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Eurointegration 2.0

Ukraine’s walnut industry, Volume 1: On the edge of global growth

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DISCLAIMER

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HIGHLIGHTS OF THE REPORT

Ukraine has quietly become a **nut powerhouse.** Despite war, fragmented production, and policy challenges, walnuts are among the country's most promising export crops – with the potential to rival Europe's best.

Ukraine's walnut industry is a paradox – **globally significant yet overwhelmingly informal**, household-based yet increasingly commercialized. With stronger seedling supply, better extension services, and full EU compliance, walnuts could become a flagship crop for Ukraine's agricultural integration into Europe.

KEY INSIGHTS

1. A global player despite modest size

- Ukraine ranked **4th worldwide in walnut production** in 2024-2025 (~101,000 tonnes), behind China, the U.S., and Chile
- More than **95% of walnuts come from households**, with trees scattered in backyards – a unique production model compared to large-scale U.S. orchards

2. Exports are the engine

- In 2023, Ukraine **exported $77 million worth of walnuts**, 72% of them shelled, mainly to the **EU (58% of revenues)**, with Türkiye, France, and Romania among top buyers
- Shelled nuts fetch nearly **4x the price** of in-shell, showing how processing upgrades directly boost export value.

3. Government & donor backing fuels growth

- Nearly **6,000 ha of new orchards** were planted with state subsidies between 2018–2023
- The **"eRobota" grant program** covers up to 70% of orchard costs and has channeled billions of hryvnias into nut crops, ranking walnuts among the top supported horticultural sectors

4. Seeds of a bottleneck

- A **shortage of high-quality seedlings** slows orchard modernization. Imports from France and Moldova exist, but many underperform in Ukrainian soils. Domestic nurseries still struggle with varietal purity

5. Quality standards: the next hurdle

- Quality issues (mold, uneven drying, aflatoxins) continue to haunt exports – a major obstacle for deeper EU integration

6. Environmental edge

- Walnuts carry a **low carbon footprint (0.76 kg CO_2/kg)** compared to almonds (3.56 kg CO_2/kg). This positions Ukraine to brand walnuts as a **climate-friendly superfood**

ОСНОВНІ ВИСНОВКИ ЗВІТУ

Попри війну, фрагментоване виробництво та політичні виклики, волоський горіх є однією з найбільш перспективних експортних культур країни – з потенціалом конкурувати з найкращими європейськими виробниками.

Горіхова галузь України – це парадокс: глобально значуща, але переважно неформальна; базується на домогосподарствах, але поступово комерціалізується. За умови кращого забезпечення саджанцями, кращих дорадчих послуг і повної відповідності вимогам ЄС, волоський горіх може стати флагманською культурою аграрної інтеграції України в Європу.

КЛЮЧОВІ ІНСАЙТИ

1. Глобальний гравець попри скромні масштаби

- У 2024–2025 рр. Україна посіла 4-те місце у світі з виробництва волоського горіха (~101 тис. тонн), поступившись лише Китаю, США та Чилі.
- Понад 95% горіхів вирощуються в домогосподарствах, здебільшого у дворах — унікальна модель виробництва на відміну від великих промислових садів у США.

2. Експорт – рушійна сила

- У 2023 році Україна експортувала волоських горіхів на $77 млн, 72% з яких — очищені. Основні ринки збуту: ЄС (58% виручки), а також Туреччина, Франція та Румунія.
- Очищені горіхи продаються майже вчетверо дорожче за неочищені, що демонструє прямий ефект переробки на експортну вартість.

3. Підтримка держави та донорів стимулює зростання

- Між 2018–2023 рр. за держсубсидії було закладено майже 6 тис. га нових садів.
- Грантова програма «єРобота» покриває до 70% витрат на закладку садів і спрямувала мільярди гривень у горіхові культури, вивівши їх у топ підтримуваних садівничих секторів.

4. Насіннєвий «вузький прохід»

- Дефіцит якісних саджанців гальмує модернізацію садів. Хоча імпортують саджанці з Франції та Молдови, багато з них погано приживаються в українських ґрунтах. Вітчизняні розсадники досі борються з проблемою сортової чистоти.

5. Наступний бар’єр – стандарти якості

- Проблеми з якістю (пліснява, нерівномірне сушіння, афлатоксини) залишаються ключовою перепоною для глибшої інтеграції в ЄС.

6. Екологічна перевага

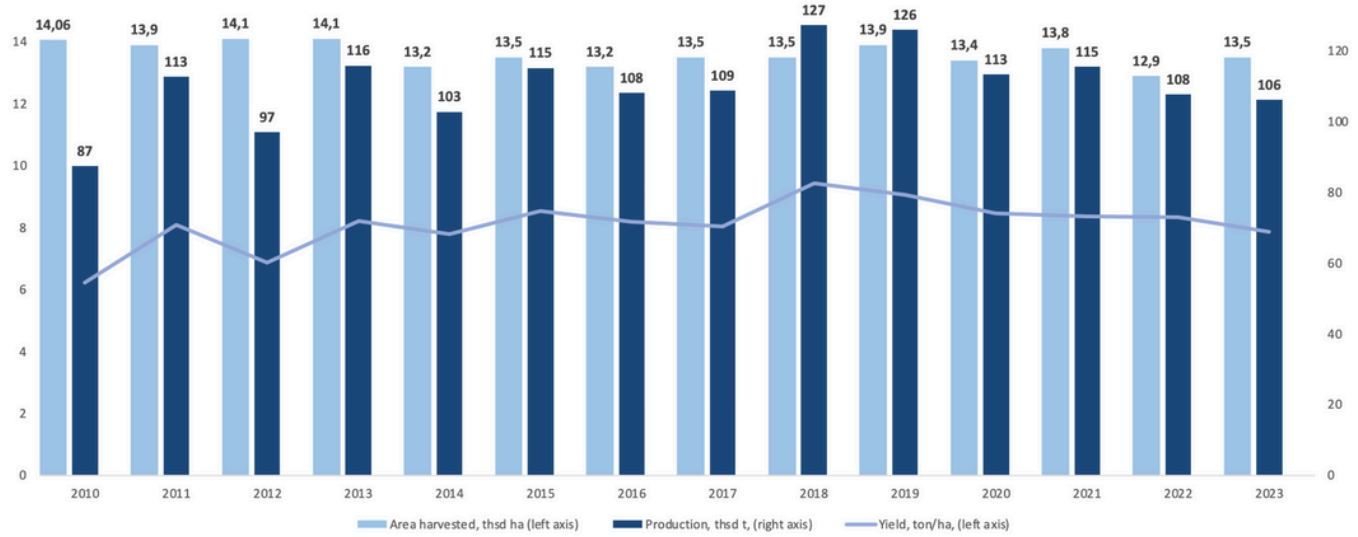
- Вирощування волоського горіха супроводжується низьким вуглецевим слідом (0,76 кг CO_2/кг) у порівнянні з мигдалем (3,56 кг CO_2/кг). Це створює можливості для позиціонування українського горіха як кліматично дружнього суперфуду.

CONTENT

I.SECTOR DESCRIPTION
PRODUCTION

Ukraine is one of the world's leading producers of walnuts, ranking 4th globally with approximately 100,000 tonnes, accounting for around 4% of total world production. It follows China, which dominates the market with 1.5 million metric tons (56%), the United States with 607,814 tonnes (23%), and Chile with 195,000 metric tons (7%).[1] Prior to the full-scale Russian invasion in 2022, the average walnut production stood around 115–120 thousand tonnes annually and in 2022-2023 averaged to 107 thousand tonnes. (Figure 1).

Figure 1. Ukraine. Walnut production, area and yield



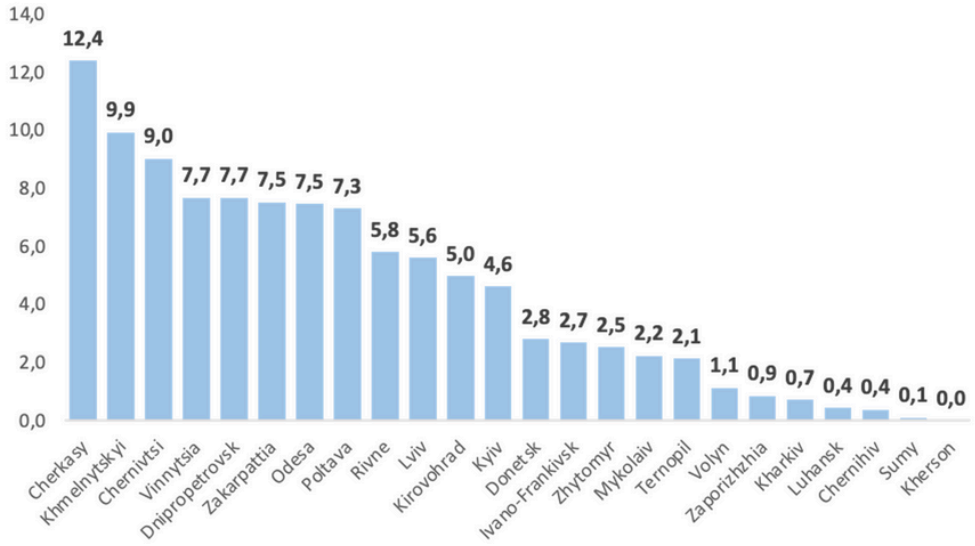
Source: FAOSTAT

Walnut cultivation in Ukraine is officially reported on approximately 13,500 hectares of productive area in 2023 (with 16,400 of total area), yielding an average productivity of roughly 8 tonnes per hectare.[2] However, two factors raise concerns about the accuracy of these figures. First, leading walnut producers such as China and the United States report lower average yields. Second, statistics indicate that household producers achieve yields nearly five times higher than agricultural enterprises (approximately 10 vs. 2 tonnes per hectare). This discrepancy suggests a potential statistical gap, where yields may be significantly overestimated—either due to inflated production figures or underreported harvested area.

The biggest producers are Cherkasy oblast (12,4 thsd tonnes), Khmelnytskyi oblast (10 thsd tonnes) and Chernivtsi oblast (9 thsd tonnes). (Figure 2.)

1 https://www.fas.usda.gov/data/production/commodity/0577901
2 https://stat.gov.ua/uk/explorer?urn=SSSU:DF_AREA_HARVESTS_CROP_YIELD(18.0.0)

Figure 2. Walnut production by regions in 2023, thsd metric tons

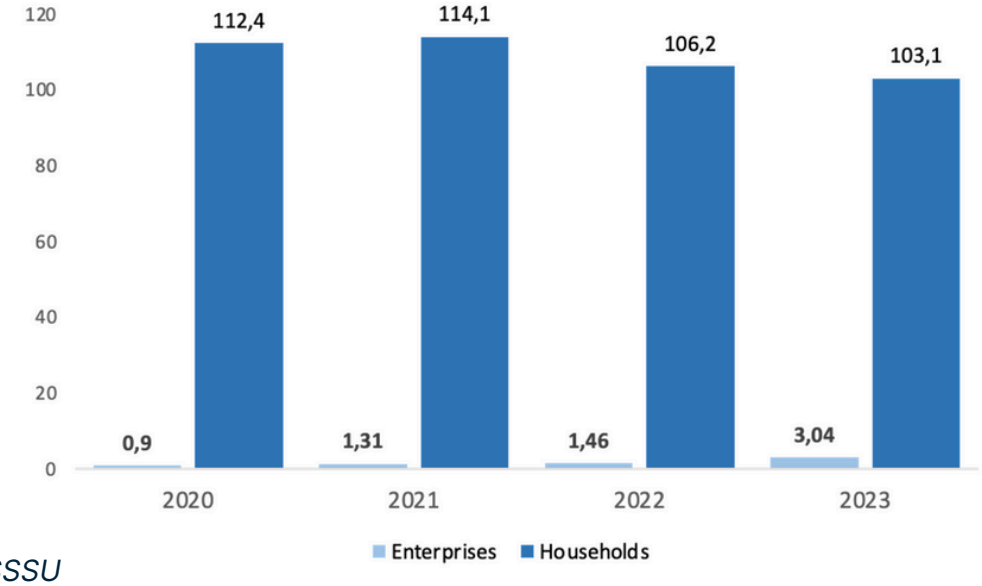


Source: SSSU

While the official data on the Ukraine's population has not been available since the start of the full-scale invasion, some estimates indicate the contraction by approximately 10 million, with around 31 million people in 2024.[3] Thus, per capita walnut production currently stands at around 0,29 kg annually.

The full-scale war has adversely impacted production capacity. Due to extensive land losses and damage in key walnut-producing regions such as Donetsk, Zaporizhzhia, Luhansk, Mykolaiv, Kharkiv, and Kherson[4], walnut production in 2023 declined by approximately 6%. (Figure 3).

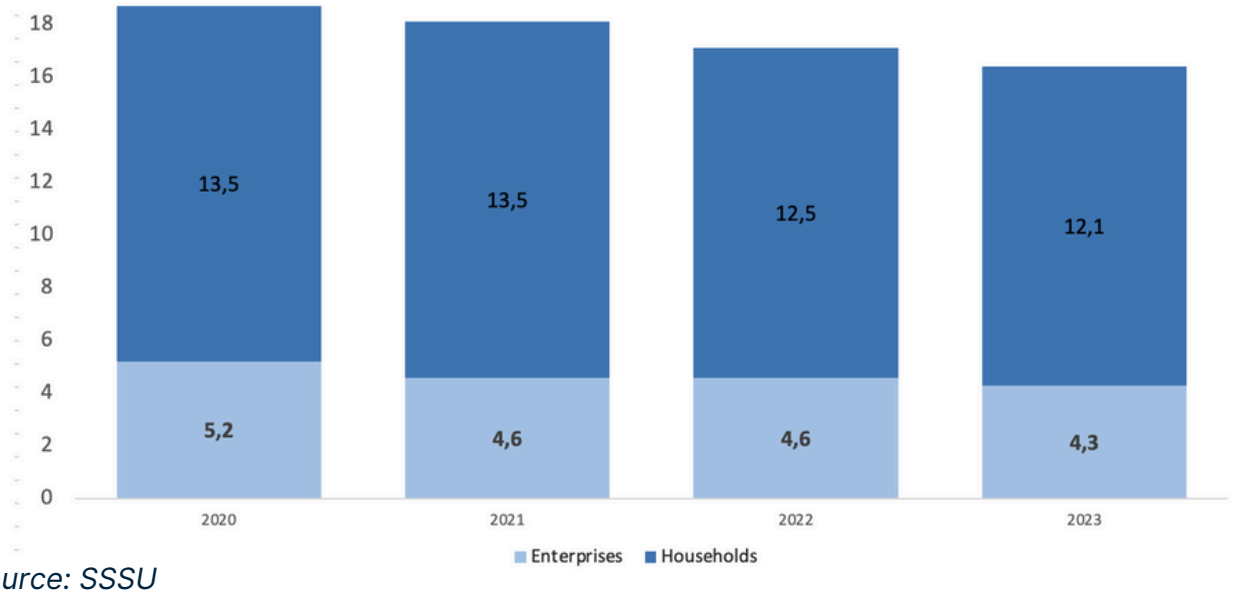
Figure 3. Production volume, thsd metric tons



Source: SSSU

3 https://fakty.com.ua/ua/ukraine/20250122-naselennya-ukrayiny-u-2025-roczi-ta-metody-vyrishennya-demografichnoyi-kryzy-prognoz-eksperta/
4 https://landlord.ua/news/v-ukrayini-sformuvavsya-unikalnyj-genofond-voloskogo-goriha/

Figure 4. Harvested area, thsd ha



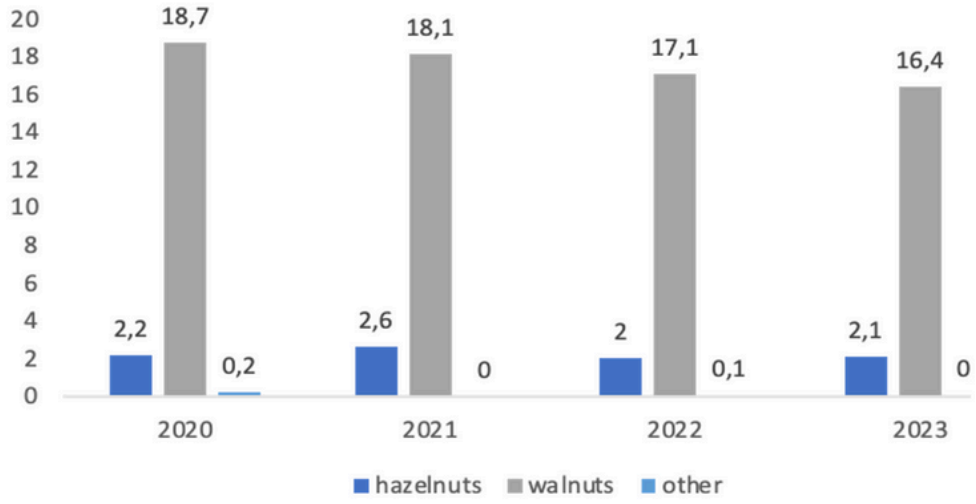
Source: SSSU

In 2023, approximately 74% of the total walnut production area was managed by households and more than 95% of production produced by them (Figure 4). This indicates that a substantial portion of walnut cultivation relies on family labor, with limited engagement of hired workers. The remaining 26% of production area was attributed to commercial enterprises, which may employ a more formal workforce.[5]

However the percentage of production area among enterprises have been increasing in past years. (Figure 4). According to a 2024 report by USDA, the main reason for it is Ukrainian farmers began developing walnut orchards for commercial purposes in 2009. The average size of these commercial orchards ranges from 20 to 50 ha. The establishment of commercial farms can be attributed to pre-2022 GOU financial support for orchard and berry producers. Industry notes that farmers were investing in high-yield commercial orchards with multiple walnut varieties, installing irrigation systems, and applying fertilizers.[6]

5 https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?
6 filename=Tree+Nuts+Annual_Kiev_Ukraine_9-17-2018.pdf
https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?
fileName=Tree+Nuts+Annual_Kyiv_Ukraine_UP2024-0018.pdf

Figure 5. Area of perennial plantings in thsd ha in Ukraine



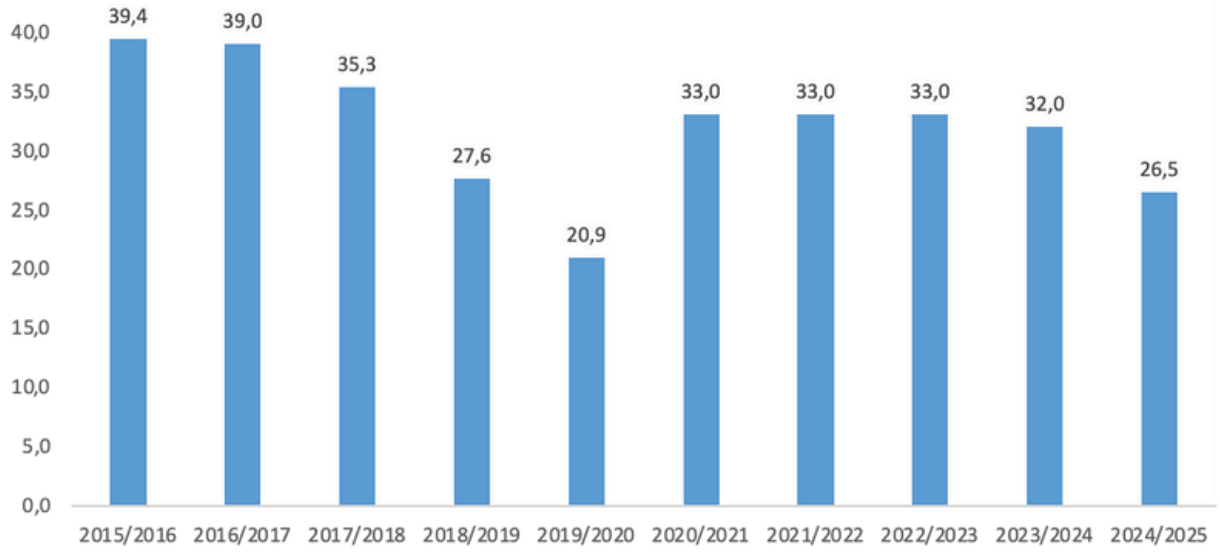
Source: SSSU

In Ukraine, according to SSSU statistics for 2023, 88% of nut plantings are walnuts and over 10% are hazelnuts. About 73% of walnut plantings are in households, where walnuts account for 99% of all household nut perennial plantings. All hazelnut production is concentrated in enterprises (Figure 5).

DOMESTIC CONSUMPTION

Domestic consumption in Ukraine averages to 33 thousand metric tons, so it is around 0.8 - 1 kg per person.[7] The decline of consumption in 2019/2020 reflects record increase in exports in 2019[8] (Figure 6).

Figure 6. Domestic consumption of walnuts in Ukraine (in shell), thousand metric ton



Source: SSSU

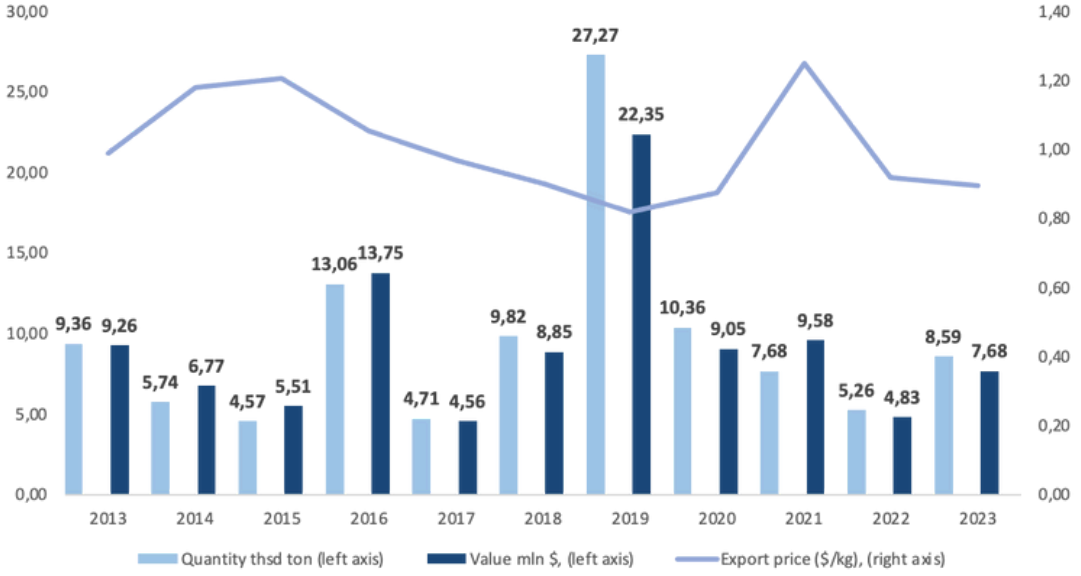
EXPORT

In 2023, 72% of Ukraine's walnut exports—amounting to 22,000 metric tons and valued at approximately $69 million—were shelled, meaning they had undergone initial processing. In contrast, 28% (8,600 metric tons, worth about $7.7 million) were exported in-shell. Shelled walnuts were sold at an average price of around $3.50 per kilogram, while in-shell walnuts averaged to $0.90 per kilogram.

Given that shelled walnuts account for about 40% of the weight of unshelled nuts, the 22,000 metric tons of kernel exported are equivalent to approximately 55,000 tons of in-shell walnuts. When combined with the 8,600 metric tons of in-shell exports and around 30,000 metric tons of estimated domestic consumption, this suggests that about 93,600 tonnes of the total 106,000-tonnes production were accounted for—leaving a margin potentially explained by losses, stocks, or unrecorded use.

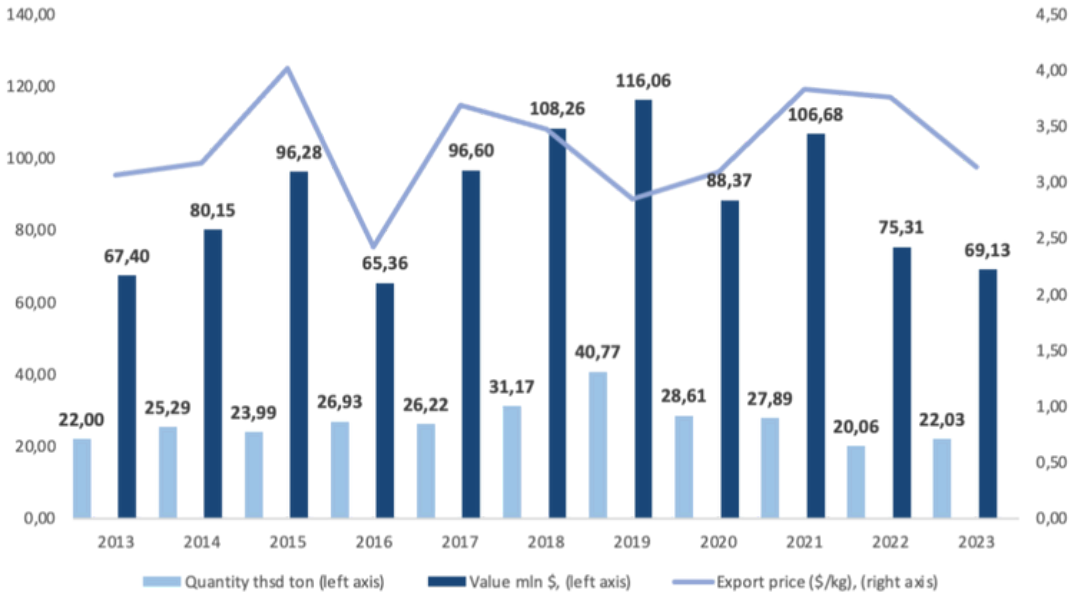
7 https://apps.fas.usda.gov/psdonline/app/index.html#/app/advQuery
8 https://news.finance.ua/ua/news/-/445349/ukrayina-rekordno-eksportuvala-gorihy-i-frukty

Figure 7. Export walnuts fresh or dried, in shell (Ukraine)



Source: UN Comtrade

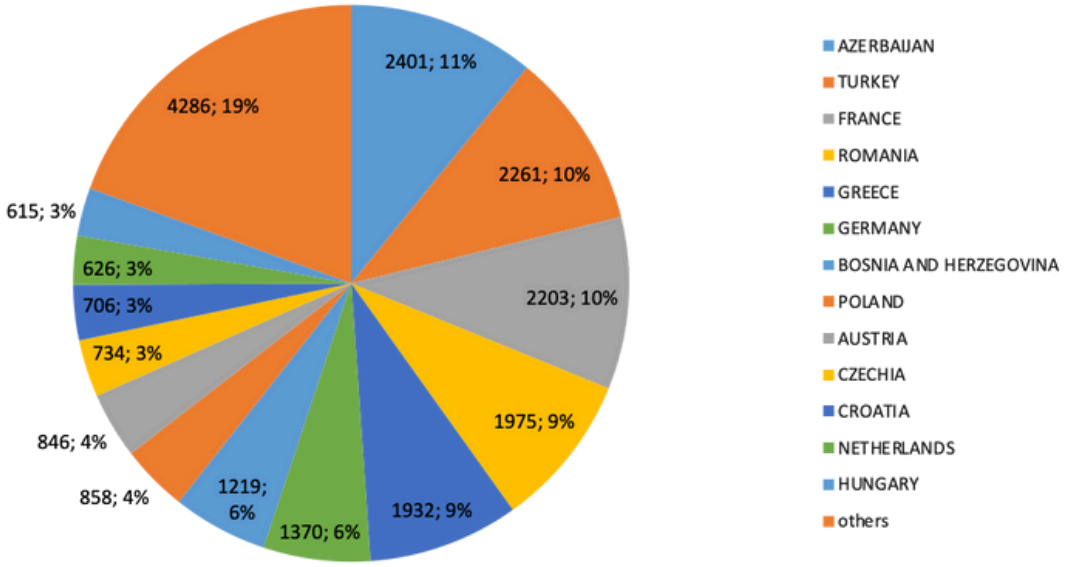
Figure 8. Export walnuts fresh or dried, shelled (Ukraine)



Source: UN Comtrade

The largest importers of Ukrainian shelled walnuts in 2023 were: Azerbaijan: 2,401 tonnes (11%), Türkiye: 2,261 tonnes (10%), France: 2,203 tonnes (10%), Romania: 1,975 tonnes (9%) and Greece: 1,932 tonnes (9%). (Figure 9).

Figure 9. Export 2023. Shelled. Metric tons

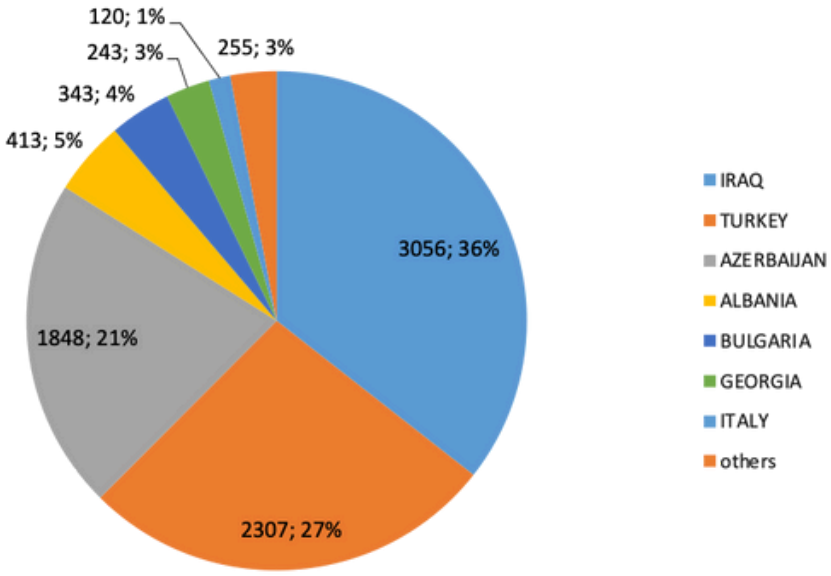


Source: UN Comtrade

For in-shell walnuts, the leading buyers were: Iraq: 3,056 tonnes (36%), Türkiye: 2,307 tonnes (27%) and Azerbaijan: 1,848 tonnes (21%). Figure 10).

In total, the European Union was Ukraine's primary export market, contributing more than $45 million, or 58% of total revenue.[9]

Figure 10. Export 2023. In shell. Metric tons



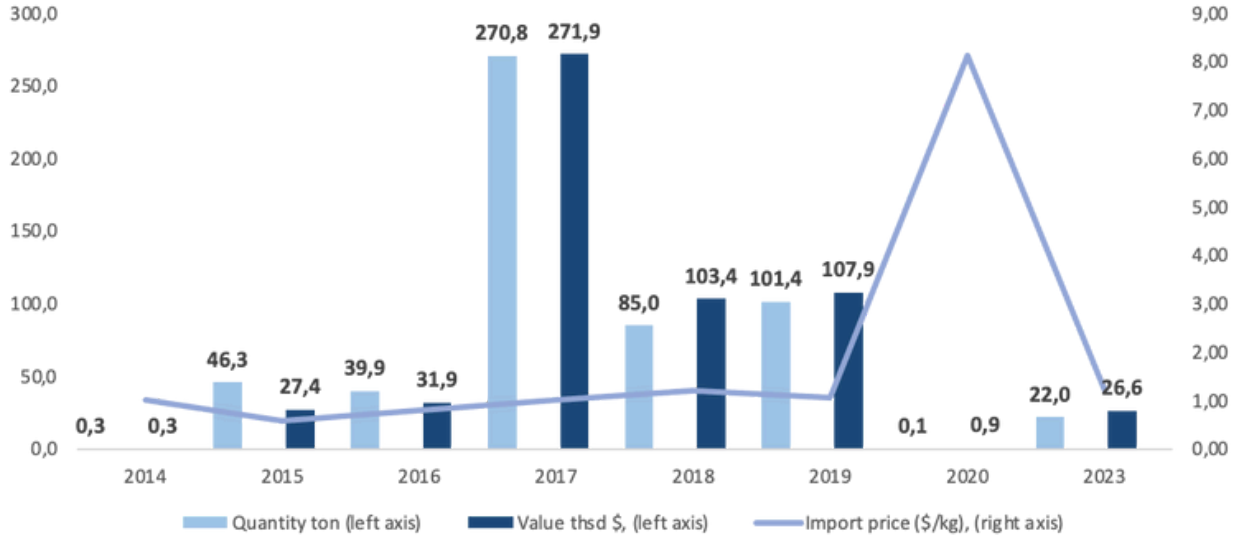
Source: UN Comtrade

9 https://landlord.ua/news/v-ukrayini-sformuvavsya-unikalnyj-genofond-voloskogo-goriha

IMPORT

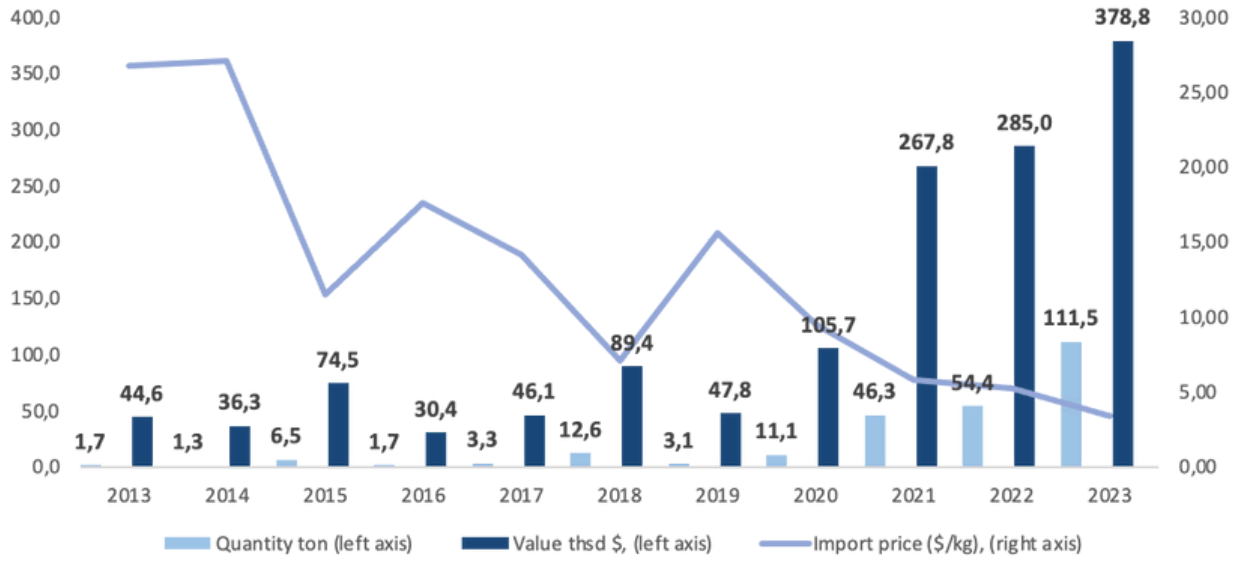
Imports of walnuts to Ukraine remain significantly lower than exports. However, in recent years, imports of shelled walnuts have been increasing, and imports of in-shell walnuts have been declining. In 2023, Ukraine imported 111 metric tons of shelled walnuts valued at $378,000, compared to just 22 tonnes of in-shell walnuts worth $26,600. The average import price for shelled walnuts was approximately $2.70 per kilogram, while in-shell walnuts were imported at around $1.00 per kilogram (Figure 11).

Figure 11. Import walnuts fresh or dried, in shell (Ukraine)



Source: UN Comtrade

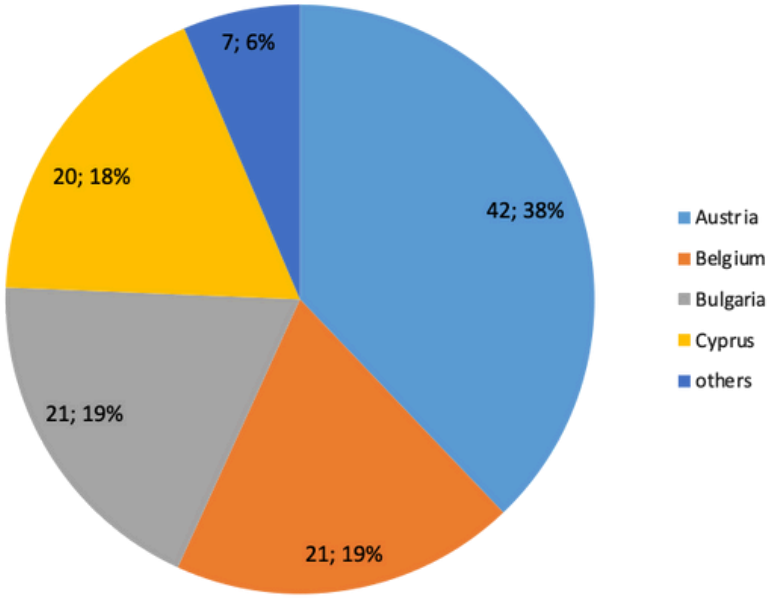
Figure 12. Import walnuts fresh or dried, shelled (Ukraine)



Source: UN Comtrade

The main countries Ukraine imported shelled walnuts from in 2023 were: Austria: 42 tonnes (38%), Belgium: 21 tonnes (19%), Bulgaria: 21 tonnes (19%) and Cyprus: 20 tonnes (18%) (Figure 13).

Figure 13. Import 2023. No shell. Metric tons



Source: UN Comtrade

The overall direct contribution of walnuts to Ukraine's total agricultural GDP remains modest, primarily because Ukrainian agriculture is heavily dominated by cereal grains, oilseeds, and animal production, which occupy far larger cultivated areas.

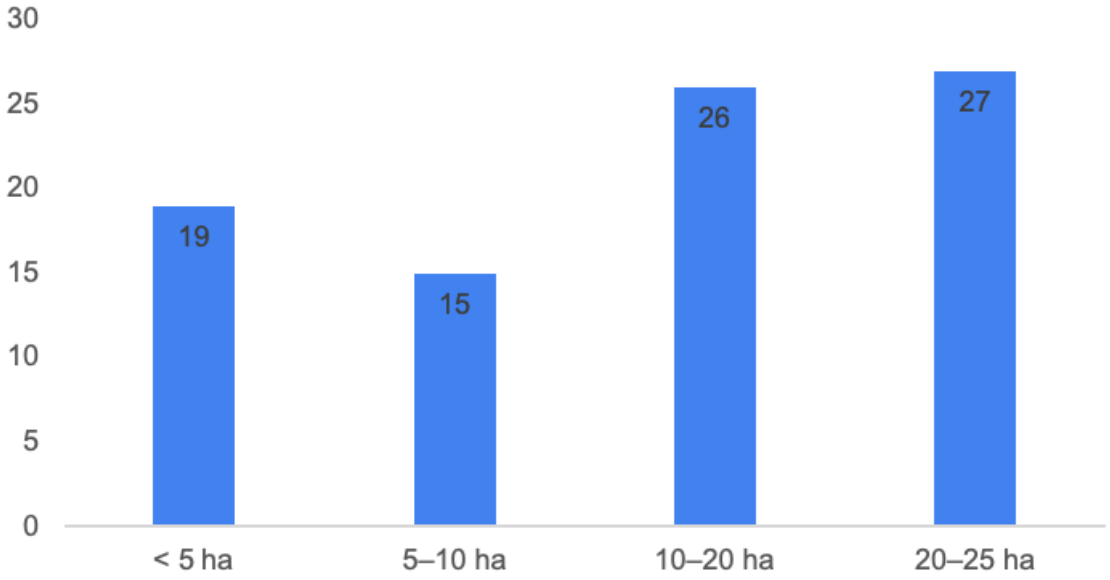
CAPITAL INVESTMENTS

One of the main tools for governmental support is the "єРобота" ("eRobota") program, launched on July 1, 2022, which is designed to support small and medium-sized businesses across the country. The primary goal of the program is job creation, and one of its key components — "Свій сад" ("Sviy Sad" or "Own Orchard") — is specifically tailored for agricultural producers and farmers seeking to establish or expand plantations of fruit, berries, grapes and nuts. Under this grant program, beneficiaries can receive funding ranging from 140,000 UAH (approx. 3,800 USD) to 400,000 UAH (approx. 10,800 USD) per hectare, but no more than 10,000,000 UAH (approx. 270,000 USD) in total per recipient. The grants can be used to cover any costs related to the planting project, with payments made directly to material suppliers based on contracts.

Grants are provided for up to 70% of the total project cost, on the condition that the recipient covers the remaining 30% with their own or borrowed funds (e.g., through loans). Additionally, the program limits the planting area to no more than 25 hectares per project and

requires the installation of irrigation and water intake systems. In Figure X, you can see the distribution of hazelnut and walnut grant recipients by orchard size, based on the area planted.

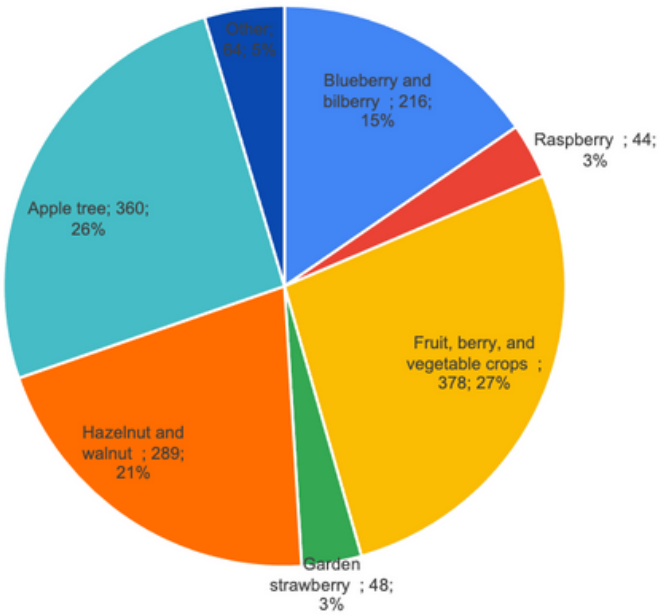
Figure 14. Distribution of Hazelnut and Walnut Grants by Orchard Size



Source: erobota.minagro.gov.ua

In 2023–2024, a total of 1.401 billion UAH was allocated under the program, out of which 289 million UAH (approx. 7.8 million USD) — or 20.66% — was directed toward hazelnut and walnut projects. This puts the crop category among the top recipients of funding, alongside apple orchards (360 million UAH), blueberry and bilberry (216 million UAH), and fruit/berry/vegetable crops (278 million UAH) — the latter is largely allocated to greenhouse production rather than orchards (Figure 15).

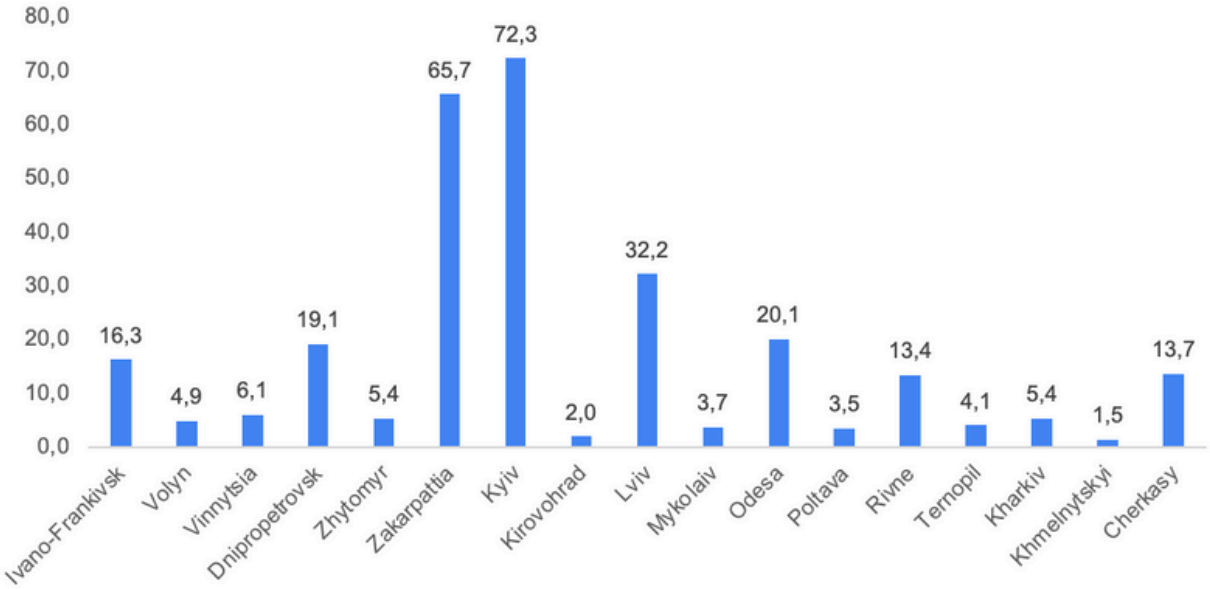
Figure 15. Grants allocation by product types, mln UAH



Source: minagro.gov.ua

The average grant size per hectare across the program is approximately 247,000 UAH. In terms of regional distribution, the largest allocations for hazelnuts and walnuts were recorded in Kyiv region (72.3 million UAH) and Zakarpattia region (65.7 million UAH) (Figure 16).

Figure 16. Grants allocation for hazelnuts and walnuts (mln UAH)

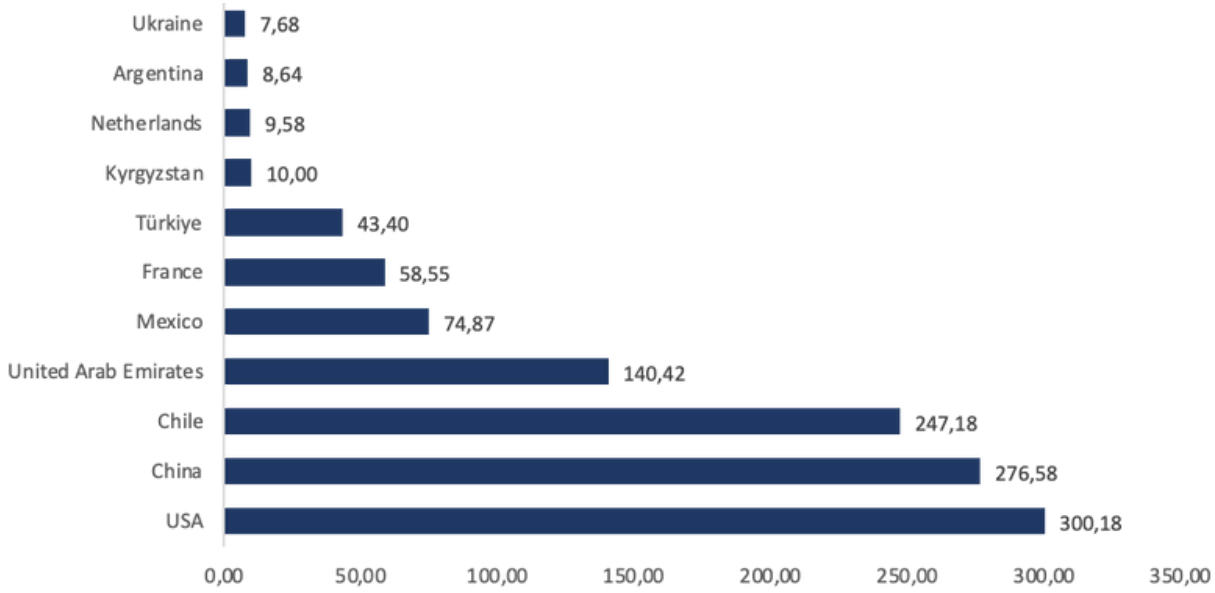


Source: minagro.gov.ua

COMPARISON TO OTHER COUNTRIES

In 2023, the United States was the world's largest walnut exporter by value, with exports totaling $300.18 million. It was followed by China ($276.58 million) and Chile ($247.18 million). Other major exporters included the United Arab Emirates ($140.42 million), Mexico ($74.87 million), and France ($58.55 million). Türkiye and Kyrgyzstan also featured in the top group, exporting $43.40 million and $10.00 million worth of walnuts, respectively. Ukraine ranked 11th, with exports valued at $7.68 million.

Figure 17. Biggest exporters (Value of exports in $ mln, 2023)

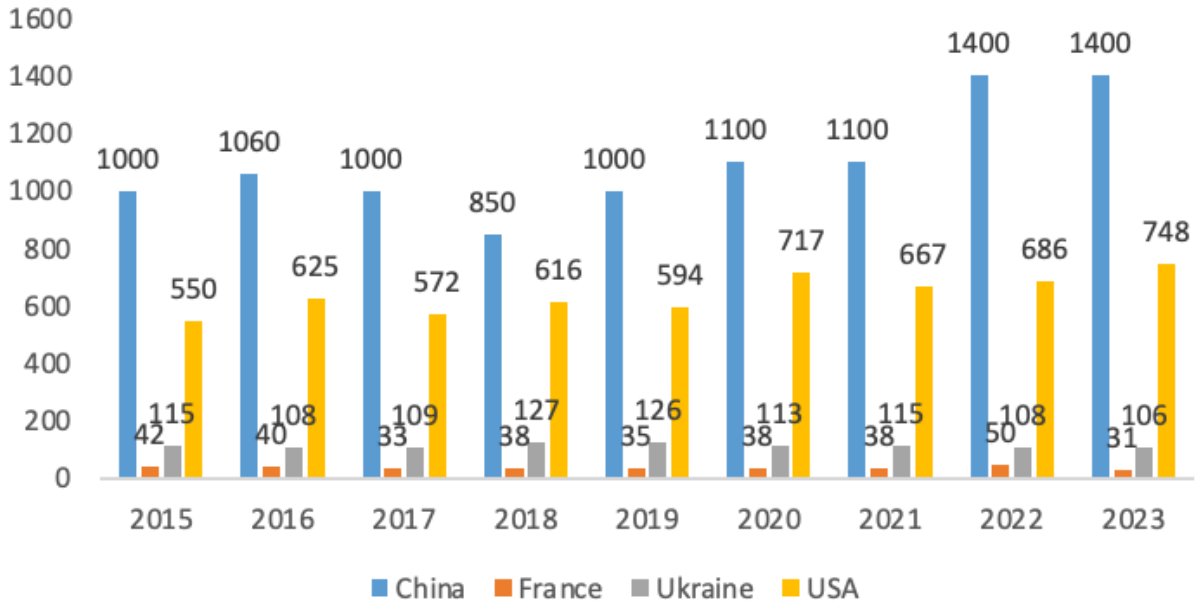


Source: UN Comtrade

We've chosen to compare Ukraine's walnut production to three reference countries: China and the United States—the global leaders—and France, as the biggest EU exporter. The data shows that in 2023, Ukraine produced 106 thousand tonnes of walnuts, more than triple France's output of 31 thousand tonnes. The United States produced 748 thousand tonnes, and China remained at the top with 1.4 million tonnes.

Over the period 2015–2023, Ukraine's production has remained relatively stable, fluctuating between 100 and 127 thousand tonnes, without a clear upward trend.

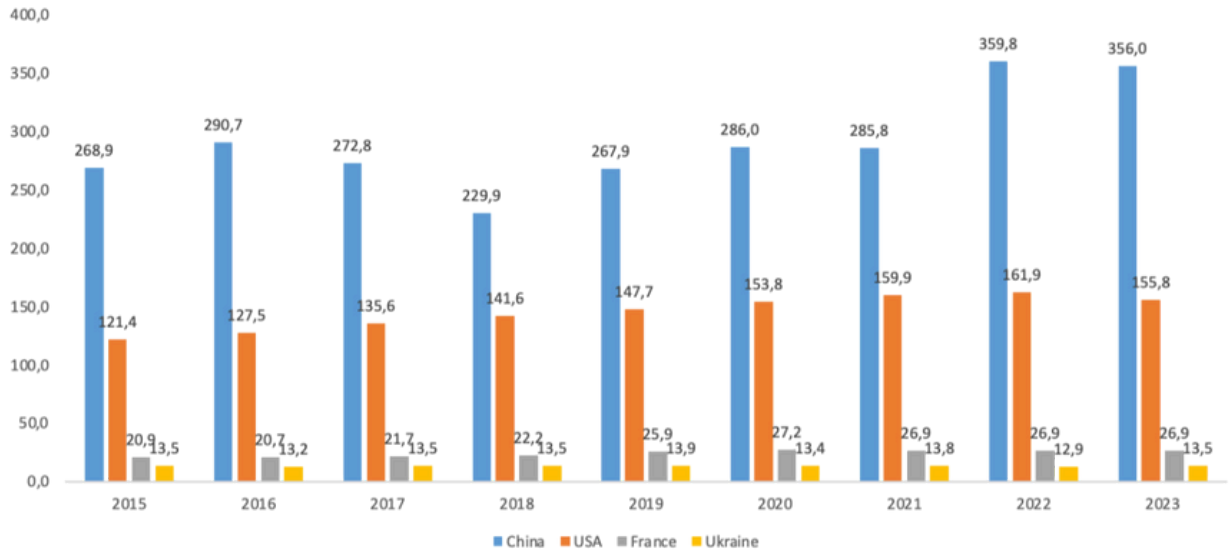
Figure 18. Production, thsd metric tons



Source: UN Comtrade

In 2023, China accounted for the highest harvested area of walnuts at 356 thousand hectares,, followed by the USA with 155.8 thousand hectares, and France with 26.9 thousand hectares. Ukraine, by comparison, harvested only 13.5 thousand hectares, the smallest among the four.

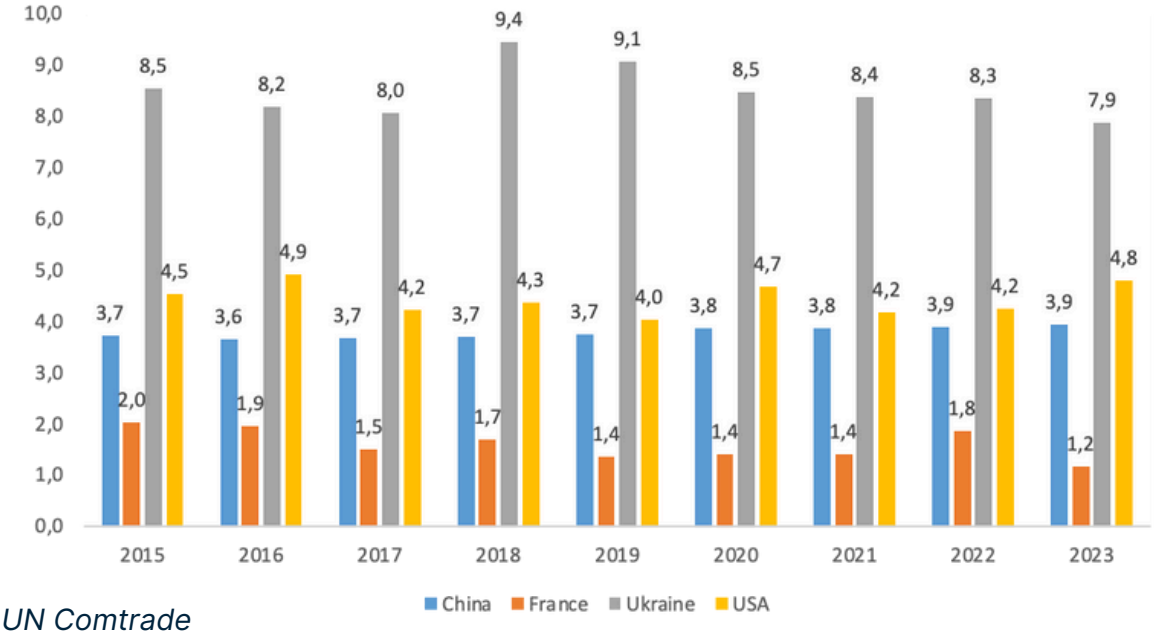
Figure 19. Area harvested, thsd ha



Source: UN Comtrade

Throughout the entire period,, China and the USA maintained yields around 3.7–4.3 tonnes/ha, while France consistently recorded the lowest productivity, typically below 2 tons/ha. It should be noted that harvested area in Ukraine is likely underestimated due to mostly non-official household production. Therefore, yields can be overestimated.

Figure 20. Yield, tonne/ha



Source: UN Comtrade

ENVIRONMENTAL IMPACT

Walnut cultivation in Ukraine presents both environmental benefits and challenges, influenced by agricultural practices, resource management, and the scale of operations. It has lower land and water requirements compared to other nuts (8800 liters per kg[1]), minimal ecological damage when produced organically and a relatively low carbon footprint (around 0.76 kg CO_2 eq per kg of walnuts). This footprint is significantly lower than that of many other nuts: the average for several nuts is around 2 kg CO_2 eq per kilogram and, for example, almonds require 3.56 kg CO_2 eq per kilogram.

Organic walnut farming reduces air, water, and soil pollution, and positively affects biodiversity and animal health.[11]

Environmental challenges include:

1. **Water Consumption:** Even though, walnuts have the lowest among of water consumption among the popular nuts, the water requirement is still high, which can strain local water resources, especially in regions with limited rainfall. Efficient irrigation techniques, such as drip irrigation, are essential to manage water use sustainably.[12]
2. **Chemical Inputs:** While many small-scale Ukrainian walnut farms traditionally avoid chemical fertilizers and pesticides, the shift towards commercial production has led to increased use of agrochemicals. This trend raises concerns about potential soil and water contamination. [13]
3. **Waste Management:** The disposal of walnut by-products, such as shells and husks, poses environmental challenges. Inappropriate waste management can lead to issues like unpleasant odors and potential groundwater pollution.[14]

Sustainable harvesting methods—such as selective picking, fair-trade and organic certification, precision farming, and reduced input use—can help minimize environmental impacts.[15] Moreover, organic agriculture is often promoted as a niche market strategy, based on the assumption that lower input use combined with price premiums will increase farmer incomes. However, this assumption is contested and highly context-specific. Yields may decline, and higher labor demands can reduce profits. Small farm sizes may hinder the profitability of organic adoption. Although price premiums exist, they are often disproportionately captured by downstream actors, with limited benefit to producers. Premiums may also diminish over time, and overall impacts on farmer incomes remain uncertain.[16]

12 https://en.ecoaction.org.ua/hasnt-plowed-for-15-years.html?
13 https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Tree+Nuts+Annual_Kyiv_Ukraine_UP2024-0018.pdf
14 https://www.frontiersin.org/journals/environmental-science/articles/10.3389/fenvs.2022.999059/full?utm.com
15 https://www.mdpi.com/2072-6643/16/8/1183
16 https://www.emerald.com/insight/content/doi/10.1108/jadee-10-2015-0047/full/html

INDUSTRIES THAT RELY ON WALNUT AS AN INPUT

The walnut processing industry in Ukraine is currently underdeveloped, yet it has significant market potential. Primary walnut processing, such as separating pericarp from kernel, is typically performed by wholesalers rather than growers themselves. Walnut kernels serve as raw materials for the oil and fat industry, which produces edible walnut oil, oil cake, and residues. These products further support the confectionery industry (e.g., bakery, macaroni, sweets, and snacks), livestock feed manufacturers, and producers of biofuels, paints, and varnishes.[17]

Deep walnut processing generates valuable by-products, including walnut flour and biofuel briquettes from shells. Processors face decisions regarding whether to produce oil independently or buy it for repackaging, as processing costs are substantial.[18]

Walnut processing also supports other industrial sectors. Walnut husks (mesocarp) yield black and brown dyes used in printing, while walnut seed oil is used in painting due to its rapid drying and glossy finish. The endocarp provides furfural, a component in linoleum and rubber manufacturing. Walnut wood, valued for its density, durability, and resistance to heat-induced deformation, is sought after by furniture producers.[19]

Walnuts are often used in traditional medicine. Due to the antioxidant, antihypercholesterolemic, antidiabetic, anti-inflammatory, antiamyloidogenic, antimutagenic, antiviral and antimicrobial activity of some of its phytochemical components, consumption of walnuts was recommended for a variety of health benefits, such as to reduce cholesterol, improve brain health, and lower the risks of diabetes and cancer. [20]

Green walnut husks have multiple industrial applications: producing condiments, preserves, sweets, liqueurs, natural dyes, polymer composites, and removing heavy metals from industrial wastewater. Agroforestry practices integrating walnut cultivation with activities like haymaking and beekeeping enhance soil fertility, support pest management, and diversify income streams, promoting sustainable agricultural systems.[21]

17 https://www.mnje.com/sites/mnje.com/files/155-_168_-_lutsiak_et_al._-_rrr.pdf
18 https://www.mnje.com/sites/mnje.com/files/155-_168_-_lutsiak_et_al._-_rrr.pdf
19 https://nv.nltu.edu.ua/Archive/2017/27_3/6.pdf
20 https://www.sciencedirect.com/science/article/abs/pii/S138993412030201X
21 https://www.mdpi.com/2072-6643/16/8/1183

PRODUCTION PROCESS AND INDUSTRIES SUPPLYING INPUTS TO THE WALNUT SECTOR

Industries supplying inputs to the walnut sector in Ukraine include agricultural equipment suppliers, producers of fertilizers, agrochemicals, and specialized walnut processing machinery. Establishing and managing walnut orchards requires tractors with attachments, planting machinery, irrigation systems, pruning tools, electric saws, hoes, cultivators, and vehicles for transporting equipment and harvests. Post-harvest processing requires equipment like dryers, separators, shelling machines, cleaners, vibratory screens, and color sorters to achieve commercial quality and appealing appearance.[22]

Walnut cultivation depends on several agricultural inputs, notably ammonium nitrate fertilizer (approximately 6 kg per tree annually), and organic fertilizers such as horse or cow manure. Agrochemical inputs include insecticides and fungicides for pest and disease management, particularly in summer when infestation risks peak. Other necessary supplies include lime for whitewashing trunks to protect against pests and diseases, and grafting materials to accelerate tree growth. Proper orchard management requires careful attention to drainage, regular watering during dry winters and bi-weekly in summer, and consistent weed removal to minimize nutrient competition.[23]

Harvesting young, green walnuts occurs between late May and June, when the nuts are immature and easy to cut. Protective gloves and dark clothing are recommended due to staining. Harvested walnuts require immediate processing or storage in cool, dark conditions for up to a week.[24] Walnuts must be dried to optimal moisture (6–8%) to prevent mold. Processing involves removing residual hulls and debris, often using specialized green-husk removal equipment for efficiency, as well as soaking to reduce bitterness and using them in culinary and nutraceutical applications.[25] Storage demands special nets, boxes, or bags ensuring adequate air circulation, with storage facilities maintained cool, dry, and dark. Regular inspections and the rotation principle help maintain nut quality. Mechanical shelling significantly increases productivity (over 200 kg/hour), despite reducing the proportion of intact kernels. Sorting kernels by size and color, using vibratory sieves and color-sorters, improves product marketability, as consumers prefer lighter and uniformly colored kernels.[26]

22 https://agroapp.com.ua/uk/blog/biznes-na-gorixax-v-ukra%D1%97ni-biznes-plan-z-rozraxunkami/?
23 https://agroapp.com.ua/uk/blog/biznes-na-gorixax-v-ukra%D1%97ni-biznes-plan-z-rozraxunkami/?
24 https://www.mdpi.com/2072-6643/16/8/1183
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SECTOR'S NUTRITIONAL VALUE

On average, 100 grams of walnuts contain 696 calories, 66 grams of fat, 6,3 grams of carbohydrates, 6.2 grams of fiber and 2.6g sugar), and 15,3 grams of protein, along with various vitamins and minerals.[27] By nutritional value walnuts surpassing many plant and animal-based foods. Walnut kernels are 1.5 times higher in calories than pork, 2.5 times more than honey, three times more than bread, 7–8 times more than fish, and 10 times more than potatoes. Just 400 grams of walnut kernels can satisfy the daily caloric needs of a human (2936 kcal). Walnuts are particularly rich in vitamin C, containing eight times more than blackcurrants and 50 times more than citrus fruits. Additionally, walnuts provide vitamins A, B, B1, P, and phytoncides.[28]

Walnut quality, including chemical composition and nutritional value, significantly varies with geographical origin. Studies indicate notable differences among walnut cultivars in moisture content, oil concentration, protein levels, fatty acids, and sterols. For example, polyunsaturated fatty acids, especially linoleic acid, dominate walnut oils, with total oil concentrations reaching up to 740 g/kg in commercial types. Components like tocopherols, sterols, and phenolic compounds, known for antioxidant properties, also vary by cultivar and location. These variations affect the nutritional quality, oxidative stability, and shelf-life of walnut products, emphasizing the importance of genetic diversity and cultivation environments in walnut production.[29]

GLOBAL CONSUMPTION TRENDS, FUTURE DEMAND AND WALNUT SUBSTITUTES

Global walnut consumption is increasing due to rising consumer awareness of health benefits and a growing preference for whole, nutritious foods. According to a survey conducted among USA consumers, eating more fruits and vegetables remains the top health-related dietary habit (56%), closely followed by increased nut consumption (44%). The consumers also reported that the recognized health benefits of walnuts positively influenced their purchasing decisions.[30] Walnuts are used in a wide range of products, from baked goods to salads and snacks, appealing to a diverse consumer base.[31] Besides rising consumer demand for walnuts as a snack, future demand is also expected to be driven by the growing vegetable oil market, fueled by consumer preferences for affordable, flavorful, organic, unprocessed, and non-refined oils.[32]

27 https://www.coopenoix.com/en/produits/noix-et-sante/
28 https://nv.nltu.edu.ua/Archive/2017/27_3/6.pdf
29 https://www.mdpi.com/2072-6643/16/8/1183
30 https://walnuts.org/food-professionals/why-walnuts/consumer-research-and-demand-for-walnuts/
31 https://essfeed.com/walnuts-production-trade-and-consumption-a-360-industry-report-walnuts-production-trade-and-consumption-a-360-industry-report/
32 https://www.mnje.com/sites/mnje.com/files/155-_168_-_lutsiak_et_al._-_rrr.pdf

Rising consumer interest in walnuts reflects the increasing popularity of more healthy diets and lifestyles associated with the growth of the urban middle class in countries such as China and India, which are currently among top three global walnut consumers along with the USA.[33] Germany, India, and Spain are among the top importers of walnuts, with companies like Ferrero, Olam International, and Del Monte Foods dominating the market.[34]

According to a study "A household-level demand system analysis of nuts in the United States", compensated (Hicksian) price elasticity estimates proved peanuts, pecans, almonds, cashews, and macadamia nuts to be substitutes for walnuts.[35] At a broader category level, according to a study on Estimating Food and Drink Elasticities based on data from the UK, fruits and nuts generally substitute meat consumption across the overall population. However, for low-income households, fruits and nuts often exhibit a complementary relationship with meat; lower prices for fruits and nuts in this segment lead to increased meat consumption. Conversely, for the general population, lower fruit and nut prices typically reduce meat consumption.[36]

FUTURE DEMAND DRIVERS: FOOD SECURITY, ENVIRONMENTAL SUSTAINABILITY AND RURAL DEVELOPMENT

Walnut production can significantly contribute to environmental sustainability and rural development. Walnut trees are perennial crops with long lifespans and relatively low input requirements compared to annual crops. Once established, they can provide a stable yield for decades, offering a buffer against price volatility in other agricultural sectors and contributing to long-term food system resilience. Green walnuts have high nutritional and bioactive value, offering diverse industrial and ecological applications.

Few studies have examined the contribution of walnut forests to rural livelihoods or household income. Existing research indicates that forest-based walnut collection alone cannot ensure sufficient income, due to strong yield fluctuations and seasonal availability. As a result, most households depend on a mix of livelihood strategies, including livestock husbandry, crop production, off-farm work, non-timber forest products (NTFPs), and both temporary and permanent migration.[37] Moreover, the underdeveloped state of walnut processing and value chains in Ukraine limits the full socio-economic potential of both natural and planted walnut sources. Similar to patterns observed in Silk Road countries, Ukraine faces a range of structural challenges in this sector. These include poor rural infrastructure and limited market access; lack of knowledge and modern technologies for harvesting,

33 https://www.sciencedirect.com/science/article/abs/pii/S138993412030201X
34 https://essfeed.com/walnuts-production-trade-and-consumption-a-360-industry-report-walnuts-production-trade-and-consumption-a-360-industry-report/
35 https://www.cambridge.org/core/services/aop-cambridge-core/content/view/E241F824440827181068B381E6E5B5D1/S1068280522000119a.pdf/householdlevel_demand_system_analysis_of_nuts_in_the_united_states.pdf?
36 https://assets.publishing.service.gov.uk/media/5a759170e5274a545822c86d/defra-stats-foodfarm-food-price-elasticities-120208.pdf?
37 https://www.sciencedirect.com/science/article/abs/pii/S138993412030201X

transportation, storage, processing, and marketing; as well as inconsistent quality of raw and processed walnut products. Fluctuations in supply, inefficient supply chains, low material efficiency, and low prices for unprocessed walnuts reduce the economic benefits of walnut harvesting. Moreover, the distribution of value within the walnut chain remains uneven, with small-scale producers and rural households often capturing only a small share of the final product value.[38]

Walnut forests provide important environmental benefits, such as the equalization of seasonal variations of water flows, slope stabilization, soil protection, biodiversity conservation, carbon sequestration, increased organic matter, and nutrient enrichment. In addition, numerous products and services originate from these forests that are used by the local populations, such as timber, firewood, and a variety of non-timber forest products (NTFP) ranging from wild fruits and nuts to feed.[39] Using walnut husks and shells as biomass energy sources can generate extra income, reduce waste, and lower production costs.[40] Walnut forest products contribute in various ways to rural livelihoods, e.g. in terms of employment and income, opportunities for processing enterprises, food security and nutrition, medicine, support of social networks, and in-kind remittances. In addition, they also contribute to foreign exchange earnings at the national level.[41]

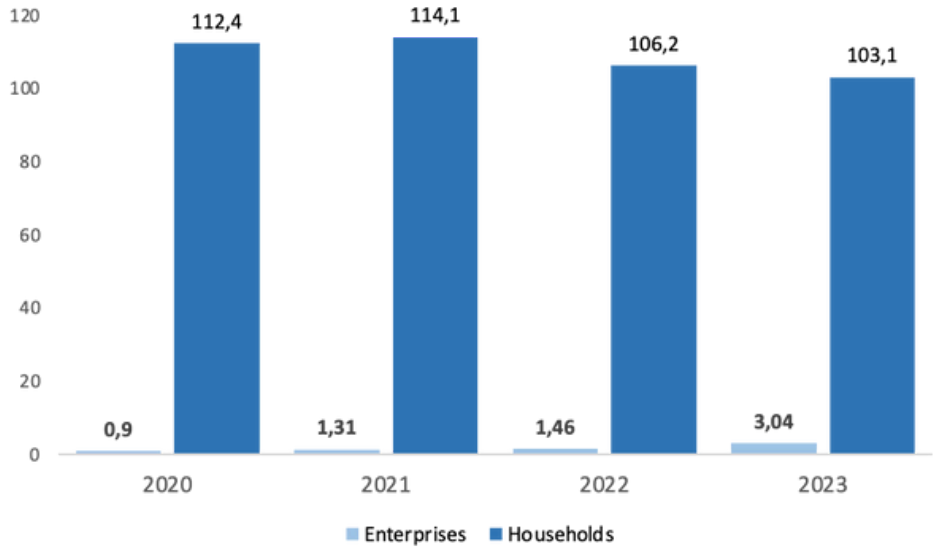
However, challenges remain, including managing bitterness from juglone and tannins, short shelf-life, seasonal availability, allergy risks, and environmental impacts related to invasive walnut trees.

38 https://www.sciencedirect.com/science/article/abs/pii/S138993412030201X
39 https://www.sciencedirect.com/science/article/abs/pii/S138993412030201X
40 https://www.mdpi.com/2072-6643/16/8/1183
41 https://www.sciencedirect.com/science/article/abs/pii/S138993412030201X

II.WALNUT PRODUCTION IN UKRAINE

Walnut production in Ukraine is dominated by household backyard farming (Figure 21). It remains largely labor-intensive, as harvesting and sorting in households are mostly done by hand or with simple tools.[42] Household producers also rarely use fertilizers, control diseases, or manage orchards for higher yields.[43]

Figure 21. Production volume, thsd ton



Source: SSSU

Since 2009, some farmers have been establishing walnut orchards for commercial purposes, supported by state financial incentives.[44] The average size of these orchards ranges from 20 to 50 ha. In 2020, households accounted for 99.2 % of total walnut output, but by 2023 their share had declined to 97.1 %, with the remainder produced by agricultural enterprises (Figure 1).

The emergence of commercial producers is gradually reshaping the sector, as professional, better-managed orchards begin to replace aging, low-input household plots.[45] These orchards are expected to achieve higher yields due to investments in high-yield varieties, irrigation systems, fertilizers, and specialized practices such as site selection, nursery development, and pest control.[46]

42 https://www.tridge.com/stories/ukraine-faces-a-tough-walnut-marketing-campaign-amid-quality-concerns-and-rising-global?utm_source=chatgpt.com
43 https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Tree+Nuts+Annual_Kyiv_Ukraine_UP2024-0018.pdf&utm_source=chatgpt.com
44 https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?filename=Tree+Nuts+Annual_Kiev_Ukraine_8-29-2019.pdf&utm_source=chatgpt.com
45 https://agrixchange.apeda.in/MarketReport/Tree_Nuts_Annual_Kiev_Ukraine_8-31-2016.pdf?utm_source=chatgpt.com
46 https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Tree+Nuts+Annual_Kyiv_Ukraine_UP2024-0018.pdf

HOUSEHOLD PRODUCERS

Households form the largest category of producers. They operate without legal entity status, focus primarily on self-consumption, and may sell limited surpluses but remain outside the formal tax system.

In 2021, there were 4734 thousands households in rural areas of Ukraine, with an average household size of 2.7 people (a total of approximately 12.62 million people), excluding the population residing in the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol, and parts of the temporarily occupied territories in Donetsk and Luhansk oblasts as of 2021.

That year, rural households produced 114 thousand tonnes of walnuts. This equates to an average of 24 kg of walnuts per household per year (a single walnut tree yields approximately 40 kg).[47]

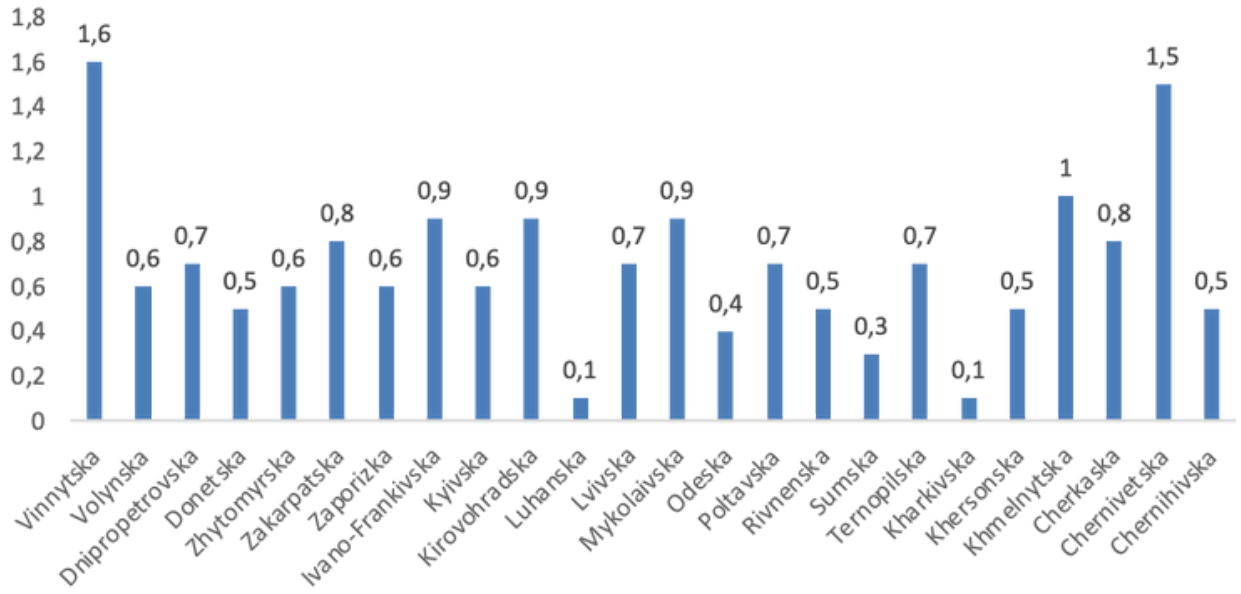
The average market price of in-shell walnuts is currently around 20 UAH per kg.[48] Although the exact price in 2021 is unknown, we assume it was approximately the same for the purpose of this analysis. Based on this assumption, the average income per household from walnuts was about 480 UAH annually (roughly $18), or 178 UAH per person. However, the exact share of households engaged in walnut production is unknown.

In comparison, the average annual income per household in rural areas in 2021 was approximately 139,812 UAH (11,651 UAH monthly). Therefore, income from walnuts constituted only about 0.34% of total household income on average.

In 2021, the average number of walnut trees reported per household in Ukraine was 0.7. This figure varied by landholding size: households with up to 0.5 hectares averaged 0.6 plantations, while those with 0.51–1.00 hectares and over 1.01 hectares both averaged 0.9 plantations per household. Regionally, Vinnytska (1.6) and Chernivetska oblasts (1.5) reported the highest averages. (Figure 22).

47 https://agroapp.com.ua/uk/blog/biznes-na-gorixax-v-ukra%D1%97ni-biznes-plan-z-rozraxunkami/
48 https://suspilne.media/poltava/868559-sezon-voloskih-gorihiv-za-skilki-mozna-zdati-plodi-na-rinku-poltavi/

Figure 22. Number of walnut trees per household



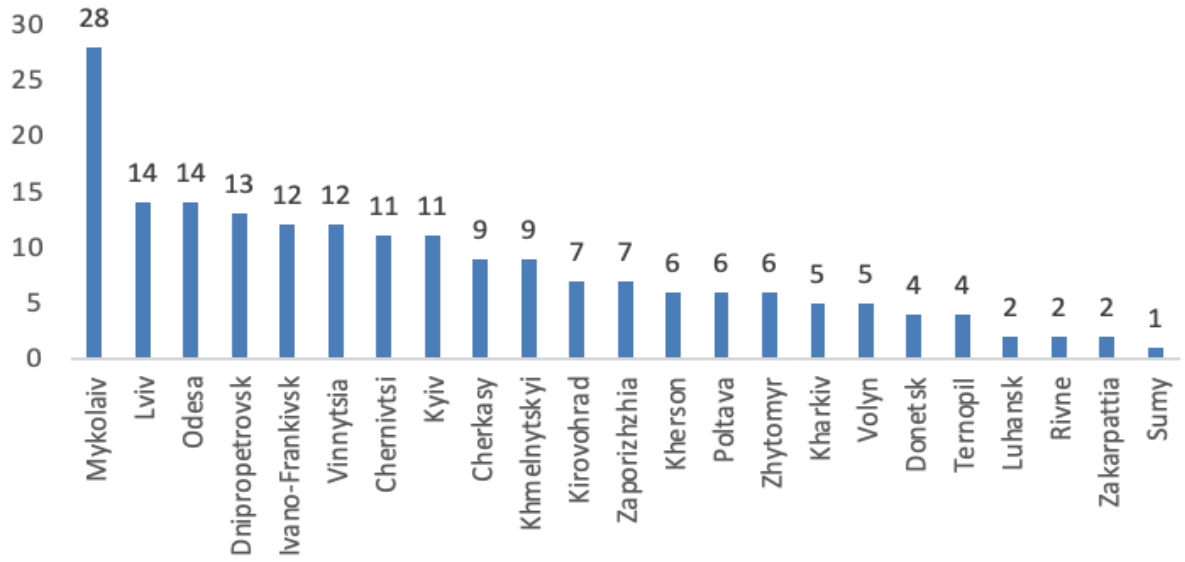
Source: SSSU

ENTERPRISES

Commercial producers are legally registered and include several forms. **Agricultural enterprises** are open to both domestic and foreign founders and provide a corporate framework suited for investment and large-scale operations. **Farm entities** represent a category of enterprise established exclusively by Ukrainian citizens; they function as legal entities, vary in size, and use both family and hired labor. Within this group, **family farms** occupy a distinct place. These can only be founded by citizens, rely mainly on family labor with occasional external employment, and may register as sole proprietors under a simplified tax regime. If the landholding exceeds the legal threshold or if hired labor is regularly employed, the farm must transform into a standard legal entity.

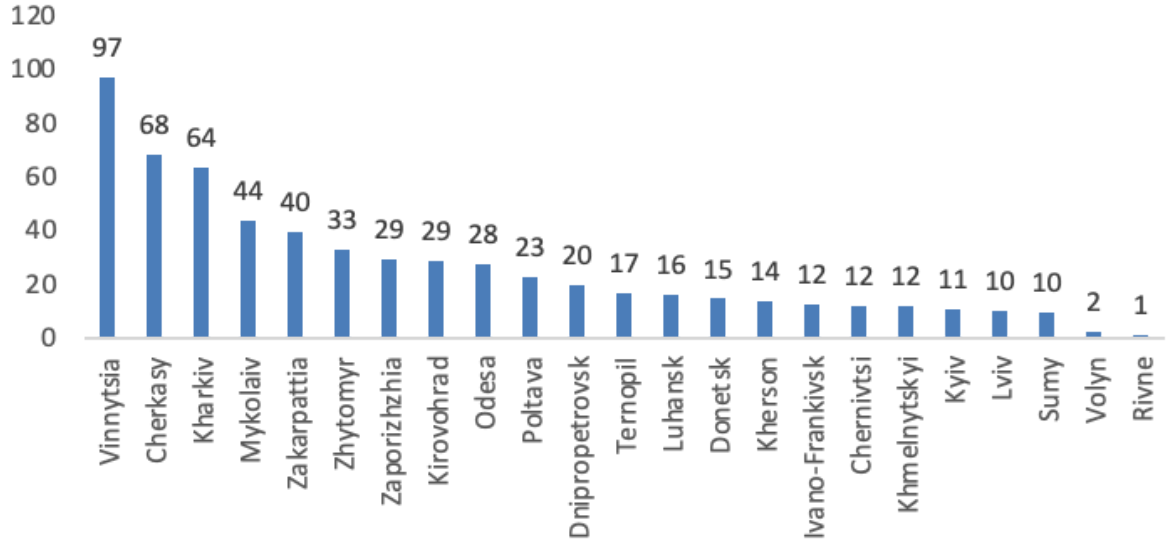
In 2019, the State Statistics Service of Ukraine reported 190 enterprises engaged in walnut production, with a total planted area of 5,694.95 hectares. The highest number of walnut-producing companies was recorded in Mykolayiv oblast (28) in 2019, followed by Lviv and Odesa oblasts, each with 14 enterprises. (Figure 1). The average planted area per enterprise across all oblasts was 29.97 hectares. The largest average areas per enterprise were observed in Vinnytsia (97 ha), Cherkasy (68 ha), and Kharkiv (64 ha) oblast, while the smallest were in Volyn (2 ha) and Rivne (1 ha) oblast. (Figure 23).

Figure 23. Number of companies by oblast, 2019



Source: SSSU

Figure 24. Average planted area by oblast, 2019 (ha)



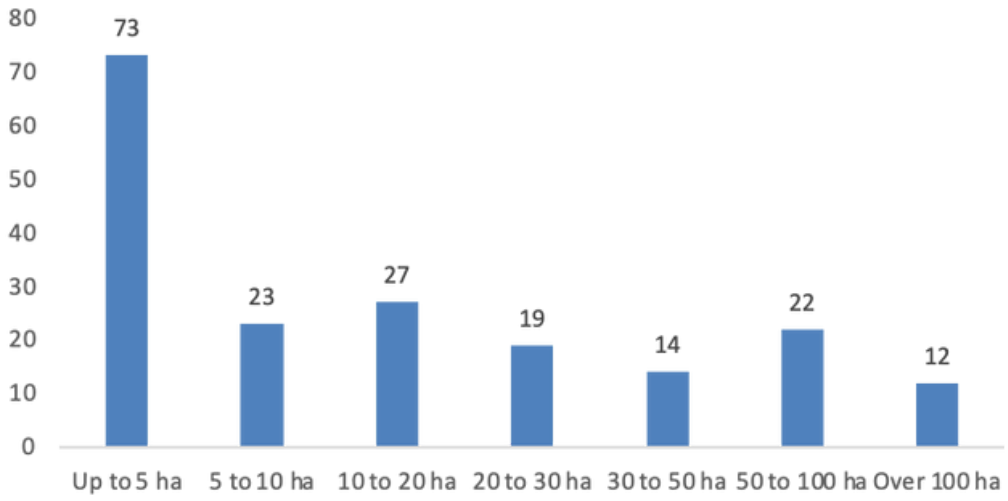
Source: SSSU

Regional differences in climate and water availability significantly influence walnut cultivation. In central and southern Ukraine, irrigation is often necessary to achieve expected yields. In contrast, lower yields may be observed in northern regions due to cooler climatic conditions. In southern Ukraine, walnut seedlings can be planted in autumn, whereas in the northern

In southern Ukraine, walnut seedlings can be planted in autumn, whereas in the northern regions, spring planting is advisable to avoid winter frost damage to young trees. The typical walnut harvest period extends from late September through the end of October.[49]

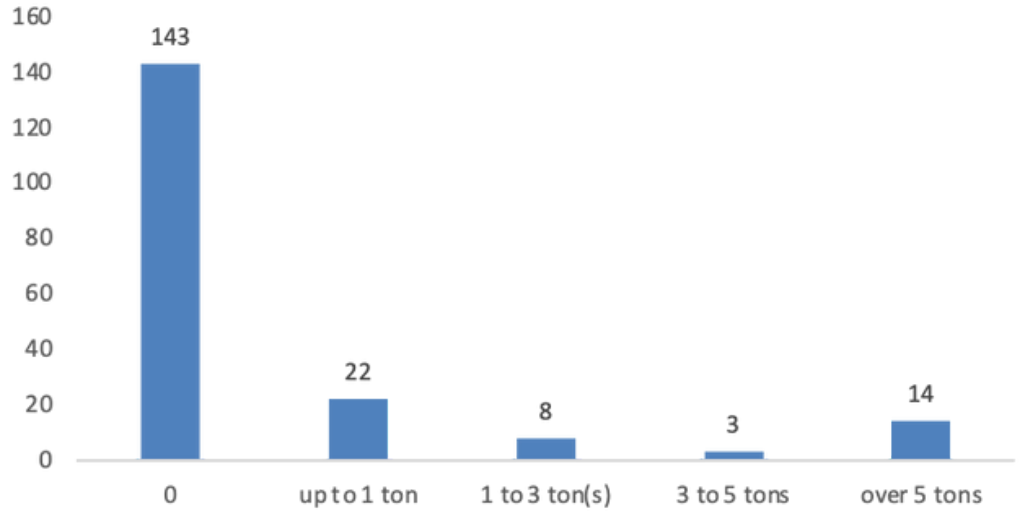
In terms of planted area distribution, 73 enterprises had up to 5 hectares of walnuts, 23 enterprises had between 5 and 10 hectares, 27 had between 10 and 20 hectares, 33 had between 20 and 50 hectares, and 34 enterprises reported areas exceeding 50 hectares. However, the distribution of walnut harvest volumes indicates that the majority of plantations were not yet in the fruit-bearing stage. Specifically, 143 enterprises (75% of those listed) reported zero harvest in 2019. (Figure 25).

Figure 25. Walnut planted area distribution in enterprises (ha, 2019)



Source: SSSU

Figure 26. Walnut harvest range distribution in enterprises (count, 2019)



Source: SSSU

49 https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Tree+Nuts+Annual_Kyiv_Ukraine_UP2024-0018.pdf

The total area under commercial walnut cultivation decreased to 4,300 hectares in marketing year (MY) 2023/24, down from a peak in MY2019/20. The current balance between bearing and non-bearing walnut trees indicates that enterprises have decreased investing in new orchards since MY2020/21, as reflected by the decline in tree imports and total planted area. This decline may indicate that some producers ceased operations due to the uncertainty and disruption caused by the full-scale Russian invasion of Ukraine, leading to the abandonment or removal of newly established orchards. Simultaneously, orchards planted 5–8 years ago are reaching maturity, contributing to the gradual increase in bearing area.[50]

To gain a more detailed understanding of the structure and activities of walnut-producing enterprises, a sample of 38 companies was selected from the 2022 Tripoli dataset for further analysis.[51] This sample includes data from 2022 reported by enterprises from different oblasts and production scales. A closer examination of selected companies engaged in walnut cultivation in Ukraine reveals that walnut production is typically not the sole or dominant focus of their operations.[52] The majority of enterprises are diversified across various agricultural activities. According to self-reported data, only 42% of the companies indicated any level of walnut yield, and among those, the reported volumes were predominantly very low. This again suggests that most walnut orchards are in the early stages of development and have not yet reached commercial productivity.

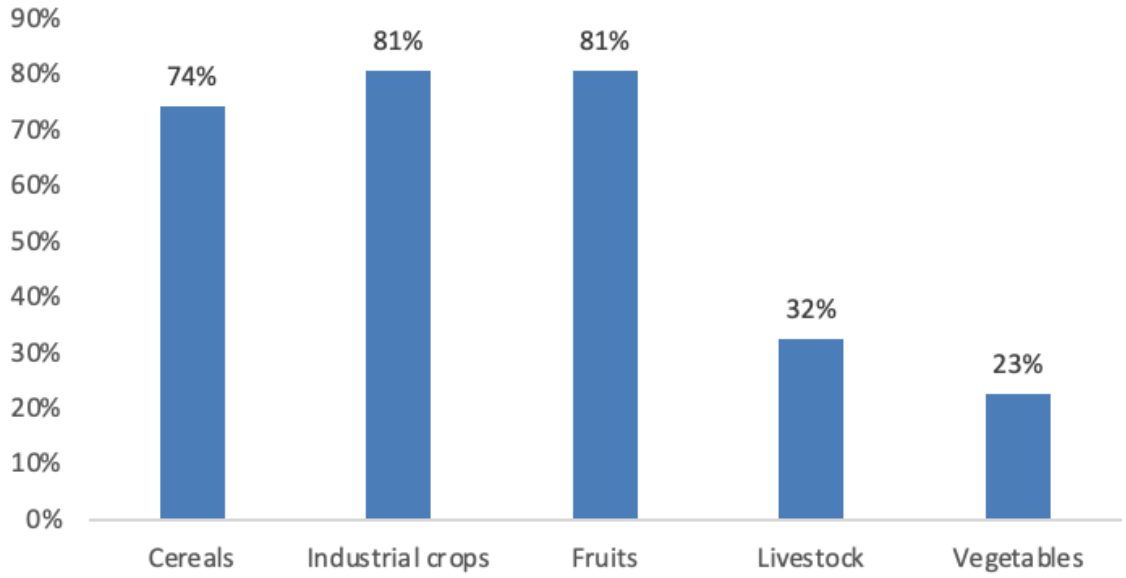
Among the companies reporting walnut cultivation since their initial year of data availability (most frequently between 2018 and 2020), 13 enterprises expanded their walnut area by 2022, with an average increase of 73.5%. In contrast, 5 companies reported a reduction in walnut area, while the remaining 20 maintained the same planted area over time.

The average total land area managed by the companies is approximately 1,595 hectares. On average, walnuts occupy around 20% of this land. In terms of registered primary economic activity, 21% of the companies list NACE 01.25 – "Growing of berries, nuts, other fruit trees and shrubs" – as their main activity. A larger proportion, 52%, report NACE 01.11 – "Growing of cereals (except rice), legumes, and oilseed crops" – as their primary activity. The remaining companies are primarily engaged in other types of crop production, including NACE 01.13 – "Growing of vegetables and melons, roots and tubers."

The production portfolios of these companies show significant diversification beyond walnuts. Among them, 74% grow cereal crops, 81% are engaged in the cultivation of industrial crops, and 81% report fruit production. Additionally, 32% are involved in livestock activities, and 23% cultivate vegetables. (Figure 27).

50 https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Tree+Nuts+Annual_Kyiv_Ukraine_UP2024-0018.pdf
51 https://tripoli.land/
52 https://tripoli.land/

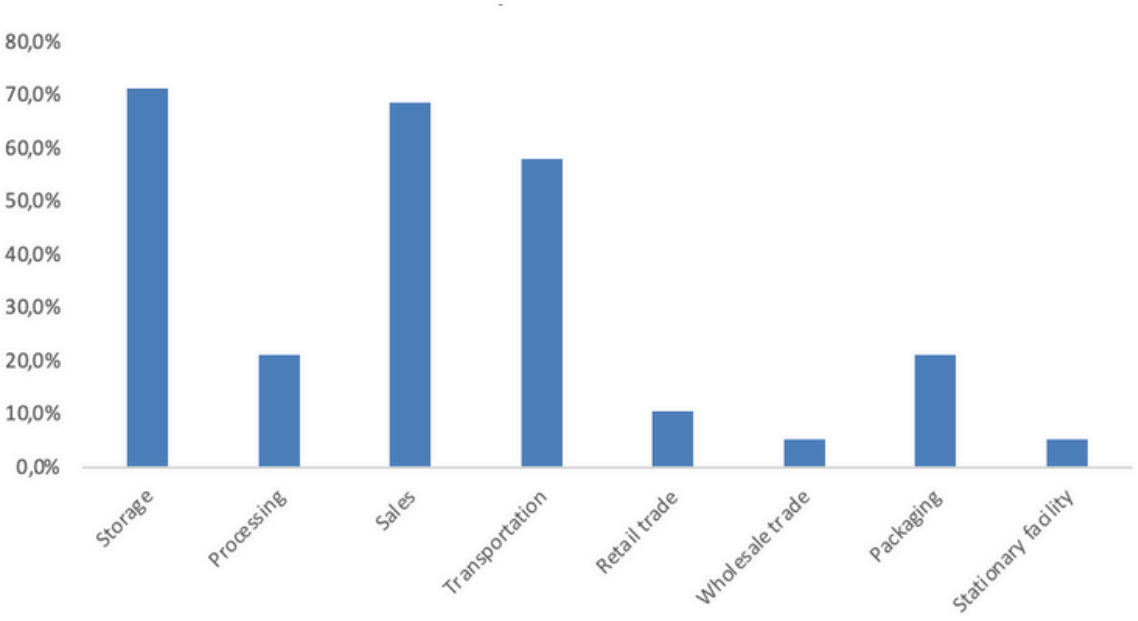
Figure 27. Products produced by companies besides walnuts



Source: Author's calculation based on data from https://tripoli.land/

In addition to primary production, the sampled enterprises are engaged in various stages of the agri-food value chain. The most frequently reported activities include storage (71.1%), sales (68.4%), and transportation (57.9%). A smaller proportion of companies reported retail trade (10.5%), processing (21.1%), and packaging (21.1%). Engagement in wholesale trade and stationary food facilities was reported by 5.3% of enterprises each.

Figure 28. Companies' involvement in activities other than primary production



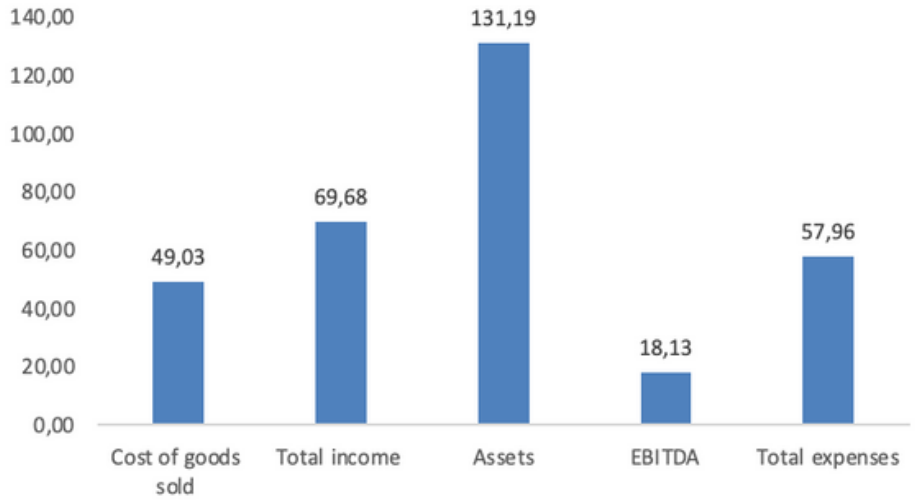
Source: Author's calculation based on data from State Register of Market Operator Facilities [53]

53 https://data.gov.ua/dataset/99adb3a4-c645-4e64-a7a9-498b73872780/resource/79da21a4-8ee9-46d6-8cea-2dc4c43f1ff7

FINANCIAL INDICATORS

The analysis of financial data from the 38 enterprises reveals the average economic performance across all agricultural activities in 2022, not limited to walnut production. On average, total income amounted to 69.68 million UAH, while the cost of goods sold was 49.03 million UAH. Total expenses averaged 57.96 million UAH, resulting in an average EBITDA (earnings before interest, taxes, depreciation, and amortization) of 18.13 million UAH. The average value of total assets held by these companies was 131.19 million UAH. (Figure 3).

Figure 29. Financial indicators (average) per company, mln UAH (2022)



Source: Author's calculation based data from on https://tripoli.land/

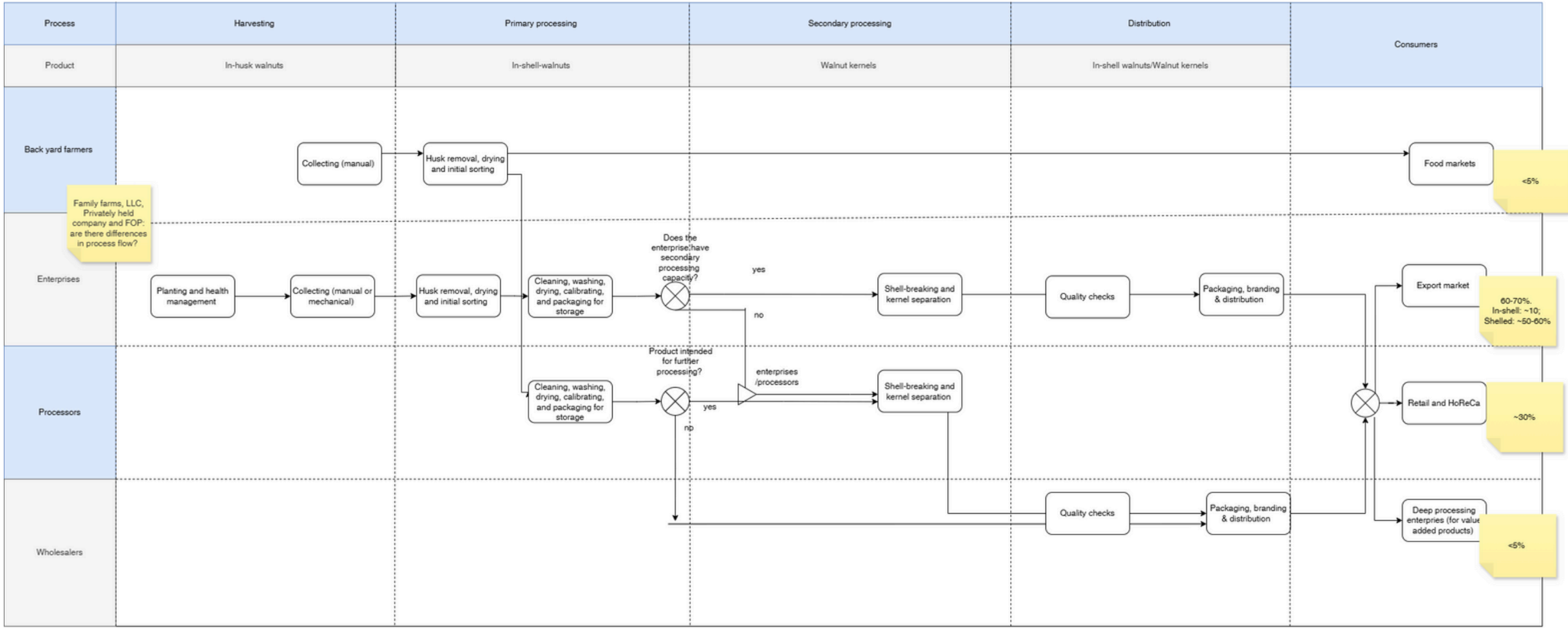
OWNERSHIP AND WORKFORCE

Among the 38 analyzed enterprises, 18—nearly half—had at least one woman listed among the founders. On average, labor intensity across the group was approximately 9 workers per 100 hectares. In terms of asset ownership, 63% of the companies reported owning real estate properties, while 55% had vehicles registered under their ownership. On average, companies owned 8 real estates, 700 land plots and 10 vehicles.

FARM-TO-FORK MAP

Backyard farmers usually collect walnuts manually, remove husks, dry and sort them, and then sell in-shell walnuts either directly to markets or to intermediaries (small traders who supply processors). Processors clean, dry, calibrate, package, and conduct quality checks before passing products to wholesalers for distribution. Enterprises manage orchards from planting to harvest and primary processing, and most also handle further processing and distribution themselves, while some smaller ones sell to processors or distributors. Figure 8 illustrates this flow.

Figure 8. Farm-to-fork map



Source: Author's own presentation

STAKEHOLDERS ALONG THE WALNUT VALUE CHAIN

WALNUT SEEDLINGS

The Ukrainian walnut seedling market is marked by a persistent shortage of high-quality planting material, which stakeholders view as a key constraint for expanding commercial orchards[54]. While the cost of orchard establishment is significant, many producers note that availability and quality of seedlings pose a more serious barrier. Domestic production amounts to approximately 150,000–200,000 seedlings annually, while imports account for an additional 30,000–50,000 units, primarily from Moldova and France.[55]

Imported seedlings are priced at €11–16 per unit, whereas Ukrainian seedlings typically cost 300–320 UAH.[56] Moldovan varieties are relatively well adapted but not very affordable, while French varieties often underperform due to lower adaptability to local conditions. Despite the higher oil content and favorable taste profile of Ukrainian-grown walnuts compared to foreign varieties, domestic seedlings frequently fail to meet commercial standards, largely due to issues with rootstock quality and propagation technology.[57]

Recent improvements in vegetative propagation—especially winter bench grafting—have helped improve yields and quality of seedlings.[58] However, establishing mother gardens for grafted seedlings remains time-consuming, requiring up to 7–8 years before the material becomes commercially available.[59]

KEY STAKEHOLDERS AND PRODUCT VARIETIES

The market for walnut seedlings in Ukraine is moderately concentrated, with a few key actors dominating certified grafted seedling production:

- Center for Industrial Nut Farming and Viticulture:[60] The Center is engaged in the development and promotion of top Ukrainian-bred walnut varieties, as well as technical grape varieties resistant to diseases. In the field of nut farming, the Center has assembled a DNA-verified collection of 20 walnut varieties and ensures varietal purity through DNA-level control. It produces around 100,000 grafted walnut seedlings annually and cultivates an additional 300,000 seedlings for landscaping purposes. The Center also manufactures a vitamin-rich balm made from green walnuts and fresh honey. In landscaping and environmental efforts, the Center organizes and participates in reforestation and greening campaigns across Ukraine. Initiatives include "Plant a tree – save the planet" and the development of the project "Feeding the forest belt." [61]

54 https://propozitsiya.com/articles/intervyu/yak-pobuduvaty-biznes-na-horikhakh
55 https://propozitsiya.com/articles/intervyu/yak-pobuduvaty-biznes-na-horikhakh
56 https://propozitsiya.com/articles/intervyu/yak-pobuduvaty-biznes-na-horikhakh
57 https://www.isatex.ua/growing-walnuts
58 https://dspace.uzhnu.edu.ua
59 https://propozitsiya.com/articles/intervyu/yak-pobuduvaty-biznes-na-horikhakh
60 https://nutscentre.com.ua/
61 https://propozitsiya.com/articles/intervyu/yak-pobuduvaty-biznes-na-horikhakh

- Institute of Horticulture of the National Academy of Agrarian Sciences of Ukraine. Among its eight research stations, the institute includes one specializing in walnut cultivation—the Prydnistrovska Fruit Growing Research Station, located in Chernivtsi Oblast. This station focuses on the development of new and selection of introduced pear and walnut varieties adapted to the conditions of Prydnistrovya and Zakarpattia. Its work also includes variety trials of fruit, berry, and nut crops; the development of technologies for growing high-quality planting material; and the advancement of intensive orchard cultivation methods for pome, stone, and nut-bearing crops.[62]
- Linard France (partnered with Vol-Nutt LLC): Supplies seedlings of French cultivars such as Lara, Fernor, and Fernette and has contributed to concept orchard development in Ukraine.[63]
- Impak: A large agricultural enterprise with a walnut nursery using a closed root system. It cultivates both Ukrainian and Moldovan varieties.[64]
- Amateur Breeders: In addition to professional institutions, the development of new walnut varieties in Ukraine is also supported by amateur breeders.[65]

Popular walnut varieties in Ukraine:

Bukovyna-bred varieties:

Bukovynskyi 2, Bukovynska Bomba, Klishkivskyi, Prykarpatskyi, Rudkivskyi, Toporivskyi, Chernivetskyi 1, and Yarivskyi are known for their thin shells and medium to large-sized nuts with mostly light-colored kernels. The trees are medium to tall in height. They bloom throughout May, and the nuts reach harvest maturity in September–October.

Crimean-bred varieties:

Karlik 3, Karlik 5, Purpurovyi, and Podarunok Valentyny are characterized by compact tree size and early fruiting. The nuts are generally medium-sized, except for Podarunok Valentyny, which produces large fruits with an average weight of 27.3 grams.

Foreign varieties:

These include three French cultivars—Lara, Fernor, Fernette, and Fergin—as well as seven Moldovan ones: Calaraș, Chișinău, Costești, Corjeuți, Codreni, Lunguța, and Sîngerei.

French varieties are distinguished by fruiting on lateral branches and medium-sized trees. Their nuts are light-colored with good to excellent taste and a delicate, slightly sweet kernel flavor. These varieties can be planted densely (up to 312 trees/ha) and have a production

62 http://sad-institut.com.ua/ua/merezha/prydnistrovska-dss.
63 html https://www.oschadbank.ua/blog/yak-investuvaty-u-gorihovyy-sad-skladayemo-biznes-plan
64 https://www.isatex.ua/growing-walnuts
65 https://agravery.com/uk/posts/show/dovgi-investicii-nuansi-virosuvanna-voloskogo-gorihu-v-ukraini

potential of up to 6.5 tons per hectare. Moldovan varieties are appreciated for their low soil requirements, high winter hardiness, and consistent yields. The trees are mostly vigorous and bloom early, typically in April.[66] Among other foreign varieties, the American cultivar Chandler is also gaining popularity in Ukraine due to its high productivity, lateral bearing, and excellent nut quality with a light kernel and thin shell.

Experts note that the market still suffers from fragmentation and a lack of uniform certification standards. Stakeholders emphasize the need to establish more local, specialized nurseries and ensure varietal purity to meet increasing domestic and export-oriented demand.[67]

WALNUT CROP PROTECTION AND NUTRITIONAL INPUTS

Crop protection

The rapid expansion of walnut orchards in Ukraine, driven by the high market value of walnut kernels, has intensified the need for effective crop management strategies.

One of the main challenges lies in the diversity of harmful organisms affecting walnuts. In Ukraine, over 100 pest species have been identified, including walnut aphid (Chromaphis juglandicola), walnut moth (Cydia pomonella), fruit moths, gypsy moth (Lymantria dispar), and various mites such as gall and leaf mites. Most damage is observed in young or weakened plants. To control insect pests, chemical treatments are commonly applied, including emulsions of malathion (karbofos).[68]

Trunks may be attacked by wood-boring insects such as the walnut borer (Agrilus juglandis) and the longhorn beetle (Cerambyx cerdo), whose larvae tunnel into the wood. Mild infestations can be managed through targeted insecticidal treatment, while severely damaged trees may need to be removed entirely. Fruit damage from walnut codling moth can be reduced through spraying and the use of mechanical trunk traps.

Walnut trees are also vulnerable to a range of diseases, including white spot, phyllosticta leaf blotch, powdery mildew, and Melanconium canker. Control measures include spraying with 1% Bordeaux mixture for brown leaf spot, 1% colloidal sulfur suspension for powdery mildew, and sanitary pruning and burning of infected branches to manage Melanconium infection.[69]

Wood decay, though less common, poses a long-term threat. It includes several types of rot caused by fungi such as Polyporus sulphureus, Daedalea quercina, Fomes igniarius, and

66 https://dspace.uzhnu.edu.ua/jspui/bitstream/lib/69190/1/%D0%93%D0%BE%D1%80%D1%96%D1%85%D0%BE%D0%BF%D0%BB%D1%96%D0%B4%D0%BD%D1%96-%D0%BA%D0%BD%D0%B8%D0%B3%D0%B0-2021.pdf
67 https://agravery.com/uk/posts/show/dovgi-investicii-nuansi-virosuvanna-voloskogo-gorihu-v-ukraini
68 https://dspace.uzhnu.edu.ua/jspui/bitstream/lib/69190/1/%D0%93%D0%BE%D1%80%D1%96%D1%85%D0%BE%D0%BF%D0%BB%D1%96%D0%B4%D0%BD%D1%96-%D0%BA%D0%BD%D0%B8%D0%B3%D0%B0-2021.
69 https://dspace.uzhnu.edu.ua/jspui/bitstream/lib/69190/1/%D0%93%D0%BE%D1%80%D1%96%D1%85%D0%BE%D0%BF%D0%BB%D1%96%D0%B4%D0%BD%D1%96-%D0%BA%D0%BD%D0%B8%D0%B3%D0%B0-2021.pdf

Stereum hirsutum. Effective measures include regular monitoring, removal of fungal fruiting bodies, and the elimination of heavily infected trees, along with consistent soil management.

Phytosanitary protection of walnut orchards is a cornerstone of orchard management. As Ukraine shifts toward more systematic and intensive walnut cultivation, the integration of agronomic, biological, and chemical protection methods becomes essential. The use of disease-tolerant or pest-resistant cultivars is a critical component in reducing vulnerability and minimizing chemical inputs.[70]

Decisions regarding the use of pesticides must be based on localized assessments. Each orchard should be regularly monitored to determine pest population levels, identify disease hotspots, and evaluate the presence of natural predators and parasitoids.

Recommended remedies and dosage:

- Aktara (Актара) - Insecticide for early-stage pest protection. Used by soaking roots (can be mixed with clay) at a rate of 300 g per 10 L of water, or by watering plants with a 0.25% solution.
- Khorus (Хорус) – Fungicide for early disease prevention at the green cone stage. Applied at the start of vegetation at a rate of 0.3 kg/ha.
- Perdago - (Пергадо) – Fungicide against bacterial blight and post-flowering diseases. Applied after the flowering of male catkins at 4 kg/ha.Contains copper salts (for bacterial control) and mandipropamid.
- Skor (Скор) – Fungicide effective against foliar fungal diseases. Applied at a rate of 0.35 L/ha.
- Lufox (Люфокс) – Insecticide for moth control during peak flight. Applied at a rate of 1 L/ha.
- Proclaim (Проклейм) – Insecticide against walnut moth. Applied at 0.5 kg/ha. Penetrates the leaf tissue and forms internal reservoirs of active ingredient for sustained protection.
- Vertymek (Вертимек) – Broad-spectrum insecticide with systemic activity. Applied at 1–1.5 L/ha. Provides similar protective action by penetrating the leaf and forming internal deposits.[71]

FERTILIZATION

It has been established that with a yield of 4,000 kg of walnuts and 4,200 kg of wood (dry weight) per hectare, walnut trees annually remove approximately 100 kg of nitrogen (N), 16 kg of phosphorus (P_2O_5), 21 kg of potassium (K_2O), and 31 kg of calcium (Ca) from the soil. Given the longevity of walnut trees, consistent high yields cannot be achieved without annual replenishment of these nutrients through fertilization.

70 https://dspace.uzhnu.edu.ua/jspui/bitstream/lib/69190/1/%D0%93%D0%BE%D1%80%D1%96%D1%85%D0%BE%D0%BF%D0%BB%D1%96%D0%B4%D0%BD%D1%96-%D0%BA%D0%BD%D0%B8%D0%B3%D0%B0-2021.pdf

71 https://techhorticulture.com/zakhyst-voloskoho-horikha-vid-shkidnykiv-i-khvorob/

Nitrogen, a key element for promoting vegetative growth, should be applied with caution, as it can stimulate the development of bacterial blight. Therefore, timely phytosanitary measures must accompany nitrogen fertilization. Moreover, nitrogen fertilizers should not be applied during the first 2–3 years of fruiting.

Phosphorus and potassium fertilizers contribute directly to fruit production and should be applied at root depth. Deep soil loosening is also recommended to improve root penetration and nutrient uptake.

In general, fertilizer rates in walnut orchards are somewhat higher than in other fruit orchards. For a mature tree aged 30–50 years, the recommended annual application includes:

- 10–12 kg of ammonium sulfate or 6–7 kg of ammonium nitrate,
- 9–10 kg of superphosphate,
- 2–3 kg of potassium salt.

Phosphorus and potassium fertilizers are applied before autumn plowing, while nitrogen fertilizers are applied in spring before cultivation.[72]

According to a business plan calculated for a 12-hectare walnut orchard, the following quantities of fertilizers and crop protection products are required per hectare over the first five years of establishment.

- Manure: 7 tons
- Phosphorus fertilizers: 0.75 tons
- Potassium fertilizers: 250 kg
- NPK compound (for root zone preparation): 150 kg
- Foliar fertilizers (for above-ground feeding): 16.6 kg
- Micronutrients: 5 liters
- Non-selective herbicide: 5 liters
- Bordeaux mixture (fungicide): 40 kg
- Actofit (insecticide): 40 liters[73]

Stakeholders

A wide range of plant protection products (PPPs) is available on the Ukrainian market.

Foreign companies:

Syngenta Global AG[74] is a Swiss-based agricultural technology company focused on crop protection and seed production. Its Ukrainian branch employs approximately 500 specialists

72 https://dspace.uzhnu.edu.ua/jspui/bitstream/lib/69190/1/%D0%93%D0%BE%D1%80%D1%96%D1%85%D0%BE%D0%BF%D0%BB%D1%96%D0%B4%D0%BD%D1%96-%D0%BA%D0%BD%D0%B8%D0%B3%D0%B0-2021.pdf
73 https://dspace.uzhnu.edu.ua/jspui/bitstream/lib/69190/1/%D0%93%D0%BE%D1%80%D1%96%D1%85%D0%BE%D0%BF%D0%BB%D1%96%D0%B4%D0%BD%D1%96-%D0%BA%D0%BD%D0%B8%D0%B3%D0%B0-2021.pdf
74 https://www.syngenta.ua

and offers a portfolio of over 80 plant protection products, as well as a wide selection of hybrid and varietal seeds for field and vegetable crops.

Bayer AG[75] is a German multinational company operating in the pharmaceutical, biotechnology, and agricultural sectors. In Ukraine, Bayer supplies a variety of agricultural chemicals, seeds, and biotechnology products as part of its global agricultural division.

BASF Agricultural Solutions[76], part of the German BASF Group, provides plant protection products and organizes specialized events related to crop production, specialty crops, and the responsible use of PPPs.

Domestic companies:

Ukravit[78] is a Ukrainian producer of plant protection and crop nutrition products. The company operates its own certified production facilities and an in-house R&D center (Ukravit Institute). Its portfolio includes 135 PPPs and fertilizers, applied across more than 10 million hectares in Ukraine. Ukravit also develops application technologies for both ground-based equipment and drones. The company employs around 700 specialists and positions itself as a domestic contributor to Ukraine's agricultural development.

EQUIPMENT

The machinery market for walnut cultivation in Ukraine is dominated by imports, especially for orchard-level technologies such as irrigation systems, mechanical harvesters, and high-capacity processing lines. However, domestic manufacturers are also present.

Foreign producers:

- Metzerplas (Israel) – Supplies drip irrigation systems(used by Vol-Nutt LLC)
- Monchiero (Italy) – Produces mechanized shakers and harvesters for walnut collection (also used by Vol-Nutt LLC)
- BSI (France) – Designs and supplies equipment for washing, drying, and calibrating walnuts, including systems with 13 tons/hour capacity and 7-fraction calibration lines

Domestic Producers:

- NUTEXIM – Ukrainian company manufacturing:
  - o Washing lines
  - o Drying complexes
  - o Calibrating lines
- OREHOVOD – Ukrainian producer offering:
  - o Full industrial lines for walnuts, hazelnuts, and almonds

75 https://www.cropscience.bayer.ua
76 https://www.agro.basf.ua/uk/
77 https://www.ukravit.ua/media/catalog/Catalog2025_UKRAVIT_web.pdf)_

- Equipment for harvesting support, washing, drying, cracking, calibrating, and automated conveying
- Machinery capacity ranges from 50 to over 1,000 kg/hour

DISTRIBUTION

Domestic market

Domestically, walnuts are consumed in raw form, and used in desserts, diet products, and confectionery production. However, local consumption remains relatively underdeveloped compared to Western markets, where walnut derivatives (oil, flour, paste) are widely integrated across food sectors.[78]

On the domestic market, distribution mainly occurs through:

- Wholesale intermediaries, who purchase raw or shelled nuts in different batch sizes:
  - Small batches (up to 500 kg)
  - Medium batches (500 kg – 2 tons)
  - Large batches (2–5 tons)
  - Very large batches (5–10 tons)

Producers with smaller yields are advised to form cooperatives or sales groups to reach higher-volume price tiers and avoid dependence on small intermediaries, who pay significantly less. For example, prices may range from 80 UAH/kg for small batches to 130 UAH/kg or more for larger ones.[79]

Sales channels within Ukraine include:

- Confectionery workshops, bakeries, cafes, and restaurants
- Retailers and supermarkets (if the walnuts are pre-packed)
- Online stores or own-brand sales points
- Processors for oil production or further industrial use[80]

There is strong product differentiation by kernel color, which directly affects marketability and price. The most popular types are:

- Light (standard) – consistently in demand
- Extra light – premium, but in short supply and often too expensive for the domestic market
- Light amber – acceptable and sells well
- Dark amber – considered a technical product used for processing, not retail[81]

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78 https://www.oschadbank.ua/blog/yak-investuvaty-u-gorihovyy-sad-skladayemo-biznes-plan
79 https://www.oschadbank.ua/blog/yak-investuvaty-u-gorihovyy-sad-skladayemo-biznes-plan
80 https://agroapp.com.ua/uk/blog/biznes-na-gorixax-v-ukra%D1%97ni-biznes-plan-z-rozraxunkami
81 https://agravery.com/uk/posts/show/ne-prozorij-rinok-sumnivna-akist-voloskogo-gorihu-ta-psevdo-eksporteri

However, one of the challenges in assessing the domestic walnut market is the lack of traceability. Most stocks are stored privately by producers, and if the product is not exported, its movement is rarely documented, complicating supply chain analysis and market planning.[82]

Export

Ukraine's walnut exports follow those main trade corridors:

- Via Poland, enabling entry into Western Europe
- Via Moldova, connecting to the Balkans, Türkiye, and the Middle East[83]

Exports peak between October and May. By May, competition intensifies as southern hemisphere producers (especially Chile) begin supplying fresh nuts. Ukraine's earlier harvest window offers a potential competitive advantage, particularly in Europe, where buyers often source from nearby markets.[84]

The Ukrainian walnut export sector faces significant structural issues:

- Lack of traceability and formal branding: Much of the exported product comes from private plots or forest belts, with no official documentation of origin. This disqualifies it from premium markets where traceability and certification are essential.[85]
- Informal and unregulated trade: Up to 98% of the market functions through intermediaries and grey export channels. Individuals without business registration often operate through proxy companies, undercut prices, and avoid taxes. These exports rarely meet food safety or traceability standards.[86]
- Weak brand identity: Unlike Chile, France, or the U.S., Ukraine lacks a recognized national walnut brand, reducing its competitiveness in high-value markets.
- Fragmented production: A large share of walnuts is grown in small-scale orchards or backyards. These producers cannot supply consistent volumes or quality, limiting Ukraine's ability to form bulk consignments of graded, sorted, and certified products.[87]

Market Preferences and Opportunities

- In Europe, walnuts are primarily used in confectionery and bakery industries.
- In China, demand is growing for walnuts in medicinal uses, gift packaging, and snacks.
- Türkiye currently plays the role of a regional hub, purchasing shelled and in-shell walnuts for repackaging and resale, including to Iraq, Azerbaijan, and Syria.[88] However, as Türkiye develops its own orchards, Ukrainian exports to this market may decline unless quality improves.

82 https://www.isatex.ua/growing-walnuts
83 https://www.oschadbank.ua/blog/yak-investuvaty-u-gorihovyy-sad-skladayemo-biznes-plan
84 https://www.isatex.ua/growing-walnuts
85 https://www.oschadbank.ua/blog/yak-investuvaty-u-gorihovyy-sad-skladayemo-biznes-plan
86 https://www.agravery.com/uk/posts/show/ne-prozorij-rinok-sumnivna-akist-voloskogo-gorihu-ta-psevdo-eksporteri
87 https://www.isatex.ua/growing-walnuts
88 https://agravery.com/uk/posts/show/ne-prozorij-rinok-sumnivna-akist-voloskogo-gorihu-ta-psevdo-eksporteri

There is a high global demand for organic walnuts. Yet due to poor traceability and inconsistent documentation, Ukrainian producers currently lose out on organic premiums.

Key Stakeholders and Exporters
Despite the fragmented market, several formal, certified exporters stand out:

- Agro Trade Lubny (AGRO-TL) – Based in Poltava, specializes in in-shell and kernel walnuts, full processing from washing to kernel calibration and color sorting, packaging certified for food contact.
- UKR-Walnut Ltd – Exporting to over 20 countries, including France, Germany, USA, and UAE. Offers conventional and organic walnuts, with full in-house production and packaging. Certified with HACCP, ISO 22000, ISO 9001, and Organic Standard.
- NUTSEE – Uses high-tech equipment (SORTEX, URSCHEL, CIMBRIA) and focuses on optical sorting, repackaging, and customer-specific adaptation. Strong sourcing network and focus on personal buyer relations.
- Sofia Nuts – Exporter since 2000, shipping to EU and Asia, combines machine and manual sorting, preparing for ISO 22000:2019 implementation.
- Yasmina Company – Family-run exporter with 3,000 tons/year capacity, present in EU and Türkiye, with its own certified processing facility and farmer network.
- NIK Company – Certified with HACCP and ISO 22000, exporting to a wide range of European and Middle Eastern countries. Full-cycle walnut processing and cold storage enable year-round shipments.

These firms represent the formal, high-quality export segment, working to meet EU and global standards. However, they remain a minority in a sector still dominated by informal trade practices.

ACCESS TO FINANCE

Several state-supported financing mechanisms are currently in place to improve investment capacity in agriculture:

- The "Affordable Loans 5-7-9%" program provides preferential loans for businesses. As of early 2025, Ukrainian entrepreneurs had received 3,727 loans totaling 11.7 billion UAH, primarily for investment and processing.[89] Since the program's launch in 2020, it has issued over 107,000 loans amounting to 371.8 billion UAH, with the majority going to agriculture, food processing, and trade. Among the top participating banks are PrivatBank, Oschadbank, and Ukrgasbank.

89 https://propozitsiya.com/news/dostupni-kredyty-5-7-9-pidpryyemtsi-otrymaly-3727-kredytiv-na-117-mlrd-hrn-vid-pochatku-roku

- The Partial Credit Guarantee Fund for Agriculture, launched in 2024, targets farmers managing up to 500 hectares. It helps them secure credit by partially guaranteeing loans, thereby lowering the risk for banks.[90]
- Grant programs supporting orchard establishment and greenhouse development have also been extended. In 2024, 450 million UAH was allocated for support to horticulture, including walnuts.[91]

Despite the availability of programs, many walnut growers are excluded from long-term credit opportunities:

- Walnut farming is a long-cycle investment: trees take at least 5–6 years to reach commercial productivity. However, banks are generally unwilling to offer grace periods exceeding a few years, making it difficult for growers to manage repayment without early cash flows.[92]
- Ukrainian farmers face unequal terms compared to peers in Western Europe. For example, French walnut producers can secure 40-year loans at 0.25–0.5% interest, along with grants and harvest risk compensation. Ukrainian growers often receive support only for seedlings, irrigation, and equipment.

Examples of Successful Financing

One of the most prominent examples of successful walnut sector financing is the Ukrainian Walnut LLC (ТОВ "Український Волоський Горіх"), which received a $15 million loan from Ukreximbank for a vertically integrated project:

- The funding is directed toward the establishment of walnut orchards in Vinnytsia and Kherson regions, as well as construction of two processing plants for cleaning, drying, and packaging.
- The first $5 million tranche was financed through a joint project with the World Bank, focusing on long-term investment access.
- The orchards are fully automated, with drip irrigation, fertilization systems, and moisture sensors, while the Vinnytsia processing plant is already under construction. The project aims to export 100% of its produce through direct contracts with confectionery and food distributors.[93]

Key Stakeholders

- PrivatBank, Oschadbank, and Ukrgasbank – These are the top three banks issuing affordable loans under the 5-7-9% program, holding a combined majority of approved credit agreements.

90 https://www.facebook.com/permalink.php/?story_fbid=122118374432069240&id=61552077201633
91 https://www.agravery.com/uk/posts/show/dovgi-investicii-nuansi-virosuvanna-voloskogo-gorihu-v-ukraini
92 https://propozitsiya.com/articles/intervyu/yak-pobuduvaty-biznes-na-horikhakh
93 https://www.eximb.com/ua/bank/press/novyny-banku/ukreksimbank-profinansuvav-investcijnij-proekt-tov-ukrainskij-voloskij-gorih_.html

- Ministry of Economy of Ukraine – Oversees and coordinates grant programs and subsidized credit schemes.

UNIONS AND COOPERATIVES

Key Stakeholder: Ukrainian Nut Association (UNA)

The most influential and well-organized body is the All-Ukrainian Public Organization "Ukrainian Nut Association" (UNA) (EDRPOU 35987029), founded in 2008. It brings together:

- Breeders and nurseries
- Farmers and industrial orchard owners
- Processing and exporting companies
- Equipment and irrigation system producers
- Advisors, agronomists, and project developers[94]

As of 2024, UNA includes over 130 full members and 2,000 associated members across all 24 regions of Ukraine. Its influence extends across the entire walnut value chain, from seedling development to export facilitation.

UNA plays a key role in:

- Shaping national strategy for the walnut industry
- Expanding industrial orchard areas, which reached over 13,100 hectares by 2023
- Disseminating knowledge through workshops, field visits, and training
- Supporting government relations and policy advocacy, especially in securing state support programs

One of UNA's most strategic initiatives is the "Orchard–Processor–Export" Program (launched in 2020), which aims to:

- Cluster industrial orchards for standardized, traceable export batches
- Support organic certification and creation of an "Organic Nut Pool"
- Promote the processing of nuts into oils, flours, and food ingredients
- Establish regional post-harvest hubs for drying, shelling, blanching, and calibration
- Develop cooperatives and storage facilities to ensure year-round supply[95]

Through these efforts, UNA not only supports small and mid-sized producers but also improves Ukraine's chances of integrating into premium international markets, where product traceability, quality, and certification are essential.

94 https://www.ukr-nuts.com.ua/about
95 https://www.isatex.ua/growing-walnuts

Some other smaller associations include:

ГО "Садівниче товариство "Горіховий гай" (EDRPOU 37638816)
ГО "Садівничий кооператив "Горіховий гай" (EDRPOU 35732793)
СТ "Горіхове" (EDRPOU 26560771)

LAND MARKET

Ukrainian legislation allows several legal arrangements for accessing land for walnut farming. These include lease agreements, assignment of lease rights, permanent land use rights (such as through purchasing a business that holds the land), and emphyteusis contracts, which grant long-term use without ownership. Land can also be acquired on the primary market through direct purchase, including cooperative models where each member contributes their land share to the cooperative's operations.[96]

Additionally, every Ukrainian citizen is entitled to a free land plot from state or municipal lands for specific uses: up to 2 hectares for personal farming, up to 0.12 hectares for horticulture, or a share equivalent to that accepted for local farms in the case of starting a private farm (Article 121 of the Land Code).[97] After the beginning of full-scale invasion this initiative was halted.

LABOR

Household vs. Industrial Labor

Labor structures in the Ukrainian walnut sector vary between household-based and industrial production. In households, labor is typically informal and unregistered, often performed by family members or neighbors without formal contracts. This reduces costs but limits access to social protections. It also means these labor inputs are usually missing from official statistics, making it difficult to assess actual labor intensity or needs in the sector.

In industrial walnut orchards, labor is more formalized and often organized around a fixed management team and seasonal subcontracted workers. The core team typically includes:

- A director who oversees strategic operations and personnel management,
- A senior gardener responsible for orchard condition and seasonal labor coordination,
- A junior gardener assisting with horticultural tasks,
- An accountant managing finances, taxes, and contracts, and
- Two security guards working in shifts.[98]

96 https://dspace.uzhnu.edu.ua
97 https://dspace.uzhnu.edu.ua
98 https://dspace.uzhnu.edu.ua

To carry out seasonal or project-based activities, subcontracted labor is used. Subcontractors are hired for the following main operations:

- Land clearing
- Plowing
- Fertilization
- Seedling planting
- Irrigation
- Crown formation
- Phytosanitary treatments
- Fence installation

Technical and expert support

III. UKRAINIAN LEGAL AND POLICY ENVIRONMENT
INTRODUCTION AND SECTOR OVERVIEW

Walnut farming has emerged as a significant component of Ukraine's agricultural sector in recent years. Ukraine is one of Europe's leading walnut producers, harvesting around 100–110 thousand tons annually[99]. Walnuts are a major export commodity for Ukraine, with tens of thousands of tons shipped abroad (over 46,000 tons in 2020) primarily to the European Union and other markets[100]. This high-value, long-term crop offers rural investment opportunities but also faces unique challenges. Recent developments – including Ukraine's alignment with European Union (EU) standards and the impacts of the 2022 war – have shaped the legal and policy landscape for walnut producers. This report examines the **national-level legal framework, public support policies, extension and advisory services, sanitary and phytosanitary measures, multi-sector support initiatives,** and the **institutional framework** affecting walnut production in Ukraine. It also identifies key bottlenecks hindering sector development and proposes **information needs and survey question**s to gather further stakeholder input.

Legal requirements for walnut producers

Regulatory Framework: Walnut producers in Ukraine must navigate a broad legal framework governing food safety, environmental protection, and occupational health. The country has modernized many laws to align with EU norms under the Association Agreement's Deep and Comprehensive Free Trade Area (DCFTA) since 2016[101]. Key legislation includes the **Law "On**

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Basic Principles and Requirements for Food Safety and Quality" (2014), which introduced EU-aligned food safety rules (notably HACCP requirements) for all food businesses. By 2019, even small-scale food processors were required to implement Hazard Analysis and Critical Control Points (HACCP) plans to ensure product safety. Walnut processing facilities (e.g. cracking and packing plants) must be registered with the State Service of Ukraine on Food Safety and Consumer Protection and obtain operating permits certifying sanitary compliance. Many larger exporters have additionally pursued voluntary certifications such as ISO 22000 (food safety) or GLOBALG.A.P. to meet international buyer requirements, but **98% of Ukraine's walnut business still operates via informal "schemes" rather than full legal compliance**, according to industry estimates[102]. This indicates a wide gap in certification and formal quality management uptake among producers.Food Safety Standards: Compliance with food safety standards is critical for walnuts destined for both domestic and EU markets. Ukraine's food safety law requires proper hygiene in production and post-harvest handling, traceability of products, and truthful labeling[103]. For example, packaged walnut kernels must have labels in Ukrainian showing the product name, weight, ingredients (if any), producer's details, expiration date, and other required information[104]. Producers exporting to the EU must also ensure their walnuts meet EU standards for contaminants (such as aflatoxins) and pesticide residues. Since mandatory Soviet-era GOST quality standards were abolished in 2018 in favor of voluntary application[105],growers are not forced to follow specific DSTU (Ukrainian) standards for walnut quality. However, meeting international quality grades (e.g. kernel size, moisture content) is essential to access high-value markets. The **main barrier to deeper EU integration remains difficulty in complying with EU sanitary and phytosanitary requirements**[106]– highlighting that legal compliance on paper does not always translate to implementation on the ground. **Environmental and Health Regulations:** Walnut orchards must adhere to general environmental and labor laws. The **Law "On Pesticides and Agrochemicals"** regulates the use of crop protection chemicals – walnut growers may only use government-registered pesticides and must observe safety intervals to avoid residues. The Law **"On Environmental Protection"** requires sustainable land use; while planting orchards is generally environmentally beneficial (tree crops), large projects may need environmental impact assessments especially if converting forest land. Producers are also subject to Ukraine's labor safety regulations, meaning farm workers should be provided proper protective equipment and training when handling agrochemicals or operating machinery. Though enforcement can be weak in rural areas, legal standards exist to prevent environmental harm (such as pollution from chemical misuse) and protect worker health. **Licenses and Certifications:** For primary production (growing walnuts), no special license is needed beyond owning or leasing agricultural land.

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However, producers who engage in nursery operations (producing walnut seedlings) must be certified for planting material quality under the Law "On Seeds and Planting Material". Processors that crack walnuts for export must obtain a veterinary-sanitary passport for their facility (even though walnuts are of plant origin, the food safety authority treats all food facilities under a similar regime). Each export shipment of walnuts (especially in-shell) requires a phytosanitary certificate issued by the State Food Safety Service attesting the product is free from quarantine pests. If walnuts are sold as organic, producers need certification under the **Law "On Organic Production" (2018)**, which mandates inspection by an accredited organic certification body and inclusion in the official register of organic producers[107]. In recent years, a handful of orchards have achieved organic certification as the market for organic walnuts grows[108]. **Alignment with EU Standards:** Ukraine's legal harmonization with the EU is ongoing. Many technical standards and food safety rules now mirror EU regulations, reducing barriers for walnut exports. The DCFTA prompted Ukraine to adopt EU-style **conformity assessment procedures** and drop redundant certifications[109]. As a result, certification in Ukraine is generally **voluntary** unless a standard is specifically referenced by law or claimed by the producer.[110] Nonetheless, to export food to the EU, Ukrainian producers must meet all relevant EU requirements (for instance, Maximum Residue Levels for pesticides). The government approved a **Comprehensive Strategy for Harmonization of SPS Measures** in 2016 to implement EU food safety legislation[111]. By 2021, Ukraine had amended laws on food labeling, child nutrition, and other areas to eliminate outdated norms and "burdensome requirements" in line with EU directives[112]. In practice, leading walnut exporters like "Ukr Walnut" have obtained multiple international certificates (HACCP, several ISO standards, organic, etc.) and even the status of an Authorized Exporter for EU trade[113]. However, smaller growers often struggle with the complexity of standards and may sell their harvest through intermediaries without directly handling certifications. Ensuring **legal compliance at the farm level** – from safe pesticide use to proper post-harvest drying and storage – remains a challenge that requires effective enforcement and farmer education.

PUBLIC POLICIES AND GOVERNMENT SUPPORT PROGRAMS

The Ukrainian government has introduced a range of policies to support walnut producers, both financially and through broader agricultural development measures. These include **direct subsidies, tax preferences, credit support, R&D initiatives, and trade policies.** This section reviews major support instruments and their effectiveness, as well as areas for improvement. Subsidies for Orchard Establishment: Recognizing the long-term investment needed to

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establish walnut orchards, Ukraine has provided targeted subsidies to horticulture. From 2**018 to 2021,** the government ran a compensation program (Cabinet of Ministers Resolution No. 587) that reimbursed a significant share of the cost of planting new orchards (including walnuts, other nuts, fruit trees, berries, etc.). Under this program, farmers could receive up to 70–80% reimbursement for certified saplings, as well as partial compensation for irrigation systems and equipment for orchard management. As a result, **over 14,200 hectares of new orchards were planted with state support during 2018–2023, of which 5,785 hectares (41%) were walnut orchards[114].** This highlights that walnuts were a top priority for investors utilizing the subsidy. The program successfully spurred rapid expansion of commercial walnut plantations. However, after the full-scale war began in 2022, the traditional subsidy scheme was paused (since funds were reallocated and implementation became difficult)[115].To continue support under wartime conditions, a new **grant-based program was launched in June 2022 (Resolution No. 738)** as part of the government's "eRobota" initiative to stimulate economic recovery.

As of late April 2025, **UAH 1.35 billion** (approximately USD 36.5 million) has been distributed to **268 agricultural enterprises.**

- **UAH 922 million** allocated to **201 farms** for new orchards, berry plantations, and vineyards.
- **UAH 352.8 million** provided to **67 enterprises** for greenhouse development[116].

In 2025 alone, **38 agricultural businesses** received funding totaling **UAH 167.7 million.**[117]

In early May 2025, the Ministry of Agrarian Policy and Food of Ukraine temporarily halted the acceptance of new applications for orchard and greenhouse grants under the "eRobota" program due to **budget limitations**. However, the Ministry assured that all previously approved grants would be fully funded by the end of 2025.[118]

Walnut among priority crops: Walnuts remain one of the top-priority crops for these grants, along with apples and hazelnuts, underscoring their strategic importance for Ukraine's agricultural development.

Grant conditions:

- Maximum grant amount: up to **UAH 7 million.**
- Government covers **up to 70% of project costs** for the first 1,000 hectares of new orchards; subsequent hectares receive up to 50%.
- Eligible applicants: legal entities and individual entrepreneurs with land ownership or lease rights for at least **25 years.**

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- Creation of 3 to 20 new jobs is mandatory, depending on orchard type.
- Applications are submitted through Ukraine's digital platform "Diia".[119]

Funding for the 2024–2025 rounds of the "eRobota" program has been supported by the World Bank through the ARISE (Agriculture Recovery Inclusive Support Emergency) project aimed at agricultural recovery in Ukraine.[120]

Tax Incentives: Ukraine offers favorable tax treatment for agricultural producers which indirectly benefits walnut growers. Notably, most farmers can opt for a **simplified Single Tax (Fixed Agricultural Tax) regime.** Under this system, farms pay a flat tax calculated as a small percentage of the normative value of their land, in lieu of corporate profit tax, land tax, and some other taxes[121] [122]. This **Single Tax** regime represents an implicit subsidy of about $158 million per year to the agriculture sector[123], easing the tax burden on farmers. Walnut orchards, which occupy agricultural land, qualify for this regime as long as the enterprise's income is mostly from agriculture. In addition, **exports of walnuts are zero-rated for VAT**, meaning exporters can claim back input VAT – a standard practice for exports but important for a VAT-intensive activity like nut processing. There are no specific tax holidays for walnut farming, but the general farm-friendly tax policies (including exemptions from import duties for certain farm equipment, and until 2017 a special VAT accumulation regime for agriculture) have improved the economics of orchard investment. Stakeholders report that the Single Tax greatly simplifies accounting for rural businesses, though very small household producers often operate entirely informally (thus outside the tax system altogether). **Credit and Finance Support:** Access to finance has historically been a bottleneck for long-term crops like walnuts, but recent policies aim to alleviate this. The government's **Affordable Loans program** provides interest rate compensation for bank loans to agricultural enterprises. Under this ongoing program, farmers (including walnut growers) can receive compensation that effectively reduces their interest rate to the level of the National Bank's base rate, as long as their annual revenue is below a certain threshold[124]. This has enabled some medium-sized producers to finance orchard establishment and processing facilities at manageable costs.In 2021, Ukraine also established a new **Fund for Partial Credit Guarantee in Agriculture** to help small and medium farms (up to 500 ha) obtain loans[125]. This fund acts as a guarantor for a portion of the loan principal, reducing risk for banks. Walnut growers, often needing sizable upfront capital for saplings and orchard maintenance before trees bear fruit, stand to benefit from such credit guarantees. Additionally, legislation was introduced to support **crop insurance,** whereby the state will reimburse up to 60% of farmers' insurance premium costs[126]. Although uptake of crop insurance remains low (it is new and not widely trusted yet), this could mitigate weather or pest risks for orchards in the future.Despite these programs, many walnut farmers – especially

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smallholders – still cite **financing constraints.** Until mid-2021, a long-standing moratorium on the sale of agricultural land meant farmers could not use land ownership as collateral for loans[127]. While the land market reform now allows Ukrainians to buy and sell land (up to 100 ha per person since 2021, expanding to 10,000 ha for legal entities from 2024)[128], most walnut growers do not yet have land assets to mortgage. Banks remain cautious with agricultural lending, given the multi-year wait for walnut trees to become profitable. The state credit guarantee fund is expected to improve this situation, but its impact will depend on effective implementation and farmer awareness. **Research and Development (R&D) Support:** Public R&D specific to walnuts has been limited but is growing. The Ministry of Agrarian Policy and Food (MAPF) oversees agricultural research institutes under the National Academy of Agrarian Sciences, including the Institute of Horticulture which has a department on nut crops. These institutes have developed domestic walnut varieties and cultivation techniques (e.g. late-flowering varieties to avoid spring frosts). The government's overall agricultural policy (per the **Law "On State Support of Agriculture")** designates horticulture as a priority sector eligible for budget support, which can include funding for research and extension projects[129]. In practice, most specialized R&D projects (such as walnut breeding or disease control studies) have been funded in collaboration with international donors or through public-private partnerships. One example is the introduction of **French walnut cultivars and intensive orchard technology** to Ukraine via a partnership between a private company ("Vol-Nat") and foreign experts, showcased at a demonstration orchard in Odesa region[130]. The state did not directly fund that project, but it facilitated knowledge transfer by supporting professional conferences to disseminate the results. Moving forward, stakeholders see a need for more government-supported R&D on walnut processing (e.g. oil extraction, value-added products) and on **pest/disease management** in walnuts, especially as climate change may introduce new threats. **Trade and Export Policy:** Walnuts have benefitted from Ukraine's trade liberalization and export-oriented policies. Under the DCFTA with the EU, **Ukrainian walnuts enjoy duty-free access to the EU market** (EU import tariffs on walnuts were eliminated)[131]. Ukraine also has free trade agreements with several other countries (EFTA states, Türkiye, CIS neighbors), improving market opportunities for nut exporters. There are **no export taxes or quotas on walnuts** in Ukraine, unlike some staple crops. In fact, since 2022, the EU temporarily suspended all import tariffs and quotas on Ukrainian agricultural exports (as a wartime economic support measure)[132]. This preference was extended through June 2024[133]. Thus, policy strongly encourages export growth in the walnut sector. On the import side, Ukraine applies phytosanitary controls to imported nuts to prevent pest introduction, but generally does not need to import walnuts due to ample domestic supply. Government trade policy has also aimed at improving **export logistics**, for instance by streamlining customs procedures.

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The **"Authorized Exporter" status,** obtained by at least one Ukrainian walnut exporter, allows simplified origin certification for faster access to EU markets[134]. **Evaluation of Policy Effectiveness:** Government support has undeniably spurred walnut orchard expansion and export growth. The surge in new orchards (nearly 6,000 ha of walnuts planted with state help in 5 years[135]) is a direct outcome of subsidy policies. The tax and trade regimes have made Ukraine one of the most competitive sources of walnuts in Europe, as evidenced by Ukraine's substantial exports (e.g. $80 million worth in 2020)[136]. Nevertheless, certain policies could be improved:

- Subsidy access **could be broadened** to ensure small family farms can benefit, perhaps through micro-grants or cooperative-based grants (since the current programs tend to be utilized by medium and larger enterprises who can navigate the application process).
- Credit support uptake remains modest; banks still perceive agriculture as high-risk, and the Partial Credit Guarantee Fund is newly established. Effectiveness will hinge on outreach and simplifying loan procedures for farmers.
- **R&D and extension funding** from the state has room to grow – currently much of the specialized knowledge dissemination is driven by private associations or donor projects, not a systemic public extension program.

In summary, Ukraine's public policies reflect a clear understanding of walnuts as a promising sector – financial incentives and favorable tax/trade conditions have laid a foundation for growth. The next step is to refine these policies to be more inclusive and oriented toward quality improvement, while cracking down on the "grey" market that distorts competition.

EXTENSION SERVICES AND KNOWLEDGE SUPPORT

Effective **extension services** – providing training, technical advice, and knowledge-sharing – are crucial for walnuts, which are a relatively new commercial crop for many Ukrainian farmers. However, the agricultural extension system in Ukraine has historically been fragmented and under-resourced. **Overview of Extension Services:** Ukraine does have a **Law "On Agricultural Advisory Activity" (2004)** that sets a framework for advisory services, but implementation has been inconsistent. As of the mid-2010s, there were around 70 registered agricultural advisory service entities in the country, but these varied widely in capacity and were mostly non-governmental[137]. Currently, **all advisory services in Ukraine are essentially private organizations operating in various forms[138].** For example, the Lviv Regional Advisory Service is organized as a charitable foundation, while the Dnipropetrovsk Agricultural Advisory Service

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is both an NGO and a limited liability company[139]. There is *no unified national* extension agency with offices in each district dedicated to farmer education. This means access to professional advice depends on location and the presence of active projects or associations. **Walnut-Specific Training and Support:** Given the lack of a pre-existing "walnut growing tradition" at industrial scale, producers have largely relied on **peer learning, industry associations, and donor projects** for knowledge. The **Ukrainian Nut Association** (Всеукраїнська горіхова асоціація) has played a pivotal role in extension. It has organized a series of professional conferences and workshops focusing on walnuts (as well as hazelnuts and almonds), often in partnership with the Institute of Horticulture (NAAS) and international projects[140]. These events bring experienced growers and experts (even from traditional walnut-producing countries like France or the U.S.) to share best practices. For instance, the association invited a third-generation French walnut grower, Sébastien Linard, to Ukraine to train local farmers on intensive orchard management – addressing mistakes made in the first wave of orchard plantings[141]. Such knowledge-sharing is **beginning to fill the education gap,** as Ukraine previously had no "industrial school" of walnut cultivation and many early orchards were established with technical errors[142]. Donor-funded **projects have extended valuable advisory support** to walnut producers as well. The **USAID Agricultural and Rural Development programs and Canadian-funded UHBDP (Ukraine Horticulture Business Development Project)** have, in regions like Kherson and Odesa, provided training on orchard maintenance, business planning, and market information for horticulture farmers (including nut growers). Another notable initiative is the **EastFruit project (supported by FAO and EBRD)**, which regularly disseminates analytical articles and organizes events to connect Ukrainian nut growers with international experience[143]. In 2022, despite the war, an international conference "Nuts of Ukraine: Exchange of experience with Georgia" was held (with FAO/EBRD support) to help Ukrainian growers learn from Georgia's successful hazelnut and walnut sector[144]. These efforts indicate strong **donor and NGO engagement in providing extension services where the government's reach is limited.Accessibility and Quality of Extension Services:** The accessibility of extension support for walnut farmers is uneven. Larger commercial farms often hire agronomists or consult private experts (some even bring in foreign consultants) to guide them. Smallholder or family farmers, especially in remote areas, may have little access to formal advice. They rely on informal networks or trial-and-error. Language can be a barrier too – many global resources are in English or other languages, so translation and localization of knowledge is needed. Where active advisory services exist, their quality can be high: for example, the advice provided through the Walnut Association's conferences is cutting-edge, covering topics like modern pruning techniques, pest prevention, post-harvest handling to

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maintain kernel quality, etc. Farmers who participate in these trainings have reported improved yields and quality. On the other hand, farmers not connected to such networks continue to use outdated practices (e.g. planting walnuts from random seed leading to variable results, or improper drying that causes mold). A limitation is **scalability** – the handful of NGOs and associations can only reach a fraction of the tens of thousands of households involved in walnut production. The war has also disrupted extension activities; travel became difficult and some funding was redirected to emergency needs in 2022. Many advisory services survive on project grants and lack stable funding, making their long-term presence uncertain. **Recent Improvements and Initiatives:** There are some encouraging moves to strengthen extension. The Ministry of Agrarian Policy and Food, re-established in 2021, has mentioned extension as part of its rural development plans, though concrete programs are still in early stages. Digital tools are being explored to extend reach – for instance, the **State Agrarian Registry** (an online platform created in 2020) not only registers farmers for subsidies but could serve as a channel to disseminate advice and e-learning materials[145]. Private ag-tech startups and input suppliers have also started offering advisory content (via webinars, YouTube, etc.) as a marketing tool. For walnuts, input companies selling grafted saplings or fertilizers often provide guidance to their buyers.In summary, while **extension services for walnut producers exist, they are patchy and largely supported by private or donor efforts.** Accessibility is better for organized farmers (those in associations or in regions with active projects) and weaker for isolated smallholders. The quality of available advisory content is improving as international best practices are introduced, but coverage remains the main issue. Strengthening and expanding agricultural extension – possibly through public-private partnerships – is critical to improve productivity and quality in the walnut sector.

SANITARY AND PHYTOSANITARY (SPS) MEASURES AND QUALITY CONTROL

Sanitary and Phytosanitary standards form a backbone of the regulatory environment for walnuts, ensuring that production is safe, pest-free, and meets quality norms. Ukraine's SPS system has undergone significant reform to align with international standards, yet implementation on the ground faces challenges such as limited laboratory capacity and the need for digital modernization.

Food Safety and Quality Control: As noted, Ukraine's food safety law mandated HACCP-based controls across food industries. For walnut processors, this means identifying critical control

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points like aflatoxin contamination (which can occur if walnuts are stored improperly) or foreign matter in kernels, and instituting preventive measures. The State Service of Ukraine on Food Safety and Consumer Protection (SSUFSCP) is the authority responsible for inspections and enforcement. SSUFSCP ensures compliance with food hygiene rules, checks that facilities maintain proper documentation, and can test walnut product samples for safety parameters. In practice, **quality control consistency is a challenge,** especially among numerous small-scale producers. Maintaining uniform size, moisture, and appearance of walnuts is essential for export markets, yet many small farmers lack the means to do so[146]. The result is that some export shipments suffer from quality issues – indeed, industry reports indicate Ukrainian walnut exports have been "plagued by quality issues" in recent years[147]. These include over-dried or discolored kernels, and occasional instances of contamination above EU limits, which can lead to rejection or price discounts. Improving compliance with quality standards is thus a focus area for both government and industry stakeholders.

Phytosanitary Measures: Walnuts can host plant pests (e.g. walnut weevils, fungi) that are subject to quarantine. Ukraine's **Law "On Plant Quarantine"** (and related regulations) requires that walnut orchards and processing batches be inspected for pests, and that any export consignment of unprocessed walnuts (in-shell or in husk) be accompanied by a **Phytosanitary Certificate.** The SSUFSCP's plant quarantine inspectors issue these certificates after checking the product and, if necessary, lab-testing for pests/disease. For example, exports to certain countries might require fumigation treatment against pests, which must be certified. Domestically, Ukraine monitors for walnut diseases like Xanthomonas blight; while there is no restriction on moving walnuts within the country, any outbreaks of regulated pests would trigger containment measures. **Sanitary services have improved under DCFTA commitments,** but full alignment with EU phytosanitary standards is ongoing. The main difficulty cited is achieving EU-level pest risk management with Ukraine's resources[148]. However, progress has been made: Ukraine and the EU have agreements in place to recognize each other's SPS certificates in certain domains, facilitating smoother trade.Laboratory Infrastructure: Reliable laboratory testing is critical for SPS enforcement (testing for toxins, pesticide residues, etc.). Ukraine's network of testing laboratories includes both state laboratories under SSUFSCP and private or academic labs. These labs must be accredited to ISO 17025 standards to provide trustworthy results. As of 2023, **Ukraine had 62 testing laboratories accredited for analysis of grains, seeds, fruits, berries, vegetables and related products[149].** This indicates a reasonably extensive lab network covering agricultural commodities[150]. Some labs, however, may lack modern equipment or full scope for specialized tests like detecting specific mycotoxins in nuts. International aid has targeted this gap – for instance, a UNIDO quality

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standards project (Phase I) worked with two regional laboratories (in Kryvyi Rih and in Rivne) to upgrade their testing capacity for berries and nuts[151]. Equipment was provided and staff trained, strengthening domestic ability to certify walnut quality for export. Despite these improvements, **access to labs can be a bottleneck:** small producers in remote areas might have to send samples far away for testing, which is costly and time-consuming. Moreover, many farmers do not proactively test their product; testing usually occurs at the exporter or processor stage. To encourage quality, some producer groups have called for mobile labs or on-site rapid testing kits to be made available to cooperatives or clusters of walnut growers.

Digital Tools for SPS Compliance: Ukraine has been modernizing its SPS management through digital solutions, though much is still done on paper. The **"e-Phyto" system** – an electronic phytosanitary certification – is something Ukraine has committed to implementing. Once fully in place, it will allow online applications and issuance of phytosanitary certificates, reducing bureaucratic delays. Similarly, the State Food Safety Service has piloted electronic systems for food safety audit reporting. Another relevant digital tool is the **State Agrarian Registry**, which could integrate modules for farmers to request services like soil or product testing. In the area of traceability, Ukraine is adopting EU-style requirements: for example, processors must be able to trace walnut purchases back to suppliers (one step back) and shipments forward to buyers (one step forward). Some larger companies have internal digital traceability systems, but an integrated national traceability system for horticultural products is not yet operational.

SPS Policy and Enforcement Issues: Policies are in place to ensure safe, high-quality walnut production, but enforcement and farmer compliance vary. **Pest management** in walnut orchards is largely left to growers – extension efforts have stressed the importance of integrated pest management, but smaller orchards may not spray or monitor adequately, potentially harboring pests that could affect others. The government does conduct periodic monitoring (for example, trapping programs for invasive pests), but resource constraints limit comprehensive coverage. On the safety side, one contentious issue has been the presence of a large **"shadow market"** for walnuts. According to experts, up to 98% of walnut trade used to be done via informal channels avoiding official inspection[152]. This not only hurts tax revenues but also **undermines SPS controls,** as unregistered handlers might bypass safety checks. The Food Safety Service has difficulty tracking products that move in the shadows. Thus, formalizing the value chain (through cooperatives or businesses registering with the Agrarian Registry) is also an SPS priority – it brings more producers under the umbrella of regular inspections and certifications.In conclusion, Ukraine's SPS regime for walnuts is gradually reaching international standards, supported by laws aligned with EU regulations and growing

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laboratory capacity. The key is to **bridge the gap between policy and practice:** educating producers about SPS requirements, improving access to testing and certification, and clamping down on informal trade that evades quality control. Continued donor and government investment in SPS (like the ongoing quality infrastructure projects) will be pivotal to ensure that Ukrainian walnuts are not only abundant but also consistently safe and high-quality in the years ahead.

SUPPORT FROM PUBLIC, PRIVATE, AND DONOR INITIATIVES

The development of Ukraine's walnut sector has benefitted from a combination of government initiatives, private sector leadership, and international donor support. This multi-faceted support ecosystem addresses different needs – from financing and infrastructure to training and market linkages.

Government Initiatives: Beyond the financial programs and policies discussed in section 2, the Ukrainian government has undertaken broader **strategic initiatives** to bolster the horticulture and nut industry. For instance, the **Concept for Rural Development until 2025** (adopted in 2015) and the **Strategy for Private Investment in Agriculture until 2023** (2019) set out priorities that include diversification into higher-value crops (like nuts) and supporting agro-processing[153]. Under these strategies, the government aimed to increase agricultural exports and promote sustainable growth. Walnuts fit well into those goals as a high-value export that can be produced by small and medium enterprises. Additionally, the Ministry of Agrarian Policy has, at times, championed the creation of **value-chain projects** – for example, encouraging the establishment of local cracking and packaging facilities to move up the value chain instead of exporting raw in-shell walnuts. In 2020, Ukraine passed a new **Law on Agricultural Cooperatives** (with support from EBRD/FAO policy dialogue) to modernize the legal framework for farmers organizing themselves[154] [155]. This law makes it easier for walnut growers to form cooperatives for joint processing or marketing, potentially enhancing their bargaining power and ability to invest in equipment. The government, with donor backing, has promoted this approach as a way to reach smaller producers. However, cooperative development is still nascent – many farmers remain wary due to past failures of cooperatives and a preference for independent or family operations.Another public initiative is the development of marketing support and trade promotion. Ukraine's export promotion office and MAPF have helped organize national pavilions at international food exhibitions (e.g., Gulf Food, Fruit Logistica) where walnut companies can meet buyers. These efforts, while not walnut-specific, integrate

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nut exporters into broader campaigns to brand Ukraine as a quality food supplier.

Private Sector and Industry Associations: The private sector has been a driving force, especially through industry associations and leading companies. The **Ukrainian Nut Association,** founded by growers and processors, provides a platform for coordination and advocacy. It engages with the government to shape supportive policies[156]. The association also helps aggregate small producers' voices, highlighting issues like the need to continue orchard grant funding or to enforce quality standards in the market. Regionally, there are groups like the **Podilsky Association of Hazelnut Producers** in western Ukraine, indicating that nut growers are self-organizing to share resources and represent their interests.Major **processing/export companies** have contributed by investing in modern facilities and certifications, demonstrating the sector's potential. For instance, the company "Ukr Walnut" (cited earlier) has a state-of-the-art processing line and international certifications, serving as a model for others[157]. Such companies sometimes provide contract farming opportunities – supplying seedlings or inputs to farmers and then buying back the harvest – effectively acting as nucleus estates that transfer technology to outgrowers. The private sector has also introduced **innovations** like walnut oil pressing, ingredient processing (walnut flour, etc.), and new product development (snack mixes), which can increase demand for walnuts and create higher margins that benefit the entire chain.One area of private sector involvement is **nursery development:** a few nurseries have imported high-performing walnut varieties and are propagating them locally, ensuring farmers have access to quality planting material. While earlier many farmers planted seedlings of variable genetic quality, now grafted varieties like Chandler, Fernor, and Ukrainian-bred varieties are more available – a critical improvement supported by both private investment and some state certification oversight.

International Donor and Development Projects: Donors have recognized the walnut sector's promise for rural development and export earnings, and have launched targeted assistance projects. Key contributions include:

- **UNIDO and SECO (Switzerland):** The Global Quality and Standards Programme (GQSP) for Ukraine, currently in Phase II (2023–2027), specifically targets **berries and nuts** value chains[158]. This project works on strengthening the National Quality Infrastructure – such as accreditation bodies, standards, and laboratories – to better serve nut exporters. Phase I of this program (2018–2022) already helped upgrade testing labs and trained producers on standards compliance[159]. Phase II will continue to "promote a quality culture and a conducive policy framework" for nuts, improving SMEs' capacity to meet international standards[160]. This indicates strong donor commitment to the SPS and quality aspect (which is a known bottleneck).

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- **FAO and EBRD:** These organizations have jointly supported Ukraine's horticulture sector for years. They often facilitate policy dialogues (such as on the cooperative law and on food safety regulations)[161] [162]. Specifically for nuts, FAO and EBRD have sponsored research and forums (like the "Nuts of Ukraine" conference series)[163]. They provide technical expertise and connect Ukrainian stakeholders with international markets. During the war, FAO has also had emergency support programs for farmers (cash grants, input distribution) – not walnut-specific but some walnut farmers in affected areas might have benefitted.
- **USAID and other bilateral donors:** Projects such as USAID's Competitive Economy Program and AGROhave value chain components that include high-value crops. They have offered grants for processing equipment, co-financed storage facilities, and helped establish market linkages. In 2022–2023, USAID and EU programs gave grants to businesses relocating or rebuilding due to war; a few nut processing enterprises reportedly received such aid to re-establish production in safer regions. Additionally, the EU4Business initiative has funded training and advisory services for agri-food SMEs that likely encompassed some walnut enterprises.
- **ITC (International Trade Centre):** The mention of an "ITC project overseeing walnut development" in Ukraine[164] suggests ITC's involvement (ITC is a joint agency of the UN and WTO focused on trade capacity building). ITC might have provided expertise on export market requirements and helped organize the professional conferences with the Walnut Association.
- **GIZ (Germany) and others:** While not as prominent in publicly available information, German development cooperation has worked on sustainable agriculture in Ukraine and might touch on perennial crops in its programming (for example, supporting organic certification, which could include organic walnuts).

These donor efforts often work **hand-in-hand with local partners** – for example, EastFruit (the information platform) is actually a project under FAO/EBRD that coordinates with the Walnut Association for events[165]. Donors bring in funding, international experts, and facilitate knowledge exchange, whereas local associations and institutes provide outreach to farmers and contextual expertise.

Impact of Support Initiatives: The combined public-private-donor support structure has addressed many needs of the walnut sector: from enabling orchard area expansion (government grants) and improving quality infrastructure (UNIDO, etc.), to enhancing knowledge (associations, EastFruit, USAID trainings) and advocating policy reform (FAO/EBRD dialogues). A tangible impact is that Ukraine maintained its walnut production growth and

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162 trade.gov
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presence even through the shocks of war; although exports dropped sharply in early 2022[166], they have since partially recovered as new logistics via the EU were established. Support from development partners was crucial in this wartime adjustment – for instance, EU's elimination of tariffs and extra controls on Ukrainian food exports[167] and EBRD's financing facilities for agribusiness kept the sector afloat. Nonetheless, gaps remain that support initiatives are striving to fill. For example, **infrastructure bottlenecks** (like inadequate drying and storage in villages) are starting to be tackled by grants for equipment, but more investment is needed. Similarly, while **quality culture** is improving among larger players, a lot of walnuts are still collected from old homestead trees by individuals with no support – integration of these smallholders into the modern value chain is an ongoing challenge. Coordination among various support programs could also be improved: stakeholders sometimes note overlap or lack of awareness about what different projects offer. A more unified approach – possibly a national program for nut industry development that aligns government, donors, and private initiatives – could enhance overall effectiveness.In summary, the walnut sector in Ukraine benefits from a robust support ecosystem featuring government policies, dynamic private associations, and active donor engagement. This triple-helix of support has helped the industry grow in volume and start addressing quality and competitiveness issues. Continued collaboration among public, private, and international partners will be key to overcoming the remaining hurdles discussed in the next section.

INSTITUTIONAL FRAMEWORK AND STAKEHOLDER COORDINATION

Multiple institutions influence and implement policies in the walnut sector. Here we analyze the roles and effectiveness of key **government bodies, industry associations,** and **non-governmental organizations (NGOs),** as well as the coordination (or lack thereof) among stakeholders.

Ministry of Agrarian Policy and Food (MAPF): MAPF is the central government body responsible for agricultural development in Ukraine[168]. It formulates state agrarian policy, including programs for horticulture and organic production[169]. Between 2019 and 2021, MAPF was briefly merged into the Ministry of Economy, which caused some turbulence in agricultural policy coordination[170]. Since being re-established as a separate ministry in 2021, MAPF has resumed oversight of sector-specific support (like the orchard grant program) and regulation of inputs (e.g., seedling certification, organic standards). In the walnut context, MAPF's

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Department of Agrarian Development and Horticulture would handle strategy and support measures for nut crops. MAPF acknowledges walnuts as an export opportunity and has included nut development in broader strategic documents (as earlier noted). Its coordination with other ministries on cross-cutting issues (trade, technical standards) is vital for coherent policy.

Ministry of Economy: The Ministry of Economy plays a significant role in technical regulation, trade policy, and investment climate. Its Department for Technical Regulation oversees the development of standards and conformity assessment procedures[171] – for example, it supervises the National Standardization Body and Accreditation Agency that set the standards environment for products like walnuts. The Ministry of Economy also handles trade negotiations and DCFTA implementation for non-food aspects. Coordination between Ministry of Economy and MAPF is needed when, say, adopting a new quality standard for walnut kernels or negotiating sanitary certificates with the EU. For walnuts specifically, the Ministry of Economy's export promotion arm (part of the ministry or under a trade office) helps producers find markets. The Ministry's role in investment is also relevant – it can promote foreign investment in processing facilities or orchards, though there's no notable example of large FDI in walnuts yet (the sector has been mostly domestic-driven so far).

State Service of Ukraine on Food Safety and Consumer Protection (SSUFSCP): This is the implementation arm for SPS and food standards, under the Cabinet of Ministers[172]. SSUFSCP's responsibilities include veterinary control, food safety inspections, plant quarantine, seed certification, and more[173]. It is a crucial institution for walnuts: it certifies nurseries, monitors orchards for pests, issues phytosanitary certificates for export, and inspects processing facilities for hygiene. The SSUFSCP has offices in each region (oblast) and at border points. Its effectiveness has improved with capacity-building; for example, by 2023 it had guided many food businesses through HACCP adoption and got several laboratories internationally accredited[174]. However, it faces resource challenges – staffing and equipping regional units adequately is difficult, especially during the war when they also must monitor for any food safety impacts of military actions (like contamination risks). Some producers report that SSUFSCP procedures (e.g., obtaining a phyto certificate) can be bureaucratic, though recent digitalization efforts aim to streamline this. The coordination between SSUFSCP and producers is partly mediated by associations (which may alert the Service of any industry-wide issues) and by MAPF (which sets policy that SSUFSCP enforces). Overall, SSUFSCP is the **linchpin for enforcement** in the walnut sector's regulatory environment, and its performance directly affects the ability of walnuts to meet market requirements.

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Regional and Local Authorities: Each region's Department of Agricultural Development (usually part of the Oblast Administration) acts as a lower-level implementer for state programs[175]. They were responsible for collecting applications and disbursing funds for the orchard subsidy program, for instance. They also often host agricultural extension units (though limited in capacity). The coordination between central policy and local execution can be a bottleneck – some regions are proactive in promoting nuts (especially where climate suits walnuts, like Zakarpattia, Bukovyna, Podillia), while others pay less attention. Additionally, local governments have some tools like community development funds which have occasionally been used to support cooperative initiatives (e.g., helping build a small processing workshop). Strong local leadership (a governor enthusiastic about horticulture) can boost walnut projects, whereas a lack of it means farmers rely more on national programs or their own initiative.

Industry Associations: The Ukrainian Nut Association (UNA) is the primary industry body dedicated to walnuts and other tree nuts. It serves as a bridge between private producers and the state. UNA provides industry data, articulates bottlenecks, and lobbies for favorable measures (it likely advocated for continuation of horticulture support and for including nuts in grant priorities). It also drives self-regulation by promoting quality standards among members. The UNA's effectiveness stems from active leadership (its president is a vocal expert) and partnerships with research institutes and international projects[176]. However, like many associations, membership may cover only a fraction of all growers – increasing outreach to the many small-scale or household growers is a challenge. Other relevant associations include **Ukrsadprom** (the Association of Fruit and Berry Producers), which also sometimes covers nuts as part of the broader horticulture sector, and **Ukrainian Agrarian Business Club (UCAB),** which represents large agribusinesses (some large walnut farm owners might be members). These associations collectively ensure that the walnut sector's interests (like export issues, tax treatment, etc.) are represented in broader agricultural policy discussions.

Research and Academic Institutions: The Institute of Horticulture of the National Academy of Agrarian Sciences (NAAS) and its experimental stations have institutional roles in walnut development. They conduct research on breeding and cultivation and provide scientific recommendations. They also collaborate with the Walnut Association for events, demonstrating a good model of research-extension linkage[177]. The NAAS institutions depend on state funding (which has been tight) and grants. Their impact is seen in the development of improved domestic walnut varieties and rootstocks suited to Ukraine's climate. Coordination between research and industry is relatively effective in this niche – breeders often respond to growers' needs (for example, working on varieties with thinner shells or disease resistance if

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that's a concern raised by industry). One area to grow is on-farm trials and demonstration plots: establishing more demo orchards in different regions under institute guidance could help disseminate best practices.

Non-Governmental Organizations: Various NGOs, often donor-funded, contribute to supporting walnut producers. For example, **EcoAction** (an environmental NGO) might push for sustainable practices (like agroecology in orchards) and note the importance of advisory services[178]. Some local NGOs in rural areas focus on community development and encourage forming cooperatives for nuts and fruits.

International NGOs and projects (like those funded by USAID, GIZ, etc.) essentially operate as NGOs in implementing trainings and grants. Their coordination with government is usually formalized via Memorandums of Cooperation with ministries or local authorities to align efforts. One noteworthy coalition could be the Donor **Coordination Platform for Agriculture** – donors often meet with MAPF to ensure their projects complement national priorities.

Coordination Across Stakeholders: A recurring theme is the need for better coordination among all these players. Bottlenecks like the shadow market for walnuts persisted in part because agencies and stakeholders were not fully aligned – tax authorities, customs, and SSUFSCP had to coordinate to crack down on unofficial exports, and only recently is that being addressed. Similarly, to improve extension, MAPF, research institutes, and NGOs could collaborate on a unified program so that information consistently reaches farmers. There have been positive steps: e.g., the Walnut Association working with a donor project and an institute to hold conferences shows academia, private sector, and donors in sync[179]. At the policy level, creation of platforms or working groups for specific value chains (something FAO/EBRD have done for other sectors like dairy and grain[180] [181]) could be beneficial for nuts too. If a **Walnut Sector Working Group** was formalized, involving MAPF, Economy, SSUFSCP, association reps, and donors, it could regularly identify issues and track progress on solutions (for example, monitoring how many producers get certified, or if export procedures are improving).The war has ironically spurred some coordination: the need to reroute exports via the EU required government, business, and international partners to work closely (as seen in organizing convoys, negotiating solidarity lanes, etc.). This experience might leave a legacy of closer cooperation.

Institutional Bottlenecks: Despite having the necessary institutions on paper, Ukraine faces issues like bureaucratic overlap (e.g., multiple permits or agencies historically involved in

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agribusiness – though deregulation efforts are simplifying this), sometimes unclear division of roles (food safety vs. quality certification roles between SSUFSCP and the Economy Ministry's standardization bodies), and resource limitations for public institutions. Continuous capacity building is needed, especially for SSUFSCP inspectors and lab technicians, to keep up with best practices. Industry associations need support to broaden their membership and services. And critically, there is a need to ensure policy continuity: changes in political leadership or ministry structures can reset progress, so institutional knowledge (perhaps maintained by career civil servants and collaboration with external experts) should be preserved.In summary, the institutional framework for walnut production involves a diverse set of actors. Each has made contributions to sector development, but the effectiveness of these institutions can improve with stronger coordination and stable support. The pieces of the puzzle (policy-making, enforcement, research, farmer representation) exist – aligning them toward common goals will help remove many of the remaining obstacles in Ukraine's walnut industry.

IV. OVERVIEW OF THE EU REQUIREMENTS TO WALNUT PRODUCTION

STATUTORY MANAGEMENT REQUIREMENTS (SMRS)

Under EU integration, Ukrainian walnut growers must comply with **Statutory Management Requirements (SMRs)** derived from EU laws[182]. These cover food safety, plant health, environmental protection, etc., and apply to all farmers (whether or not they receive CAP payments)[183]. Below is a map of key SMRs relevant to walnuts, with each requirement's implications, advantages, and disadvantages for producers:

Food Safety & Traceability (General Food Law, Regulation 178/2002)
Requirement: Ensure that walnut products are safe for consumers and fully traceable one step forward and back in the supply chain[184]. This means producers and processors must implement hygiene controls (e.g. clean drying/storage to prevent aflatoxins) and record-keeping to quickly trace any safety issues.

Advantages: Aligning with EU food safety standards opens access to the large EU market and increases consumer trust in Ukrainian walnuts[185]. It can also incentivize better post-harvest handling (e.g. proper drying facilities) leading to more consistent quality.

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185 *freepolicybriefs.org*

Disadvantages: Compliance requires improved documentation and quality control systems, which can be burdensome for small-scale growers who currently operate informally[186]. Many family walnut farms in Ukraine have had "unstable quality" and minimal formal standards, pushing their nuts into lower-value segments[187]. Meeting EU-level safety protocols (like establishing HACCP plans at processing facilities) may incur new costs and necessitate training.

Pesticide Authorization (Plant Protection Products Regulation 1107/2009)

Requirement: Only use crop protection chemicals that are EU-approved, and apply them according to strict label conditions[188]. Any pesticides or fumigants currently used on walnuts that are not authorized in the EU would need to be phased out or replaced.

Advantages: Walnut orchards would shift to using more modern, environmentally safer pesticides, reducing residues and improving worker safety. This can enhance the international marketability of Ukrainian walnuts by ensuring they meet EU residue standards and "zero-pesticide" consumer preferences.

Disadvantages: Producers might lose access to some inexpensive or locally available pest controls if those are banned in the EU, potentially facing higher costs for approved alternatives. There could be short-term yield risks if highly effective but non-compliant chemicals are withdrawn without readily available substitutes. Additionally, producers and input suppliers must navigate the complex EU registration status of products, which can be challenging without guidance.

Sustainable Pesticide Use (Directive 2009/128/EC)

Requirement: Adopt Integrated Pest Management (IPM) and safe pesticide use practices[189]. Farmers must be trained and certified in pesticide handling, maintain application records, calibrate sprayers, and take measures to reduce spray drift and pollution.

Advantages: Over time, this encourages more efficient use of agrochemicals and can lower input costs – for example, by monitoring pest levels and spraying only when needed. It also improves farm worker safety and environmental health (less chemical runoff to soil and water). Adhering to IPM may even improve walnut quality by minimizing chemical residues.

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Disadvantages: In the near term, compliance creates new obligations – farmers need to attend training courses, obtain licenses for pesticide application, and possibly invest in modern spraying equipment. These requirements impose "additional compliance costs"[190] and time burdens, especially for small growers unused to formal training. Some walnut farmers who currently use manual or informal methods might find the bureaucracy of record-keeping and equipment inspections daunting.

Fertilizer and Water Protection (Nitrates Directive 91/676/EEC & Water Framework Directive 2000/60/EC)

Requirement: Protect water quality by controlling nutrient runoff and water pollution. Under the Nitrates Directive (an SMR under CAP environmental rules), farms in designated vulnerable zones must limit nitrogen application (e.g. ≤170 kg N/ha from manure annually), store manure properly, and avoid spreading fertilizers during winter or on frozen ground[191]. The Water Framework Directive (WFD) further obliges farmers to prevent any practices that could deteriorate water bodies, and may require permits or registration for on-farm water abstraction (e.g. for irrigation)[192].

Advantages: These measures help maintain clean groundwater and surface water, which benefits community health and the farm's own resources (wells, irrigation). Efficient fertilizer use can also save costs – walnut orchards will only apply nutrients in the necessary amounts and timing, improving nutrient uptake efficiency. Over time, preventing nutrient leaching preserves soil fertility and can sustain yields.

Disadvantages: Farmers may need to invest in infrastructure like fertilizer storage, protective manure pits, or irrigation water meters to comply. In regions where walnuts require irrigation (e.g. southern Ukraine), registration of water use under the WFD could restrict how much water can be withdrawn, potentially limiting irrigation in dry years. Compliance can thus mean reduced flexibility – producers must plan nutrient applications carefully and might face yield impacts if they can no longer fertilize or irrigate as liberally as before. The administrative burden of keeping fertilizer application logs and possibly submitting reports is another drawback for farmers not accustomed to detailed paperwork.

190 *freepolicybriefs.org*
191 *agriculture.ec.europa.eu*
192 *teagasc.ieteagasc.ie*

Biodiversity Conservation (Birds Directive 2009/147/EC & Habitats Directive 92/43/EEC)

Requirement: Ensure farming activities do not harm protected species or habitats. If walnut orchards or farm land overlap with Natura 2000 sites or important habitats, farmers must avoid destructive practices – for instance, not clearing trees or hedgerows during bird nesting season and protecting any rare flora/fauna present[193]. New orchard planting may be restricted on ecologically sensitive lands.

Advantages: Preserving on-farm biodiversity can provide ecosystem services – natural pest predators, pollinators for walnut trees, and healthier soils. Compliance with these SMRs also helps brand Ukraine's produce as environmentally responsible, potentially adding value in eco-conscious markets.

Disadvantages: There could be land-use restrictions – a farmer might be unable to expand a walnut orchard into a plot that is deemed a sensitive habitat, even if it's on their property. Pest control can be complicated if certain wildlife (e.g. birds) are protected – growers must avoid methods that could harm those species. From the farm perspective, these rules might seem like "red tape" limiting their autonomy, and monitoring compliance (to ensure no protected species are disturbed) can be challenging without expert guidance.

GOOD AGRICULTURAL AND ENVIRONMENTAL CONDITIONS (GAECS)

In addition to SMRs, farmers seeking EU direct payments must meet **Good Agricultural and Environmental Conditions (GAECs)** – standards for sustainable land management[194]. These standards, part of CAP 2023–2027 conditionality, build on the "greening" practices and focus on soil, water, and habitat preservation. The following GAEC requirements would affect Ukrainian walnut production (from on-farm cultivation to post-harvest land management), with potential benefits and drawbacks:

GAEC 1 – Permanent Grassland Preservation

Maintain a certain share of permanent grassland relative to total agricultural land[195]. This rule prevents large-scale conversion of pastures or meadows into arable land.

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Relevance to Walnuts: If a walnut grower's farm includes pasture or hayfields (for example, mixed farming operations), they would be limited in plowing up those grasslands to plant new walnut orchards.

Advantages: Preserving grasslands aids carbon sequestration and biodiversity. It can also benefit the farm by maintaining areas for bee forage or livestock integration (if they keep animals) and protecting soil from erosion on lands unsuited to cropping.

Disadvantages: It restricts land use flexibility – a farmer cannot freely expand walnut acreage onto grassland if it would drop their grassland share below the mandated level. In a country with plans to drastically increase nut orchards, GAEC 1 could slow conversion of fallow/grass areas to walnuts. For some producers, this may feel like a lost opportunity to capitalize on high walnut demand.

GAEC 2 – Wetland and Peatland Protection: Protect wetlands and peatlands on agricultural holdings[196]. Farmers must refrain from draining or damaging these sensitive areas.

Advantages: Wetlands and peat soils often are not ideal for walnut trees (which prefer well-drained soil), so preserving them doesn't directly conflict with production in most cases. It provides environmental benefits – safeguarding biodiversity and huge carbon stores in peatlands, which aligns with climate mitigation goals. Farmers maintaining wetlands could potentially leverage agri-environment payments or develop eco-tourism (bird watching, etc.) as an alternative income.

Disadvantages: If a farmer does have a plot of peatland or swamp within their property, they effectively cannot convert it to orchard or use it productively. Some Ukrainian producers might have seen such land as reserve area for future planting – GAEC 2 means those plans must be shelved. There may also be costs in fencing off or managing wetlands (to prevent grazing or pollution) without direct economic return.

GAEC 3 – Ban on Burning Stubble: Prohibit the burning of arable stubble or plant residues, to maintain soil organic matter and structure[197].

Relevance to Walnuts: While this rule is aimed at arable crop residues (like wheat straw), it signals a general expectation to avoid open burning. Many walnut growers traditionally burn

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pruned branches, leaves, or walnut husks to dispose of waste or control pests. Under EU-aligned practice, open burning of field residues would be discouraged or forbidden.

Advantages: Eliminating burning retains organic matter on the farm – for walnuts, chipping or composting prunings can add nutrients back to the soil and improve soil health. It also reduces air pollution and fire risk.

Disadvantages: Farmers must invest in alternative residue management. Shredding and composting require machinery or labor, and leaving debris can harbor diseases (one reason growers burned was to prevent spread of blight or pests). Especially in walnut processing, shells and husks would need disposal in compliance with waste management rules rather than simple burning. This GAEC might thus introduce additional handling costs and complexity for post-harvest waste.

GAEC 4 – Buffer Strips Along Watercourses

Establish and maintain buffer strips (uncultivated, vegetative strips) alongside rivers, streams, or drainage ditches[198]. These buffers filter runoff and prevent pollution entering water.

Advantages: For walnut orchards near waterways, grassy buffer zones will trap sediment, agrochemicals, and nutrients, thereby protecting water quality. This also helps prevent soil erosion at the field's edge and can provide habitat for pollinators and natural pest enemies. Compliance might not be difficult if many traditional farms already leave some space near streams; if not, it's a one-time adjustment to planting layout.

Disadvantages: Some productive land near water must be taken out of cultivation – a small percentage of orchard area could be lost, which for a large orchard could mean a notable volume of nuts not produced on those border trees. Additionally, maintaining the strip (mowing or managing vegetation) is an extra task with no direct financial return. For farms in arid regions with irrigation canals, leaving a buffer could complicate water delivery if not planned well. Overall, though the land loss is usually minor, it's a new constraint growers must accept.

GAEC 5 – Soil Erosion Prevention: Implement practices to prevent soil erosion, especially on vulnerable sloping lands[199]. The exact practices are determined by context – e.g. contour planting, terracing, or maintaining ground cover.

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Advantages: Many walnut orchards in Ukraine are on rolling terrain (e.g. in central regions); requiring cover crops or grass in alleyways can significantly reduce soil loss during heavy rains. This keeps the topsoil fertile and productive for the long term, benefiting yields and reducing the need for fertilizers. Anti-erosion measures like terracing can also improve water retention in the soil (useful for walnut trees in dry spells).

Disadvantages: These measures might entail investment and ongoing work – e.g. sowing grass in the orchard aisles, building small terraces or diversion ditches on hillsides, etc. If a farmer currently plows the orchard floor or uses herbicides to keep it bare, they must change to a covered soil system, which could increase labor (regular mowing or weeding) and possibly harbor more pests (groundcover might increase rodents or insects if not managed). In some cases, farmers believe a clean cultivated orchard floor makes harvest easier (fallen walnuts are easier to spot on bare ground), so a shift to grass cover could complicate nut collection or require new harvesting equipment.

GAEC 6 – Minimum Soil Cover

Ensure minimum soil cover on arable land during sensitive periods to avoid bare soil[200]. For permanent crops like walnuts, this generally means maintaining vegetative cover in the orchard during off-season or year-round, except perhaps immediately around young trees.

Advantages: Similar to GAEC 5, keeping soil covered (with grass, cover crops, or mulches) improves water infiltration, adds organic matter, and prevents erosion. It also can suppress weeds naturally. For walnut orchards, a grass cover can make the orchard more accessible in wet conditions (less mud) and can provide a cooler microclimate in hot summers (reducing soil moisture evaporation).

Disadvantages: Maintaining cover year-round may conflict with certain practices – for example, some farmers traditionally till under the trees in autumn to incorporate leaves or to reduce pest overwintering sites. Under GAEC 6, they would need to leave the soil undisturbed or immediately re-seed any disturbed ground. Continuous cover might also increase disease pressure (higher humidity at ground level) and complicate harvest as noted above. There's a cost to seeding cover crops and managing them, and no immediate financial benefit except compliance. For smallholders who currently do minimal land management (some may simply let livestock graze under walnut trees), meeting a formal "soil cover" standard may require clearer planning of seasonal practices.

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GAEC 7 – Crop Rotation: Introduce crop rotation on arable land (except crops under water, e.g. rice) to preserve soil potential[201].

Relevance to Walnuts: This standard primarily affects annual cropping systems. Walnut orchards are **permanent crops,** so rotation doesn't apply to the trees themselves. Most specialized walnut producers won't be affected by GAEC 7 if their land is all orchard or fallow. However, if a farm also grows annual crops (e.g. intercropping young orchards with vegetables or maintaining some grain fields alongside the orchard), then those arable plots must follow rotation rules (e.g. not monocropping the same cereal every year).

Advantages: For any arable portion of a walnut farm, rotations can improve overall soil health and break pest cycles, which indirectly benefits the orchard by reducing pest reservoirs in nearby fields.

Disadvantages: This GAEC could limit a farmer's ability to keep, say, a profitable intercrop every year between young walnut rows. In general though, for walnut-focused farms, GAEC 7 is not a significant constraint – it is noted here for completeness, but its impact on walnut operations is minimal.

GAEC 8 – Landscape Features & Non-Productive Areas

Dedicate a share of land to non-productive features and preserve existing landscape elements. Also, a **ban on cutting hedges and trees during the bird breeding season** is enforced[202]. In practice, GAEC 8 requires (for large farms with arable land) that at least 4% of arable area be set aside as fallow or ecological focus areas, and it prohibits hedge/tree removal at critical wildlife times.

Advantages: For walnut producers, maintaining hedgerows, buffer strips, or patches of wild vegetation can boost on-farm biodiversity. Beneficial insects and birds from these refuges can help with pest control in the orchard. The scenic landscape features might even enhance agri-tourism potential (an attractive orchard with wildflower strips, etc.). Compliance with seasonal hedge-cutting bans is manageable by scheduling pruning in late summer or winter, which many growers do already.

Disadvantages: If a walnut farm has field margins or unused corners, GAEC 8 might require leaving them untouched or actively managing them for nature, rather than bringing every bit of

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land into production. This could slightly reduce the plantable area or entail effort to maintain non-productive zones. The hedge-cutting ban (often March to August) could interfere with orchard management if, for example, a grower wanted to remove or heavily prune walnut trees during spring to replant new ones – they would have to delay such work until after nesting season. In some cases, old or diseased walnut trees might harbor pests, and a farmer would want to fell them immediately; GAEC 8 would force a schedule adjustment to avoid wildlife disturbance. Overall, while not hugely limiting, these rules introduce timing and land-use constraints that producers must plan around.

GAEC 9 – Protect Environmentally Sensitive Grasslands

Prohibit the conversion or ploughing of designated environmentally-sensitive permanent grasslands, particularly in Natura 2000 protected areas[203].

Relevance to Walnuts: This would apply if a farmer owns pasture or meadow within a Natura 2000 site – such land could not be turned into a walnut orchard or otherwise tilled. This situation may be rare and region-specific (e.g. in Carpathian foothills or steppe zones where protected grasslands exist).

Advantages: It ensures that fragile ecosystems with high biodiversity (like species-rich steppes or alpine meadows) are preserved, which is a public good and aligns with Ukraine's conservation goals. Walnut producers, as part of the community, benefit from the ecosystem services (pollination, water regulation) that intact grasslands provide regionally.

Disadvantages: Any individual farmer who happened to have such land would be unable to expand production onto it, potentially foregoing expansion opportunities. Even improvements like reseeding or fertilizing those grasslands could be restricted, keeping that portion of land economically less productive from a narrow farm business perspective. Given that this affects a small subset of land, it's not a widespread disadvantage but is a firm limitation where it applies.

***(Note:** The GAEC standards would become mandatory once Ukraine implements EU-like direct payment schemes. They represent a "**higher environmental ambition**" of the new CAP[204]. For Ukrainian walnut growers, many GAEC practices overlap with good orchard management – e.g. avoiding erosion, keeping shelterbelts, etc. However, the **challenge is the formalization and enforcement:** what was previously a recommended or optional good practice becomes a*

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monitored requirement. As one analysis noted, transitioning to these new standards will be "the biggest challenge for Ukrainian agricultural producers" and will require preparation and support[205]. On the positive side, adopting GAECs can make production more climate-resilient and sustainable over the long term, potentially offsetting compliance costs through improved efficiency[206].)

TRANSITIONAL CONSIDERATIONS FOR EU CANDIDATE COUNTRIES

Adapting to the EU's CAP conditionality is a **gradual process,** especially for a candidate country like Ukraine that is integrating during an ongoing conflict and economic strain. The EU typically allows some transitional arrangements and support mechanisms for new members and candidates to meet these standards. In the walnut sector, transitional requirements may include phased implementation or capacity-building measures rather than immediate full enforcement:

Phased Implementation: Ukraine may negotiate phase-in periods for certain environmental directives. For example, the full enforcement of the Nitrates Directive or Water Framework provisions could be gradual, giving time to set up monitoring systems and extension services. Walnut producers might initially be encouraged (through pilot programs and training) to adopt practices like buffer strips or IPM, with actual penalties for non-compliance coming later. This staged approach eases the burden on farmers and allows learning-by-doing.

Institutional Support: Establishing the necessary institutions (e.g. a Paying Agency, Farm Advisory System, and Integrated Administration and Control System) is part of Ukraine's alignment with CAP. During the transition, these institutions can prioritize advisory support over punishment. For instance, farm advisors could visit walnut orchards to explain new rules and assist in compliance planning. The EU's pre-accession rural development funds (such as IPARD) could be accessed to finance on-farm improvements – **grants for manure storage, sprayer upgrades, orchard cover crop seed, etc.,** directly helping walnut growers meet SMR/GAEC requirements.

Transitional Subsidies or Derogations: To prevent hardship, candidate countries sometimes receive temporary derogations on certain standards. In the short term, Ukraine might seek a derogation for GAEC 7 (crop rotation) given the structure of its agriculture, or additional flexibility on GAEC 8 if food security is a concern (as the EU itself allowed some GAEC

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exemptions in 2023 due to the war's market impacts[207]). For walnut producers, a transitional leniency could mean, for example, no immediate penalties for small-scale farms not yet fully compliant with record-keeping or for orchards that need a season to establish cover crops. Any such derogation would be temporary; it simply gives farmers breathing room to adapt.

Knowledge Transfer and Pilot Projects: As part of the candidacy, Ukraine has access to expertise from EU member states. Organizing demonstration walnut farms that implement all SMR/GAEC practices can show feasibility and create local examples. These pilots, along with producer trainings (possibly funded by EU technical assistance), are a de facto transitional step – they build knowledge so that when rules are formally enforced, producers are ready.

Overall, transitional requirements acknowledge that **"complying with the complex EU acquis"** has costs and learning curves[208]. The goal is to make adaptation feasible through financial aid, education, and phased timelines, so that Ukrainian walnut producers can gradually achieve full compliance by the time of EU accession without losing their competitive edge. Indeed, research suggests that if done smartly, Ukraine's farmers can **maintain competitiveness while improving environmental performance, offsetting the compliance costs[209].** Planning for this transition period is therefore critical in policy design.

GAPS IN EXISTING INFORMATION

To fully assess the feasibility of compliance for walnut producers, several information gaps need to be addressed. Current data is insufficient in the following areas.

Baseline Farm Practices: There is a lack of detailed data on the current agronomic practices of Ukrainian walnut producers across different regions. For instance, to what extent do growers already use cover crops, buffer strips, or integrated pest management? Knowing the baseline (e.g. percentage of farms that burn residues or use prohibited pesticides) is crucial to estimate the effort needed to comply with each SMR/GAEC.

Awareness and Knowledge Levels: It's unclear how familiar walnut farmers are with EU standards. Do producers know about nitrate pollution issues, or the concept of GAEC landscape features? Are they aware of the need for product traceability and record-keeping? This gap in knowledge assessment makes it hard to tailor training programs – we need to identify which topics are most novel or confusing to growers.

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Economic Impact and Cost of Compliance: Little farm-specific economic analysis has been done for the nut sector regarding compliance costs. We lack data on the expected expense for a typical walnut farm to implement measures like new storage facilities (to replace residue burning or to store manure), training personnel for food safety, or machinery upgrades for soil management. Without this, it's difficult to weigh the disadvantages against potential advantages or to argue for necessary financial support.

Infrastructure and Organizational Gaps: The state of post-harvest infrastructure (drying, sorting, storage) in the walnut value chain is not fully documented. Given that many small farms rely on intermediaries and have "unstable quality" outputs[210], we need information on what facilities or cooperatives exist to improve quality control under EU standards. Similarly, understanding whether farmers are organized (e.g. in associations or co-ops) is important, since collective action could facilitate compliance (for example, shared use of a composting site for walnut husks). This information gap affects how feasible and scalable certain adaptations might be.

Regulatory Enforcement Capacity: Another gap is how prepared Ukrainian regulatory bodies are to implement and monitor these conditionality requirements in walnuts. It's not well known if local agricultural extension services have the expertise to guide walnut farms on EU compliance, or if laboratories in Ukraine can perform all the necessary testing (soil nitrates, water quality, pesticide residues on nuts, etc.). Without understanding enforcement and support capacity, it's hard to predict compliance feasibility.

Regional Variability and Special Cases: Ukraine's diverse geography means adaptation might not be one-size-fits-all. However, information is missing on region-specific challenges – e.g., are there areas with peat soils under walnuts (raising GAEC 2 issues)? Which regions rely heavily on irrigation for walnuts (heightening WFD relevance)? Are there any walnut groves near Natura 2000 sites? Identifying these special cases is needed to fully map out compliance hurdles, but the data is currently sparse.

By identifying these gaps, stakeholders can design surveys and studies to gather the needed information. This will enable a realistic assessment of how ready the walnut sector is for EU conditionality and what targeted interventions or policy adjustments are required.

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