dough properties. Proteins like gliadin and glutenin determine gluten's impact on texture and quality. The relative contributions of environmental and genetic factors (GxE) in wheat quality are essential for effective breeding strategies, as they help delineate conditions impacting yield and stress tolerance.

This research investigates the quality parameters of five local wheat genotypes across four locations in Serbia, focusing on their variability relative to similar geographic conditions. The aim was to determine which genotypes yield optimal quality parameters, thereby improving overall wheat quality and yield in the region.

This study utilized five winter bread wheat genotypes, namely four cultivars developed at the Maize Research Institute in Zemun Polje – 'Osatka', 'Zemunska rosa', 'Aurelija', and 'ZP Sara' – and one cultivar designated as 'Genotype 1' from an alternative producer. The examined genotypes were farmed in the 2024/2025 growing season using a randomized complete block design (RCB) with two replications. Each plot, consisting of 5 rows and measuring 1.0 m in length, was sowed with 250 seeds, with a spacing of 0.2 m between rows and plots. The sowing occurred in October at four sites in Serbia: Donja Trepča (Čačak municipality, Moravica District, 43.9136°N 20.4708°E); Sefkerin (Opovo municipality, South Banat District, Vojvodina, 45°00′10″N 20°28′35″E); Zemun Polje (Zemun municipality, Belgrade, 44°52′N 20°19′E); and Klenje (Bogatić municipality, Mačva District, 44°50′N 19°29′E). Standard cultivation procedures were employed to maintain the plots free from weeds and diseases while ensuring adequate nutrient supply for the plants. Standard laboratory protocols were used to evaluate grain test weight, chemical composition, and gluten content of whole-wheat flour.

The findings indicated considerable variation in chemical composition, gluten content, and test weight among genotypes and locations. The test weight for all samples ranged from 71.20 to 80.76 kg/hl, making them suitable for industrial use (≥73 kg/hl). However, only 65% of the samples met the quality standard for human consumption (≥76 kg/hl) established by Serbian regulations on grain quality, milling, bread products, and pasta. Gluten concentration varied from 20.9% to 43.8%. The cultivar 'Aurelija' from Donja Trepča had the highest starch content at 67.46% dry matter, while the cultivar 'Osatka' from Zemun Polje had the highest protein content at 16.04% dry matter. These findings indicate that both genotype and location significantly affect grain quality. Nonetheless, these quality parameters are considered high quality according to Serbian standards for cereal grains and products.

Through examination of the 'Zemunska Rosa' cultivar, it was discovered that there is a compelling interaction between environmental factors and key agricultural metrics, particularly test weight, which exhibits significant variation across locations. The importance of growing conditions in determining the overall quality of crops is highlighted by the fact that these conditions can vary. It is also important to note that the 'Osatka' cultivar exhibited significant variation in the amounts of protein and oil it contained, highlighting that external factors influence these characteristics. A further illustration of how environmental conditions can significantly impact nutritional quality is that 'Aurelia' stands out among the cultivars investigated for its remarkable variation in gluten content, which was found to be 18.94%.

Taken together, these findings highlight the critical need for crop breeders, farmers, and agronomists to consider local environmental factors when evaluating crop performance and quality. This will ultimately lead to more tailored cultivation practices that will optimize yields and enhance food security.

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SUBSTANTIATION OF YIELD STRUCTURE ELEMENTS AND TECHNOLOGICAL SUITABILITY OF CHICKPEA VARIETIES FOR MECHANIZED HARVESTING

Chickpea (*Cicer arietinum* L.) holds a significant position among grain legumes due to its unique combination of high drought resistance, atmospheric nitrogen fixation capacity, and high biological value of its seeds.

Given the global trend of climate aridity, chickpeas have become a strategic crop for diversifying agricultural production, enabling stable yields in regions with precipitation deficits. However, the realization of the genetic yield potential of chickpeas heavily depends on the correct variety selection, which must be adapted to the specific soil and climatic conditions of the region. Modern domestic and foreign genotypes differ in their growing season duration, resistance to abiotic stresses, and yield structure.

Studying the correlation between the weight of seeds per plant and the number of pods is of particular relevance, as it allows for the optimization of cultivation technology. Investigating the morphobiological parameters of different varieties is an essential stage in forming a varietal policy aimed at the sustainable development of the pulse sector. Furthermore, as a valuable predecessor, chickpeas contribute to improving soil fertility and increasing the overall profitability of crop rotations.

Special attention is given to the study of morphobiological markers of productivity, which allow for

the identification of varietal potential during early stages of organogenesis and the prediction of their response to fluctuating hydrothermal conditions throughout the growing season.

The introduction of foreign genotypes into domestic agroecosystems requires a rigorous assessment of their ecological plasticity, as a mismatch between the plant's genetic program and the specifics of the local climate can lead to a significant decrease in seed filling and technological quality. Thus, a systematic approach to assessing modern chickpea varietal diversity is a necessary tool for forming a stable raw material base and enhancing the overall profitability of the grain production industry in Ukraine.

The aim of the study is to conduct a comparative assessment of morphometric parameters and yield structure of modern chickpea varieties to identify the genotypes most adapted to the conditions of the Right-Bank Forest-Steppe of Ukraine.

Experimental work was conducted at the research field of Uman National University of Horticulture. The objects of the study were chickpea varieties of various morphotypes: 'Triumf', 'Skarb', 'Rozanna' (domestic breeding), and 'Pasha' (foreign breeding). The experiments were established using the randomized block method in four replicates.

The observation program included assessments of field germination, height of the lowest pod attachment, seed weight per plant, and 1,000-seed weight. Statistical data processing was performed using variational analysis methods.

Analysis of the growth and development dynamics of the studied chickpea varieties confirmed their high adaptability to the hydrothermal conditions of the Forest-Steppe, although significant variability was observed in certain yield structure indicators. It was established that the 'Triumf' variety was characterized by the most stable field germination (88–92%), which ensured optimal plant density at the time of harvest. Plant height at full maturity ranged from 45 to 58 cm, with the maximum values recorded for the 'Rozanna' variety. An important technological indicator is the height of the lowest pod attachment, which for the 'Skarb' variety was 22–24 cm, allowing for mechanized harvesting with minimal losses.

The foreign genotype 'Pasha' was noted for its large seed size; however, its number of pods per plant was 12–15% lower than that of the domestic variety 'Triumf'. The 1,000-seed weight was highest in the 'Skarb' variety, reaching 380–410 g, which meets the requirements for high-quality seed material.

'Rozanna' demonstrated the highest resistance to anthracnose and fusarium, maintaining active photosynthetic potential until the end of seed filling. The number of pods per plant significantly depended on moisture availability during the flowering phase, where 'Triumf' proved to be the most tolerant to atmospheric drought. Over the years of research, the average seed yield ranged from 2.2 to 2.8 t/ha, with 'Skarb' leading at 2.95 t/ha.

The protein content in 'Rozanna' seeds was 24.5%, highlighting its high nutritional value. Statistically, it was proven that 'Pasha' responds better to improved nutrition backgrounds, while domestic varieties are more stable on poorer soils. Initial growth energy was higher in 'Triumf' and 'Rozanna', allowing them to compete effectively with weeds.

The analysis of the vegetative period duration revealed that domestic varieties reached physiological maturity 5–7 days earlier than the foreign genotype, which is a significant factor in avoiding late-summer moisture deficits. It was established that the 'Skarb' variety exhibited the highest lodging resistance due to its strong lignified stem, ensuring a stable canopy architecture even under intensive precipitation. The lodging index for 'Triumf' remained consistently low, which, combined with its synchronized pod ripening, significantly reduced seed shattering during the direct combining process. Evaluation of the harvest index (HI) showed that 'Rozanna' efficiently partitioned dry matter to reproductive organs, reaching a coefficient of 0.42–0.45 depending on the year of cultivation. Furthermore, the seed cleaning and grading process indicated that 'Pasha' provided the highest output of the large-fraction seed (over 9 mm), which increases its commercial attractiveness for the export-oriented food market.

Correlation analysis confirmed a direct dependence of yield on the number of productive nodes on the main stem. In general, the use of the studied genotypes ensures high economic efficiency of chickpea cultivation in the region.

Based on the set of economically valuable traits for the conditions of the Right-Bank Forest-Steppe, the domestic varieties 'Skarb' and 'Triumf' are the most promising, as they combine high yield with suitability for direct combining. The 'Rozanna' variety is recommended for use in organic technologies due to its high resistance to pathogens. The foreign variety 'Pasha' is best suited for intensive technologies with high levels of agrotechnical support to realize its large-seed potential.