

# Sunflower production in Ukraine During Times of War and its Global Consequences

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# Sunflower production in Ukraine During Times of War and its Global Consequences

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## *Abstract.*

*Sunflower — the primary oil crop of modern global agriculture, whose demand and profitability have driven significant expansion of cultivated areas and intensification of growing technologies. In Ukraine, sunflower also ranks among the primary agricultural crops. Benefiting from favorable soil and climatic conditions, Ukraine has been a significant sunflower exporter to the global market, holding the top position among leading nations until 2022. The large-scale invasion of Russia into Ukraine has adversely impacted all sectors of the economy, including agribusiness. Due to territory occupation, landmines, and other factors, sunflower cultivation areas have decreased, negatively affecting Ukraine's export capabilities. This situation may have adverse consequences for global food security.*

*Key Words : Sunflower, Food Security, the War in Ukraine, Crop Yields, Cultivated Areas.*

Among global sunflower producers, Ukraine holds a prominent position in

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terms of gross sunflower seed harvest, which is a traditional oil crop of the country with versatile applications across various industries. Sunflower covers approximately 90% of oilseed cultivation areas in Ukraine. Its relatively low per-hectare expenses, undemanding cultivation technology, and attractive market price make sunflower one of the most profitable crops for cultivation in Ukraine [1, 2].

According to data from the State Statistics Service of Ukraine, considering the full-scale war, sunflower cultivation areas have contracted by over 30%. In 2022, Ukraine harvested 10.5 million tons of sunflower, enabling it to maintain its leadership among strategic crops whose production is exported, thereby contributing significant revenue to Ukraine's budget.

Sunflower stands as a pivotal oleaginous and proteinaceous crop in global agriculture, serving as a crucial source for oil and meal production. It plays a distinct role in enhancing the financial health of agricultural enterprises during periods of economic crisis and transition to market relations. Sunflower production has consistently proven financially rewarding, with its processed products remaining competitive in domestic and international markets. It is also an essential component of both human and animal food and feed protein resources. Sunflower seeds are utilized as a valuable food product and find widespread applications across various sectors of the processing industry [3].

According to the State Statistics Service of Ukraine [4], during the period of 2014 – 2021, there was a substantial increase in sunflower production in Ukraine, with figures rising from 10.1 to 16.4 million tons (+62.4%). However, in 2022, due to the widescale invasion of russia into Ukraine, the gross sunflower harvest declined to 11.3 million tons. The positive growth trend in sunflower production from 2014 to 2021 was driven, firstly, by an expansion in cultivation areas by 1.4 million hectares, or 27% (from 5.2 to 6.6 million hectares), and secondly, by an increase in yield levels from 19.4 to 24.6 quintals per hectare (Table 1). In 2022,

the occupation of southern regions of Ukraine and deliberate destruction, along with field mining, led to a reduction in cultivation areas to 5,293 thousand hectares. The instability of weather conditions, resulting from global warming and the introduction of various pollutants due to armed conflict, contributed to a decrease in the average yield indicators to 21.6 quintals per hectare.

In 2023, according to data from the Ministry of Agrarian Policy and Food of Ukraine, sunflower sowing was conducted on an area of 5,307.5 thousand hectares [5].

**Table 1 Dynamics of sunflower production indicators in Ukraine**

Indicators	2022**	2021*	2020*	2019*	2018*	2017*	2016*	2015*	2014*
<b>Area, thousand ha</b>	5293	6622	6457	5928	6117	6034	6073	5105	5257
<b>Gross Harvest, thousand tons</b>	11329	16392	13110	15254	14165	12236	13627	11181	10134
<b>Yield, quintals/ha</b>	21,6	24,6	20,2	25,6	23,0	20,2	22,4	21,6	19,4

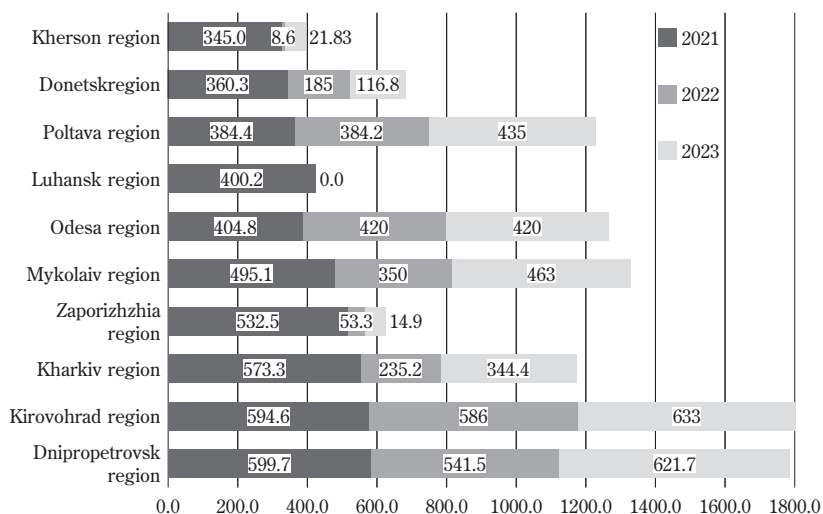
\* Data exclude the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and a part of temporarily occupied territories in the Donetsk and Luhansk regions.

\*\* Data exclude the territories which are temporarily occupied by the Russian Federation and part of territories where the military actions are/were conducted.

\*\* Information has been compiled on the basis of reports actually submitted by enterprises (reporting rate amounted to 82%) and additional estimates of indicators. Data may be revised.

Sunflower is cultivated across virtually all regions of our country, but most actively in the central and southern areas (Kherson, Zaporizhzhia, Donetsk, Dnipropetrovsk, Kirovohrad, Kharkiv, Poltava, Vinnytsia). An analysis of the distribution of sunflower cultivation areas prior to the full-scale invasion by Russia, categorized by regions, revealed that over 50% of the total 2021 harvest was contributed by agricultural producers from Dnipropetrovsk (12%), Kirovohrad (12%), Kharkiv (11%), Zaporizhzhia (11%), Mykolaiv (10%), Odesa (8%), Luhansk (8%), Poltava (8%), Donetsk (7%), and Kherson (7%) regions (Fig. 1).

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**Figure 1. Sunflower cultivation area structure by regions of Ukraine, 2021 – 2023, thousand ha**

According to the press service of the Seed Association of Ukraine, in 2022, traditionally “sunflower” regions such as Kherson, Zaporizhzhia, Donetsk, and others, saw minimal cultivation of this crop due to occupation, deliberate destruction by occupiers, or active combat operations taking place on these territories [6].

For comparison, let’s provide information about sunflower cultivation areas by regions for the years 2021 – 2022: Kherson: 2021 – 345 thousand ha, 2022 – 8.6 thousand ha; Zaporizhzhia: 2021 – 532.5 thousand ha, 2022 – 53.3 thousand ha; Donetsk: 2021 – 360.3 thousand ha, 2022 – 185.0 thousand ha. A critical situation is observed in Luhansk region, where active combat operations continue. In 2021, sunflower was cultivated on 400.2 thousand ha, while in 2022, due to the ongoing conflict, no cultivation was possible, resulting in 0 ha being sown [7].

However, the “sunflower relay” was picked up by other regions that sowed more of this crop than the previous year: Odessa (404.8 thousand ha in 2021 compared to 420.0 thousand ha in 2022), Sumy (265.6 thousand ha in 2021 com-

pared to 271.9 thousand ha in 2022), and Zhytomyr (147.1 thousand ha in 2021 compared to 150.3 thousand ha in 2022). Even regions where sunflower cultivation is not as active sowed several thousand hectares more: Rivne, Ternopil, and Ivano-Frankivsk regions.

Overall, across the regions of Ukraine in 2022, the sunflower sowing situation was as follows: in areas without active combat operations, farmers aimed to sow as much as possible. The most challenging situation was in Luhansk region, where sowing was completely hindered due to ongoing conflict.

This year, sunflower has been sown significantly more than in 2022 – a total of 5,307.5 thousand ha. The transition from the corn belt to sunflower cultivation is gradually occurring in Vinnytsia region. In 2021, an area of 313.5 thousand ha was dedicated to this crop, increasing to 314.5 thousand ha in 2022 and further to 338.5 thousand ha in 2023. The difference is substantial.

Some farms in Cherkasy region are also increasing their sunflower cultivation areas. For instance, the enterprise “LAN”, which manages 6.5 thousand ha, has doubled its sunflower cultivation area this year, expanding from 300 ha to 612 ha, while nearly tripling the area dedicated to corn (reducing from 300 ha to 120 ha).

Mykolaiv region has nearly returned to pre-war levels of sunflower cultivation area, reaching 463 thousand ha, following a reduction to 350 thousand ha in the previous year. This year, it ranks in the top three alongside Kirovohrad (633 thousand ha) and Dnipropetrovsk (541.5 thousand ha) regions [8].

Poltava and Chernihiv regions have also allocated significant areas for sunflower cultivation. While in 2021, 384.4 and 240.4 thousand ha were designated for this crop respectively, in 2023, these figures have increased to 435.0 and 325.1 thousand ha.

Western regions of Ukraine (Volyn, Ternopil, Khmelnytskyi, Ivano-Frankivsk) have also expanded their sunflower cultivation areas in 2023. In the occupied and

Sunflower production in Ukraine During Times of War and its Global Consequences partially occupied territories, the situation this year has remained relatively unchanged.

Large agribusiness holdings operating in Southern Ukraine have favored oil crops this year. For instance, the “Nibulon” agribusiness holding reduced its corn cultivation by 50% and entirely abandoned it in risk-prone farming zones in Mykolaiv and Cherkasy regions. Instead, they sowed nearly 19.5 thousand ha with sunflower, with the largest portion, 10.1 thousand ha, located in the South of Ukraine.

Thus, this year’s planting campaign unfolded with considerations not only of weather factors but also with adjustments made in response to the challenges of wartime. Agricultural producers adapted crop rotation, production practices, commercial approaches to procurement of essential resources, and harvest marketing strategies, among other aspects. Factors such as resource costs, uncertainty in product distribution channels, a shortage of circulating funds, and a lack of qualified personnel (resulting from migration) influenced the final decisions of farm managers and the course of planting. In these circumstances, a clear trend toward the increasingly vigorous adoption of resource-efficient technologies is evident. For instance, agricultural producers are focusing on minimum tillage technologies such as No-Till and Strip-Till. The implementation of these techniques allows for moisture conservation in the soil (critical for sunflower cultivation), reduction in fuel consumption, optimization of mineral nutrition systems, and significant reduction in field work execution time [9].

Major sunflower-producing countries in the world, including Ukraine, Russia, Argentina, China, and European Union countries (it is noteworthy that Romania significantly increased its sunflower production in the 2021/2022 marketing year), collectively occupy nearly 85% of the global sunflower production market. The result of sunflower production in the 2021/22 marketing year yielded record-

breaking figures of 57.2 million tons of sunflower harvested worldwide. According to data from the United States Department of Agriculture, global sunflower production totaled 53.03 million metric tons in the 2022/2023 marketing year, and it is projected to increase to 54.69 million metric tons in the 2023/24 marketing year, representing a 3% increase compared to the previous season. The increase in production is attributed to the expansion of sunflower cultivation areas.

In the 2022/2023 marketing year, sunflower harvest in Argentina increased by 21.0% compared to the previous season. Other countries also saw growth in oilseed production: russia by 4.4% and Turkey by 8.6%. Prior to the war, sunflower cultivation in Ukraine reached 17.5 million tons; however, following the russian aggression, production volumes dropped to 12.2 million tons. The market continues to be affected by russia's invasion of Ukraine, leading to record yields for both the EU and russia. This year, russia remains the world leader in sunflower production, surpassing Ukraine in the 2022/23 years. According to experts' forecasts in the agricultural market, Ukraine may be able to return to pre-war levels of sunflower production by the year 2040 (Fig. 2).

However, in the EU countries for the 2023/2024 marketing year, sunflower production is expected to reach 11.5 million tons, which is 23.8% higher than the previous season. Despite the growth in sunflower production in major producing countries, Ukraine will remain the world's largest producer of oilseeds this season [10].

Global sunflower consumption is projected to increase according to forecasts from the US Department of Agriculture. The demand for this oilseed in the current season is estimated at 55.3 million tons, which is 0.6% higher compared to the previous year. It's worth noting that consumption levels exceed its production (Figure 3). Global consumption of sunflower meal is also expected to increase to 22.3 million tons. Significant reductions in global ending stocks are anticipated.



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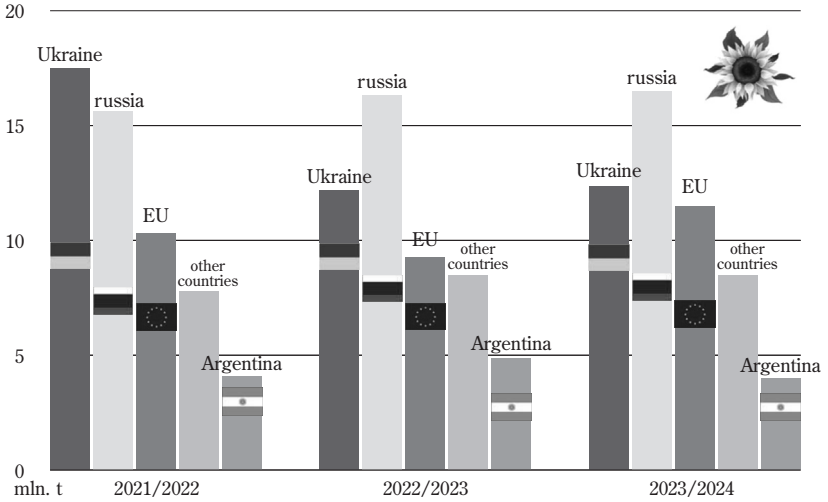


Figure 2. Top Sunflower-Producing Countries, million tons

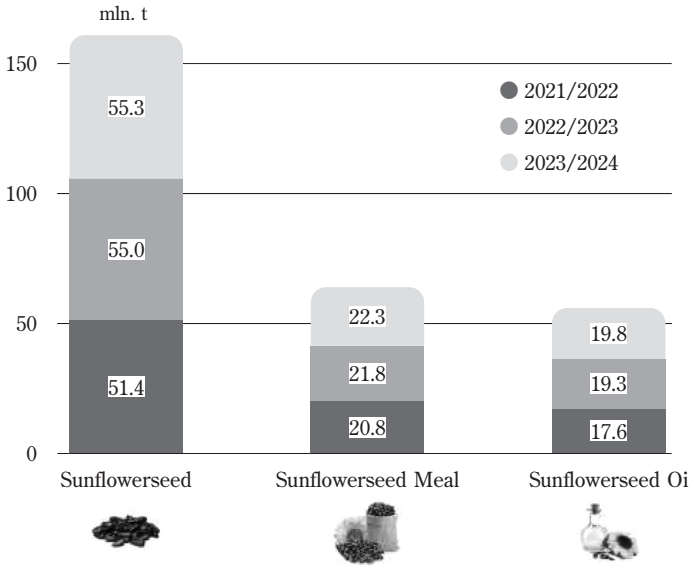


Figure 3. Dynamics of sunflower consumption worldwide, million tons

At the end of this season, they are expected to be around 4.6 million tons of sunflower, which is 17.2% lower than the previous level, 1.2 million tons of meal, and 2.8 million tons of sunflower oil.

During a multi-year period, Ukraine has been a leader among sunflower producers worldwide, holding a share of nearly 30% and possessing a well-developed processing industry. It accounted for approximately one-third of global production and about half of the global sunflower oil exports.

The Russian aggression and subsequent war have had a negative impact on the functioning of Ukraine's oil and fat sector. This includes the complete shutdown of industrial enterprises, particularly oil extraction and oil and fat processing facilities in conflict zones and temporarily occupied territories [11].

The blockade of Black Sea and Azov Sea ports in the early months of the war led to a halt in the export of sunflower oil and meal. According to estimates from the Association "Ukroliaprom," in March-April 2022, up to 70% of the main sunflower seed processing capacities were stopped, primarily due to the inability to export sunflower oil. The oil sector was compelled to rapidly establish new logistics chains and search for alternative markets. The redirection of exports to other modes of transportation, particularly rail transport, significantly altered the geography of sunflower oil and meal exports. In the 2022/23 marketing year, the main focus for Ukraine remained the EU market, where sunflower oil exports increased by 30%. The country's share in the total sunflower oil imports of the European Union rose to 89%, with the main competitor in this market being domestically produced oil.

Poland has become a key partner for Ukraine in shaping its exports, both in the oil market and in agricultural products as a whole. During March-June 2022, Poland increased its import of Ukrainian oil by nearly 6 times compared to the same period in the previous year, and in June, the highest monthly figure of

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Ukrainian sunflower oil was shipped in this direction – nearly 50 thousand tons.

From a global competition perspective in the sunflower oil market, it's worth noting that while the inspection of vessels by the russian side in the grain corridor is slowing down and the operation of the Pivdennyi port is completely blocked, there is a gradual increase in the presence of russian sunflower oil in the Indian and Chinese markets. While Ukraine is gradually increasing its export to China in the current season, it is losing its position in the Indian market [12].

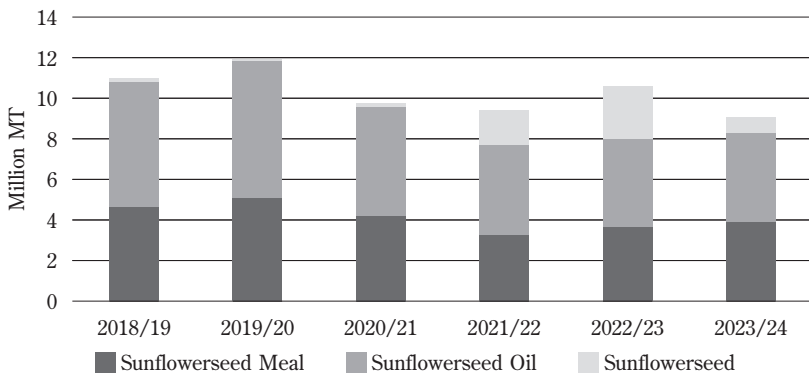
Indeed, India reduced its import of Ukrainian sunflower oil by 53% in the 2022/2023 season, while the export of russian oil in this direction increased by approximately 50%. Additionally, both the EU countries and Ukraine increased their exports of sunflower oil to India. However, it's worth noting the remarkable increase in Ukrainian sunflower oil exports to Turkey – during the September-May period of the 2022/2023 season, shipments to Turkey grew 13-fold, significantly displacing russian oil in that market, as russian oil exports to Turkey decreased by 79%. As a result, the geographical structure of sunflower oil exports remained largely unchanged, indicating that despite the challenges posed by the war and logistics difficulties, Ukraine managed to maintain its market presence.

In the future, Ukraine plans to popularize sunflower oil and target other markets. However, in the current year, the blockage of the “grain corridor” could lead to another reduction in exports and consequently the production of sunflower oil and meal. It's important to note that traditionally, oil has been exported by sea due to the underdeveloped logistics of overland transportation for this product. Therefore, maintaining normal operation of waterways is crucial for the export of Ukrainian sunflower oil.

In the 2022/23 marketing year, Ukraine remained one of the leading countries in global sunflower production. However, there was an internal redistribution in the utilization of sunflower, particularly in the export of sunflower oil. The share

of oil exports increased by 8.6% compared to the previous season. In other words, more sunflower oil was exported to external markets. At the same time, the volume of sunflower meal (sunflower cake) exports remained at the same level. Sunflower meal is an important product of sunflower seed processing and is used, notably, in the livestock feed industry. This may indicate a shift in market demand and a strategic approach to the export of sunflower products, especially oil, to ensure maximum efficiency and profitability.

Sunflower seed exports from Ukraine during the beginning of the 2022/23 season (September-February) reached a new historical peak, totaling 1.54 million tonnes. By the end of the season, this figure had risen to 2.03 million tonnes. According to forecasts from the United States Department of Agriculture, sunflower exports will be modest in the current year, sunflower oil exports will remain nearly at the same level as the previous year, and meal exports will increase.



**Figure 4. Ukraine sunflowerseed and product exports [13].**

In 2020, countries from the Far East, such as Japan, imported a total of \$44.7 million worth of sunflower oil. In 2021, Ukrainian sunflower oil exports to Japan amounted to \$4.65 million, which was \$0.66 million lower compared to the same period in 2020 (-12.4%). The import of sunflower oil to South Korea has also

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been steadily increasing, maintaining an 11% growth rate over the past 5 years. During the first 11 months of 2021, Ukraine exported sunflower oil to South Korea amounting to \$19.3 million. This marked an increase of \$9.2 million compared to the same period in 2020 (+90.5%). The annual growth rate of sunflower oil exports to this country has been 107% over the last 5 years. Analysts predict that the consumption of sunflower oil in these sun-soaked countries will continue to rise and is projected to reach 39,000 tons per year by 2027.

According to Euromonitor data, in 2021, Japan ranked eleventh in the world for sunflower oil retail trade volume. The market for products based on sunflower oil is steadily expanding, and analysts predict that this market will grow by approximately 1% annually over the next five years [14].

Amidst the volatility in the global geopolitical and economic landscape, war (Ukraine) and conflicts (such as Nagorno-Karabakh, Yemen, and Taiwan), attempts at reshaping world influence zones, and the climate-related consequences of global consumer lifestyles are contributing to economic fluctuations within nations and societies. For instance, the disruption of the “grain deal” (grain corridor) and intentional destruction (rocket attacks on grain elevators in Ukraine, “unfortunate incidents” at elevators in Turkey and other countries) of agricultural production is expected to lead to a 15% increase in global prices for the oilseed group of commodities. Presently, according to Ukrinform, Ukraine has already experienced a more than 5% increase in prices for grain and oilseed agricultural products. Analysts predict that if this situation continues and Ukraine, as a guarantor of global food security, is unable to access the Black Sea, prices will continue to rise.

The rise in prices on the global markets will have negative consequences for impoverished countries in Africa, Asia, and the Middle East. Some African nations may find it increasingly difficult to afford food, leading to a heightened risk

of famine within the region. Presently, the combined effects of climate change and overpopulation are resulting in nearly 800 million people worldwide experiencing chronic undernourishment. Additionally, in 2022 alone, 345 million people faced acute food shortages, and the year 2023 began on the brink of starvation for 50 million individuals.

Ukraine, with its capability for cultivating, processing, and exporting sunflower and its products, serves as a guarantor of global food security. The agricultural production of Ukraine, particularly its oilseed crops, which are grown by 864 companies and enterprises across 6.4 million hectares of some of the world's most fertile soil, is poised to meet the demand of the global market for vegetable oils, notably sunflower oil, including the Asian region. Close cooperation, mutual understanding, and support from the global community and agricultural markets will contribute to stabilizing the economic and political situation in the world's most impoverished countries, reducing the number of populations on the brink of hunger, and addressing the issue of global food insecurity.

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