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CURRENT STATE OF SPECIES, VARIETY-HYBRID COMPOSITION, AND YIELD LEVELS OF PUMPKIN IN UKRAINE

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The article presents the results of an analysis of the current state of pumpkin production in Ukraine and the peculiarities of the development of its varietal composition. The relevance of pumpkin cultivation as a promising vegetable crop characterized by high nutritional, feed, medicinal, preventive, and industrial value is substantiated. It is emphasized that under the conditions of climate change and the need to diversify agricultural production, pumpkin is becoming increasingly important due to its high adaptive potential, comprehensive utilization of its products, and growing demand for fruits and seeds in both domestic and international markets.

The study found that pumpkin seed yield exhibits considerable variability across years and farm categories, indicating the significant influence of agronomic, economic, and weather-related factors on production efficiency. In contrast, the yield of table pumpkin remained relatively stable throughout the study period, demonstrating the crop's high adaptive capacity and the effectiveness of existing cultivation technologies. An upward trend in yield levels was identified for both agricultural enterprises and peasant (farmer) farms, which can be attributed to the introduction of modern varieties, improvements in cultivation technologies, and increased production concentration.

The analysis of the State Register of Plant Varieties Suitable for Dissemination in Ukraine revealed that, as of June 2026, a total of 47 pumpkin varieties and hybrids had been registered, representing three botanical species: Cucurbita pepo L., Cucurbita maxima Duch., and Cucurbita moschata Duch. The most intensive expansion of the varietal assortment occurred during 2022–2025, reflecting the intensification of breeding activities and the growing interest of producers in modern high-yielding varieties and hybrids. Domestic breeding was found to play a leading role in shaping the assortment of C. pepo and C. maxima, whereas the assortment of C. moschata is predominantly represented by varieties developed through foreign breeding programs.

The obtained results confirm the considerable potential for further development of pumpkin production in Ukraine. The identified trends may serve as a scientific basis for improving varietal policy, optimizing cultivation technologies, developing recommendations for agricultural producers, and determining promising directions for future breeding programs.

Key words: pumpkin, botanical species, diversification of vegetable crops, fruit and seed yield, farm categories, plant breeding, varietal and hybrid composition.

Сидякіна О.В., Гамаюнова В.В. Сучасний стан видів, сорто-гібридного складу та рівнів урожайності гарбуза в Україні

У статті наведено результати аналізу сучасного стану виробництва гарбуза в Україні та особливостей формування його сортового складу. Обґрунтовано актуальність вирощування гарбуза як перспективної овочевої культури, що характеризується високою харчовою, кормовою, лікувально-профілактичною та промисловою цінністю. Відзначено, що в умовах змін клімату та необхідності диверсифікації аграрного виробництва гарбуз



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набуває дедалі більшого значення завдяки високому адаптивному потенціалу, комплексному використанню продукції та зростанню попиту на плоди і насіння на внутрішньому та міжнародному ринках.

Встановлено, що врожайність гарбуза за вирощування на насіння характеризується значною мінливістю як за роками, так і категоріями господарств, що свідчить про істотний вплив агротехнологічних, економічних і погодних чинників на ефективність виробництва. Урожайність гарбуза столового протягом досліджуваного періоду залишалася відносно сталою, що свідчить про високий адаптивний потенціал культури та відповідність технологій її вирощування. Виявлено тенденцію до підвищення рівнів урожайності у сільськогосподарських підприємствах і фермерських господарствах, що пов'язано із впровадженням сучасних сортів, удосконаленням технологій вирощування та концентрацією виробництва.

За результатами аналізу Державного реєстру сортів рослин встановлено, що станом на червень 2026 р. в Україні зареєстровано 47 сортів і гібридів гарбуза, які належать до трьох ботанічних видів: гарбуза звичайного, гарбуза великоплідного та гарбуза мускатного. Визначено, що найбільш інтенсивне поповнення сортименту відбулося впродовж 2022–2025 рр., що свідчить про активізацію селекційної роботи та зростання зацікавленості виробників до сучасних високопродуктивних сортів і гібридів. Встановлено, що провідні позиції у формуванні сортименту займає вітчизняна селекція, особливо для гарбуза звичайного та гарбуза великоплідного, а сортимент гарбуза мускатного більшою мірою представлений сортами іноземної селекції.

Наведені результати обґрунтовують наявність значного потенціалу подальшого розвитку виробництва гарбуза в Україні. Встановлені закономірності можуть бути використані для формування сортової політики, удосконалення технологій вирощування культури, розроблення рекомендацій для товаровиробників та визначення перспективних напрямів селекційної роботи.

Ключові слова: гарбуз, ботанічні види, диверсифікація овочевих культур, урожайність плодів і насіння, категорії господарств, селекція, сорто-гібридний склад.

Problem statement. Pumpkin is a strategically important crop in global agriculture, combining high nutritional, feed, medicinal, preventive, and industrial value. Owing to its broad species diversity, adaptability to diverse soil and climatic conditions, and high ecological plasticity, pumpkin is successfully cultivated in many countries worldwide, including Ukraine.

Pumpkin fruits are characterized by high contents of carotenoids, dietary fiber, vitamins, phenolic compounds, and antioxidants, whereas the seeds represent a valuable source of plant protein, unsaturated fatty acids, tocopherols, phytosterols, magnesium, zinc, and other biologically active compounds. Therefore, pumpkin is regarded as a promising raw material for the production of functional foods, dietary supplements, and vegetable oils [1–3].

Particular attention has recently been paid to hull-less pumpkin varieties, whose seeds lack a hard seed coat and constitute a highly profitable raw material for edible oil production. The global demand for pumpkin seed oil continues to increase, especially in the countries of the European Union, where it is widely used as a high-value functional food ingredient. At the same time, the assortment of butternut pumpkins (*Cucurbita moschata* Duch.) is rapidly expanding due to their excellent sensory qualities and suitability for processing [4–6].

Under the conditions of climate change, pumpkin has attracted considerable attention as a crop with relatively high drought tolerance, efficient utilization of photosynthetically active radiation, and broad opportunities for the comprehensive use of harvested biomass. Virtually all plant components have economic value: fruits are processed by the food industry, seeds are used for edible oil and food ingredients, while processing by-products serve as raw materials for animal feed and bioenergy production. Such versatility is fully consistent with the modern concepts of zero-waste and sustainable agricultural production [7].

For Ukraine, pumpkin represents a promising niche crop capable of contributing to the diversification of vegetable production, expansion of export opportunities, and improvement of the economic efficiency of farming enterprises. However, enhancing the competitiveness of pumpkin production requires increasing crop productivity, improving cultivation technologies, and introducing modern high-yielding varieties and hybrids adapted to specific soil and climatic conditions. Therefore, an assessment of the current varietal composition of pumpkin included in the State Register of Plant Varieties Suitable for Dissemination in Ukraine is of particular scientific and practical importance.

Analysis of recent research and publications. During the past decade, the number of studies devoted to pumpkin has increased considerably. Contemporary research is mainly focused on the biochemical composition of fruits and seeds, the functional properties of pumpkin-derived products, and their applications in the food, pharmaceutical, and cosmetic industries.

In a comprehensive review, Kaur et al. [8] summarized current knowledge regarding the chemical composition of pumpkin and demonstrated that it is among the richest plant sources of carotenoids, polyphenols, tocopherols, flavonoids, and cucurbitacins, which determine its antioxidant, anti-inflammatory, and health-promoting properties.

Special attention has been devoted to pumpkin seeds as a functional food ingredient. According to Dotto and Chacha [1], pumpkin seeds contain up to 50% oil and approximately 30–40% protein and are rich in essential fatty acids, phytosterols, squalene, tocopherols, and mineral elements, making them highly promising for the production of functional foods and nutraceuticals.

The review by Singh and Kumar [2] demonstrated that all parts of the pumpkin plant can be efficiently utilized in the production of food products, vegetable oil, protein concentrates, animal feed, and biomaterials, making pumpkin an almost zero-waste crop. The authors also emphasized the steadily growing global demand for pumpkin seed products, particularly within the healthy food sector.

The review by Batool et al. [3] further confirmed the considerable potential of different *Cucurbita* species as sources of biologically active compounds and highlighted the importance of breeding varieties with elevated contents of carotenoids, antioxidants, and oil.

Despite the growing number of international publications, studies addressing the current state of pumpkin production and varietal diversity in Ukraine remain limited. This particularly concerns the assessment of the current assortment of varieties and hybrids included in the State Register of Plant Varieties Suitable for Dissemination in Ukraine, which is essential for identifying breeding trends and determining future prospects for pumpkin production. Therefore, the analysis of pumpkin productivity and varietal composition represents a relevant area of contemporary agricultural research.

Materials and methods. The objective of this study was to analyze the current state of pumpkin production in Ukraine based on the productivity of seed and table pumpkins across different farm categories; to investigate the current varietal and hybrid composition of pumpkin included in the State Register of Plant Varieties Suitable for Dissemination in Ukraine; and to identify prospects for improving the efficiency of pumpkin production.

To achieve the stated objective and ensure the reliability of the obtained results, a combination of general scientific and specialized research methods was employed, including the monographic method for reviewing scientific literature, the statistical and economic method for analyzing the dynamics of pumpkin yield across different farm categories, the comparative method for evaluating crop productivity and the characteristics of varietal composition, and systems analysis and generalization for interpreting the obtained results and formulating conclusions.

The study was based on official statistical data provided by the State Statistics Service of Ukraine on pumpkin production and yield [9], the State Register of Plant Varieties Suitable for Dissemination in Ukraine (as of June 2026) [10], as well as scientific publications by Ukrainian and international researchers addressing the current state of pumpkin production, breeding, and varietal resources.

Presentation of the main research material. Statistical analysis demonstrated that pumpkin productivity in Ukraine differs substantially depending on the production purpose of the crop and the category of agricultural producers. Seed pumpkin production was characterized by considerably greater yield variability than table pumpkin production, indicating a higher sensitivity of seed-oriented cultivation to agronomic practices and weather-related factors (Table 1).

Table 1

Dynamics of pumpkin seed yield by farm categories in Ukraine, t/ha

Farm category	Year									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Farms of all categories	0.72	0.40	0.75	0.63	0.57	1.11	0.96	0.71	0.76	0.56
Peasant (farmer) farms	0.49	1.11	0.88	0.50	0.42	0.72	0.31	0.57	0.50	0.37
Enterprises	0.72	0.38	0.68	0.53	0.64	1.23	1.04	0.62	0.64	0.38
Households	0.73	0.49	0.91	0.70	0.44	0.94	0.90	0.76	0.87	0.84

Source: State Statistics Service of Ukraine [9]

During 2016–2025, the average seed pumpkin yield across all farm categories ranged from 0.40 to 1.11 t/ha. The highest yield was recorded in 2021, followed by a declining trend in subsequent years. A similar pattern was observed for agricultural enterprises, where seed yield reached 1.

23 t/ha, representing the highest value recorded during the study period. This may indicate more efficient implementation of modern cultivation technologies, the use of high-quality varietal material, and a higher level of technical and resource support compared with other farm categories.

Peasant (farmer) farms exhibited the greatest variability in seed yield, with values ranging from 0.31 to 1.11 t/ha. Such fluctuations are likely attributable to relatively small cultivation areas, differences in resource availability, and variations in production technologies. In contrast, household farms demonstrated relatively stable performance and, during the final years of the study period, achieved higher seed yields than both peasant (farmer) farms and agricultural enterprises.

Unlike seed pumpkin production, table pumpkin cultivation was characterized by considerably more stable yield performance (Table 2). Across all farm categories, yields during 2015–2025 varied within a relatively narrow range of 20.92–23.48 t/ha, indicating a generally stable level of crop productivity despite year-to-year weather fluctuations.

The most consistent yields were recorded in household farms, where productivity remained virtually unchanged throughout the study period. At the same time, agricultural enterprises demonstrated a positive trend toward increasing productivity, particularly in 2025, when yields reached 36.36 t/ha. A similar trend was observed in peasant (farmer) farms, where, following substantial interannual fluctuations, the maximum yield of 36.59 t/ha was recorded. These improvements can be attributed to the adoption of modern high-yielding varieties and hybrids, advances in cultivation technologies, and the increasing concentration of production in specialized farms.

Table 2

Dynamics of table pumpkin yield by farm categories in Ukraine, t/ha

Farm category	Year										
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Farms of all categories	21.80	21.61	22.07	23.48	23.26	21.76	21.96	21.87	22.60	20.92	21.75
Peasant (farmer) farms	–	5.24	12.97	13.27	22.52	16.14	32.79	12.59	10.37	13.99	36.59
Enterprises	12.33	11.14	16.38	19.27	19.49	18.15	15.88	17.48	19.99	19.72	36.36
Households	22.05	21.84	22.15	23.56	23.34	21.83	22.10	21.91	22.63	20.96	20.79

Source: State Statistics Service of Ukraine [9]

Overall, the results indicate that the potential for further improving pumpkin productivity in Ukraine remains substantial. This is particularly evident in seed pumpkin production, where yield variability across years and farm categories remains considerable. In contrast, the stability of table pumpkin production reflects the crop's high adaptability to cultivation conditions. Under these circumstances, one of the key reserves for enhancing production efficiency is the wider adoption of modern varieties and hybrids that combine high yield potential, superior product quality, and broad adaptability to diverse soil and climatic conditions.

The analysis of the State Register of Plant Varieties Suitable for Dissemination in Ukraine revealed differences in the rate of expansion of the varietal and hybrid composition among the three botanical pumpkin species. As of June 2026, the Register included 47 pumpkin varieties and hybrids, of which 17 (36.2%) belonged to *Cucurbita pepo* L., 16 (34.0%) to *Cucurbita maxima* Duch., and 14 (29.8%) to *Cucurbita moschata* Duch. (Fig. 1).

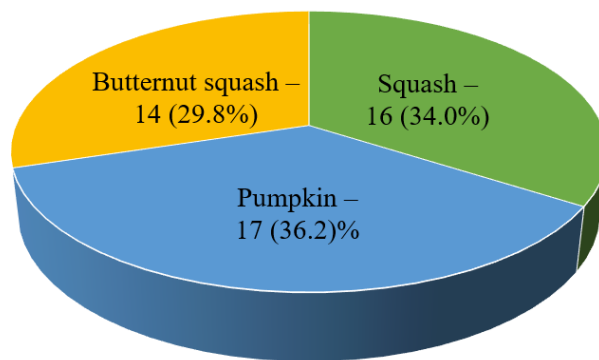


Fig. 1. Structure of the variety and hybrid composition of pumpkin in the State Registry of Plant Varieties Suitable for Dissemination in Ukraine [10]

The most intensive breeding activity for *Cucurbita maxima* was observed in 2022, when four new varieties and hybrids were registered. Three varieties and hybrids were added to the State Register in both 2018 and 2025, two in 2017, and one each in 2019, 2024, and 2026.

The varietal assortment of *Cucurbita pepo* is characterized by the longest period of development. The first two varieties were registered as early as 1950, followed by a gradual expansion of the Register, with one variety added in 1987, 1993, 1998, 2000,

2016, 2018, and 2020, and two varieties each in 2015 and 2024. The most intensive renewal of the assortment occurred in 2025, when four new varieties and hybrids were registered.

The varietal composition of *Cucurbita moschata* has been formed primarily over the last decade. Two varieties were registered in 2010, followed by two additional varieties in 2017, one variety each in 2018 and 2024, and three in 2021. The most substantial expansion of the assortment was recorded in 2023, when five new varieties and hybrids were included in the State Register.

The obtained results indicate a marked intensification of breeding activities for all three botanical pumpkin species in recent years. Particularly active expansion of the State Register occurred during 2022–2025, reflecting the growing interest of breeding institutions and producers in developing new high-yielding varieties and hybrids adapted to contemporary cultivation conditions and market requirements.

The results also demonstrate that domestic breeding plays a leading role in shaping the pumpkin assortment in Ukraine (Fig. 2). The highest proportion of Ukrainian-developed varieties and hybrids was identified for *Cucurbita pepo* (58.8%) and *Cucurbita maxima* (50.0%). In contrast, the assortment of *Cucurbita moschata* is dominated by introduced varieties, primarily of Dutch origin. An analysis of the countries of origin indicates the extensive use of both domestic and foreign breeding achievements to broaden the assortment of pumpkin crops available in Ukraine.

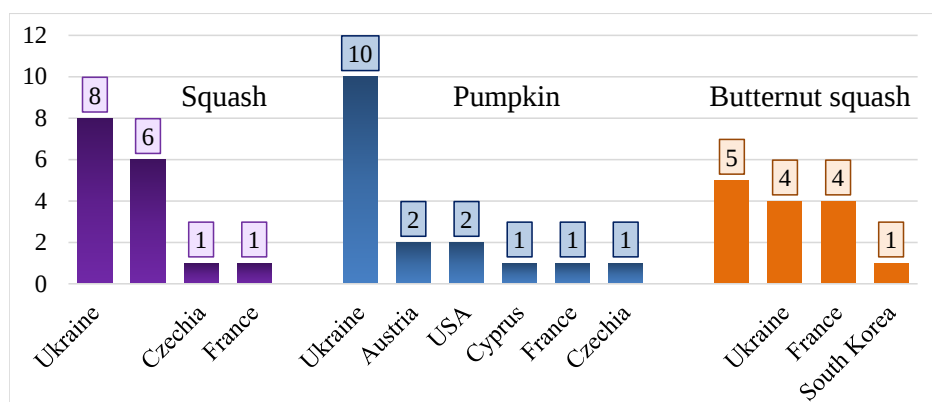


Fig. 2. Distribution of pumpkin varieties and hybrids by originating countries and botanical species

Source: State Registry of Plant Varieties Suitable for Dissemination in Ukraine [10]

Overall, the results demonstrate that the current pumpkin varietal composition in Ukraine is characterized by substantial species diversity and a positive trend in varietal renewal. The active expansion of the State Register of Plant Varieties in recent years reflects the increasing demand for high-yielding varieties and hybrids adapted to current soil and climatic conditions as well as market requirements. At the same time, the considerable share of domestically developed varieties confirms the strong scientific potential of Ukrainian breeding institutions and their capacity to provide producers with competitive planting material. Future development of the sector should focus on expanding the assortment of pumpkins for different economic purposes, particularly hull-less and butternut types, which possess considerable export potential and meet the current requirements of the processing industry.

Thus, the analysis of production performance and the current varietal composition of pumpkin indicates that further improvements in the efficiency of pumpkin cultivation in Ukraine should be based on the integration of advanced cultivation technologies with the adoption of high-yielding varieties and hybrids adapted to specific soil and climatic conditions. Variety selection remains one of the principal factors for realizing the biological potential of the crop and enhancing the competitiveness of pumpkin production.

Conclusions and prospects. Pumpkin productivity in Ukraine varies in its degree of stability depending on the production purpose of the crop. Seed pumpkin production is characterized by considerable yield variability, whereas table pumpkin production demonstrates relatively stable productivity over time. The study revealed an active renewal of the pumpkin varietal composition in recent years and an increasing contribution of domestic breeding programs. Further improvement in production efficiency should be associated with the introduction of modern high-yielding varieties and hybrids adapted to regional cultivation conditions.

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