 are projected to fall modestly from the realized production in 2022, which was down severely from the five-year average.

Ukrainian Exports Since the Beginning of the War

At the start of the war, Russia's blockades of the Azov and Black Sea ports caused major delays and concerns that crops could not be exported using these sea routes. An early arrangement allowed exports to resume by rail and through Danube ports via the Solidarity Lanes. Then in July 2022, the Black Sea Grain Initiative allowed Ukraine to export food commodities through "humanitarian" corridors in the Black Sea. These two arrangements allowed the Ukrainian exports of grains, sunflower oil, and other food crops to recover to some extent.

In recent years, Ukraine has accounted for more than half of world sunflower oil exports and between 10% and 20% of world exports of barley, corn, and wheat. Ukraine also ships about 3% of world walnut exports, well behind California's 35% by value.

Ukraine remains the world's largest exporter of sunflower oil. However, because of difficulties with processing, about 20% of the export value shifted to sunflower seeds rather than oil in 2022, denying Ukraine gains from the value added. Because prices rose, total revenue from oil and seeds together went up, not down, in 2022.

With export values rising slightly for these two largest export crops, the loss of $2.1 billion in the export value of major Ukrainian crops came from the large percentage declines in the export of wheat and barley, which are harvested in the early summer. As shown in Table 3, exports of wheat fell by 43% and barley by 63%. Overall, export revenue from major crops decreased by about 11.5%.

Because of the disruption in the export routes, export shipments from Ukraine were diverted to Eastern Europe and other European countries. This became controversial because diversion of grains drove down local prices in Eastern Europe, spawning complaints from farmers. Political pressure caused some governments to temporarily ban grain and other imports from Ukraine in April 2023. However, within a month, the EU began compensating affected farmers and had negotiated arrangements to keep the Solidarity Lanes open for continuing transit of exports from Ukraine.

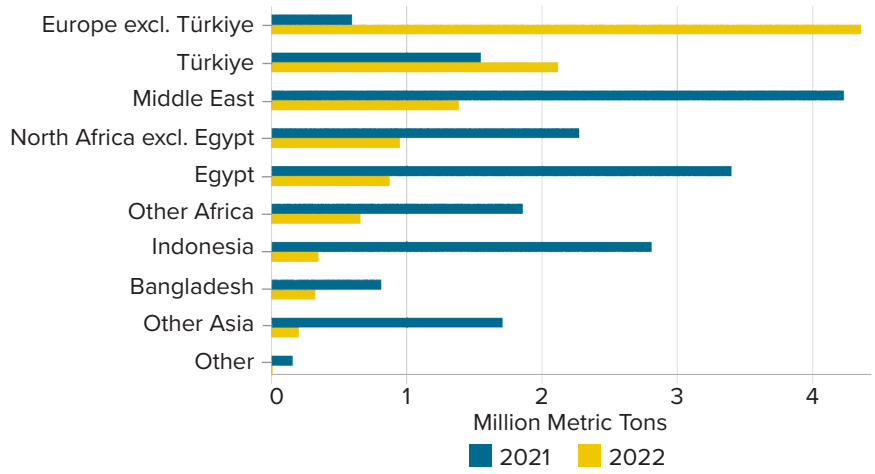
Figure 1 shows the dramatic diversion of Ukraine's wheat exports from 2021 to 2022, even as export quantities fell by 42%. Exports to Türkiye rose by 25% and exports to other European countries as a group rose by about seven-fold. Exports to all other formerly major destinations for Ukrainian wheat, such as Egypt, other countries in North Africa, and the Middle East, fell by 67%. Exports to Indonesia, Bangladesh, and other countries in Asia fell by 84%.

Export diversions for sunflower oil and corn were similar, although not as stark as for wheat, given that their harvests are not until the fall. India and China were the top destinations for sunflower oil from Ukraine in 2021. In 2022, exports to these countries decreased by 62% (see Figure 2), with sunflower oil diverted to Türkiye, Poland, Romania, and other countries in Europe.

As shown in Figure 3, exports of Ukrainian corn to Europe—mostly Romania, Poland, and Hungary—increased by 83% in 2022, while exports to China, Egypt, and countries in the Middle East decreased by 40%.

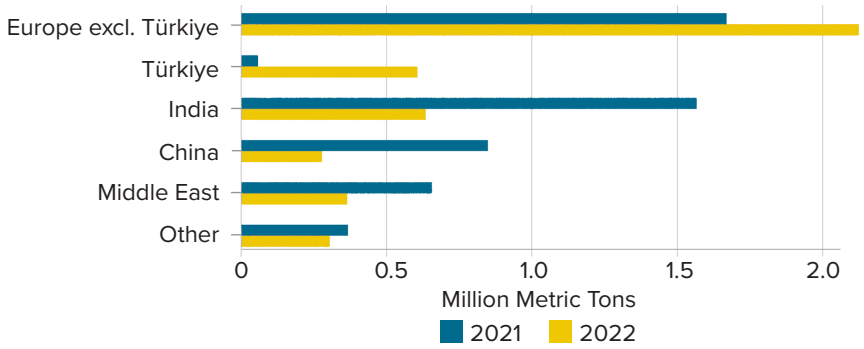
Changes in Ukrainian export destinations did not imply that commodities did not get to Ukraine's original export partners. Diversion means

Figure 1. Exports of Wheat From Ukraine, for 2022 Compared to 2021



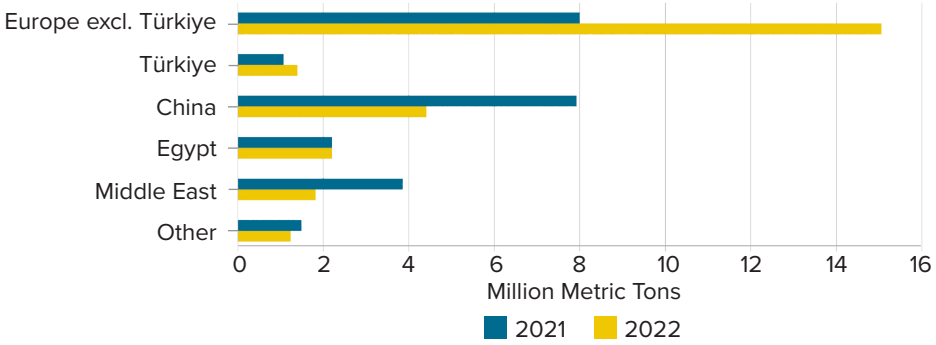
Source: UN Comtrade database. Available at: https://comtradeplus.un.org/TradeFlow.

Figure 2. Exports of Sunflower Oil From Ukraine, for 2022 Compared to 2021



Source: UN Comtrade database. Available at: https://comtradeplus.un.org/TradeFlow.

Figure 3. Exports of Corn From Ukraine, for 2022 Compared to 2021



Source: UN Comtrade database. Available at: https://comtradeplus.un.org/TradeFlow.

that some Ukrainian exports now go through Europe, rather than directly to their final destinations, or that other sources replace Ukrainian commodities in the original destination. For example, the June 2023 USDA WASDE report shows that imports into Bangladesh, which fell by 21% in the 2022/2023 marketing year relative to the 2021/2022 marketing year, are projected to almost recover in the 2023/2024 marketing year. Imports of wheat into Southeast Asia, including Indonesia and the Philippines, fell by

9% in the 2022/2023 marketing year but are projected to mostly recover in 2023/2024.

Likewise, the imports of wheat into North Africa for the 2023/2024 marketing year are projected to be 19% higher than they were in 2021/2022, while consumption of wheat in the Middle East is projected to be 3% higher in 2023/2024 than it was in 2021/2022.

Implications

As we discussed last year, the overlap in crops produced between Ukraine and California is small. The main connection is sunflowers. In California, sunflowers are grown almost exclusively as seed for sowing, and most of the sunflower seed was exported to Russia and Ukraine. California acreage of sunflower seed fell by about 30% to about 33,000 acres from 2021 to 2022, mostly due to severe cuts in irrigation water availability in Northern California. California sunflower seed acreage is expected to be up in 2023, but not back to the total 2021 acreage. California exports of sunflower seed have been diverted from direct shipments to Ukraine to destinations in Europe and elsewhere. Ukraine now imports more seed from some of these places as well as other suppliers.

California food consumers have not been affected measurably by the Russian invasion of Ukraine. Any global commodity price impacts have not affected costs in the United States enough to notice in retail prices.

In the past year, global efforts to relieve shortfalls in poor countries that were facing disruptions in imports from Ukraine seem to have reduced food insecurity. Conditions have not returned to normal, but much of the potential hunger has been averted. The June 2023 USDA WASDE report projects that world wheat production, trade, and ending stocks for the 2023/24 marketing year will be slightly above 2022/23 quantities.

Finally, Russia is the world's largest exporter of fertilizer and a major exporter of natural gas, which is used to produce nitrogen fertilizer. Therefore, another global agricultural apprehension about the Russian invasion was that prices of fertilizers would rise further after having risen dramatically from 2020 through the winter 2022. In fact, however, fertilizer prices began to decline in the late spring and early summer of 2022 as the war continued. Overall fertilizer prices have now fallen roughly to what they were in 2021, a decline of more than 40% compared to peak prices in early 2022.

Longer-Term Concerns

The agricultural devastation in Ukraine caused by the Russian invasion will take decades to repair. The Ministry of Agrarian Policy and Food and the Kyiv School of Economics estimated financial losses due to the damage to Ukrainian agricultural assets to be $6.6 billion. They also projected losses to Ukrainian agriculture from reduced crop and livestock production and trade to be $34.2 billion as of November 2022. These estimates have risen and are continuing to rise.

The destruction in June 2023 of the dam across the Dnipro River flooded towns and cities, as well as 25,000 acres of cropland on the right side of the river and several times more on the Russian-occupied left side. The reservoir supplied irrigation to about 1.5 million acres that produced grains, oilseeds, melons, onions, and tomatoes. Losses from this destruction alone will total many billions of dollars of farm value that will continue until repairs can be completed after Ukraine has secure access to the territory.

Of course, agricultural destruction and loss are but a small part of the suffering from the Russian invasion of Ukraine. Global consequences will continue for a very long time.

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Authors' Bios

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For additional information, the authors recommend:

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