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COMPARATIVE ANALYSIS OF WINTER WHEAT *(TRITICUM AESTIVUM L.)* CULTIVARS UNDER THE PEDOCLIMATIC CONDITIONS OF THE WESTERN PLAIN OF ROMANIA, 2025

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Abstract. *The objective of this study was to evaluate the performance of several winter wheat cultivars grown under the pedoclimatic conditions of the Western Plain of Romania during the 2024–2025 growing season. The experiment was carried out on a clay-loam chernozem soil, including three cultivars (Glosa, FDL Miranda, and Pitar) arranged in four replications under a uniform crop management system. Fertilization consisted of applying the complex fertilizer 16-48-0 (32-96-0) and urea (92 kg N ha⁻¹). Throughout the vegetation period, climatic conditions were favorable, with evenly distributed rainfall and moderate temperatures. The results showed that the average grain yield ranged from 7100 to 7500 kg ha⁻¹, with grain moisture between 9.2% and 10.0%. The FDL Miranda cultivar achieved the highest yield (7500 kg ha⁻¹), followed by Glosa (7180 kg ha⁻¹) and Pitar (7100 kg ha⁻¹). Morphological traits indicated a greater plant height for FDL Miranda (92 cm) and a higher thousand-kernel weight for Pitar (46 g). All cultivars exhibited good tolerance to wintering and drought but showed moderate susceptibility to* Septoria tritici*, particularly FDL Miranda. Overall, the results confirm the adaptability of the tested cultivars to the climatic conditions of the Western Plain and highlight the high productive potential of FDL Miranda.*

Keywords*: wheat, cultivar, yield, morphology, Western Plain, Romania*

INTRODUCTION

Winter wheat (*Triticum aestivum* L.) is one of the most important cereal crops worldwide, ranking second after maize in terms of cultivated area and total grain production. Due to its high nutritional value and major role in ensuring food security, wheat holds a strategic position in the agricultural structure of Romania (BĂTRÎNA, 2018; IMBREA ET AL., 2019).

In the Western Plain of Romania, pedoclimatic conditions are generally favorable for winter wheat cultivation, as clay-loam chernozem soils and a moderate rainfall regime allow for stable and high-quality yields (POP & SMULEAC, 2020). However, in recent years, climatic variability — particularly the alternation of drought periods with intense rainfall episodes — has significantly influenced phenology, grain mass, and quality (LAL, 2020; ZHANG ET AL., 2021).

The genetic diversity of modern wheat cultivars enables the selection of genotypes with improved adaptability to thermal and hydric stress, enhanced resistance to foliar diseases, and higher nutrient use efficiency (CAIRNS ET AL., 2013; IMBREA ET AL., 2022). In this context, the correct choice of cultivar becomes a key factor for ensuring yield stability and grain quality, especially in areas with a temperate-continental climate such as the Western Plain of Romania (CHIȚU & SĂULESCU, 2024).

The aim of this study was to evaluate the behavior of three winter wheat cultivars — Glosa, FDL Miranda, and Pitar — regarding morphological traits, yield performance, and resistance to major diseases, under the specific pedoclimatic conditions of the Western Plain during the 2024–2025 agricultural year.

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MATERIAL AND METHODS

The research was carried out during the 2024–2025 agricultural year in the Western Plain of Romania, on a clay-loam chernozem soil characterized by medium fertility and good water retention capacity. The preceding crop was winter oilseed rape. The experimental field was established in autumn 2024 and organized in a randomized block design with three cultivars and four replications. Each plot had an area of 10 m², and the row spacing was 12.5 cm.

The biological material consisted of three winter wheat (*Triticum aestivum* L.) cultivars with different morphological and productive characteristics: Glosa**,** FDL Miranda, and Pitar. All technological measures were applied uniformly across the experimental variants. Fertilization included the application of 16-48-0 (32-96-0) on October 9, 2023, and urea (92 kg N ha^{-1}) on March 6, 2025. The seeds were treated with Amiral Profi (0.5 L t^{-1}) prior to sowing.

Sowing was performed on October 17, 2024, at a depth of 4 cm, followed by pre-emergence weed control using Omnera 1.0 L ha^{-1} (April 24, 2025). Two fungicide treatments with Falcon Pro 1.0 L ha^{-1} were applied on April 24 and June 4**,** respectively, and an insecticide treatment with Mospilan 0.15 kg ha^{-1} was applied in early June. Harvest took place between June 26–27, 2025, and threshing was performed on July 5, 2025**.**

Meteorological data recorded during the growing season showed a relatively favorable year, with moderate temperatures (mean 12.9°C) and a total rainfall of approximately 295 mm between October and June. The most significant precipitation was recorded in May (71 mm) and April (27 mm)**,** which ensured optimal conditions for grain filling.

The following parameters were analyzed: phenological stages (emergence, heading, and physiological maturity), plant height, plant density, thousand kernel weight (TKW), test weight (TW), grain moisture, and yield per hectare. Disease incidence was assessed visually for *Septoria tritici*, *Puccinia recondita*, *Puccinia striiformis*, and *Fusarium* spp., using frequency (%) and intensity (%) scales. Data were statistically processed, and average values were calculated for each cultivar**.**

RESULTS AND DISCUSSIONS

The climatic conditions recorded during the 2024–2025 growing season were generally favorable for winter wheat. Average air temperatures ranged between 8.3°C in April and 24.2°C in July, while total rainfall during the vegetation period reached approximately 295 mm, concentrated mainly in May and June. These conditions supported good vegetative growth and grain filling, with no major abiotic stress factors.

Phenological and Morphological Traits

Phenological observations (Table 1) showed that all cultivars had uniform emergence and heading, with small differences in maturity. The cultivars Glosa and FDL Miranda headed around May 3–4, while Pitar was slightly earlier, on May 3. Maturity was reached between June 21 and June 22 for Glosa and FDL Miranda, and on June 1 for Pitar, confirming its earliness.

Plant height varied between 81 and 92 cm, with FDL Miranda exhibiting the tallest plants. The plant density after winter ranged from 480 to 840 plants m^{-2}, indicating very good winter survival and tillering capacity. Thousand kernel weight (TKW) ranged between 42 and 46 g, while test weight (TW) ranged from 78 to 81 kg hl^{-1}. The cultivar Pitar recorded the highest TKW (46 g), while Glosa and FDL Miranda had slightly lower values (42 g).

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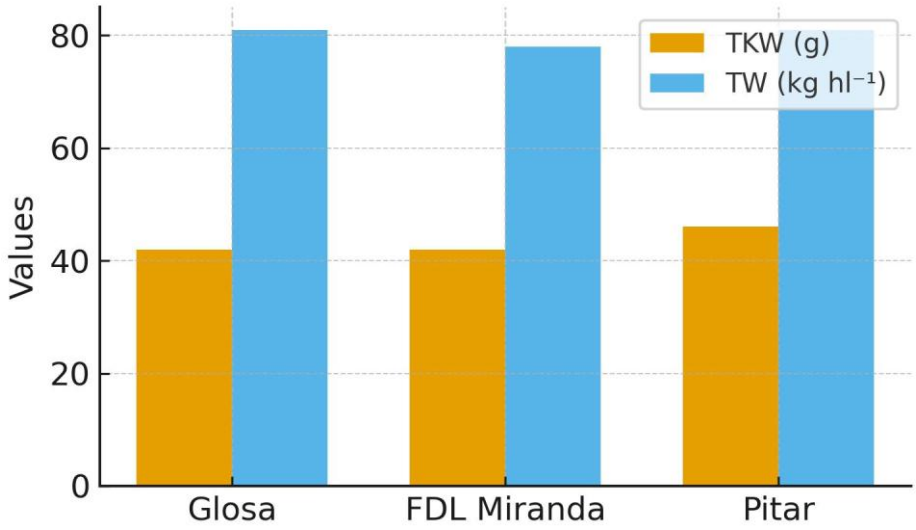

Figure 1. Average grain yield of winter wheat cultivars under the pedoclimatic conditions of the Western Plain (2025)

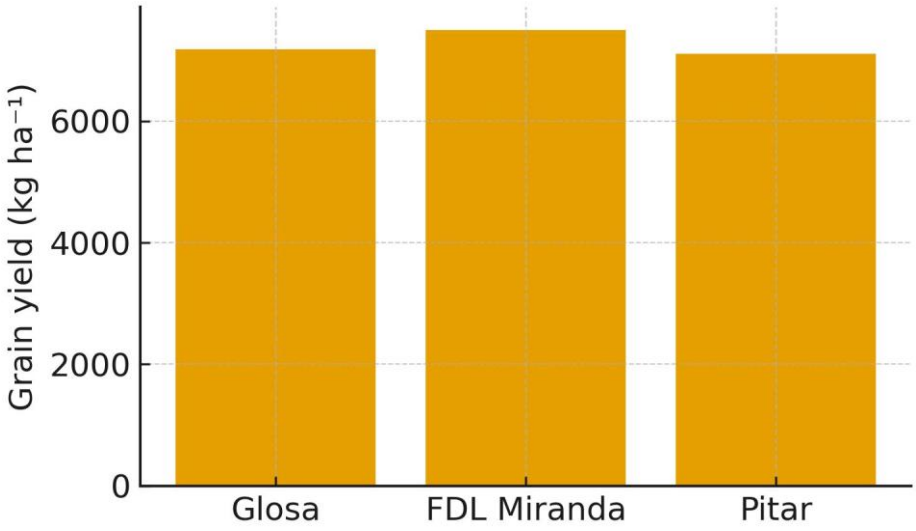

Figure 2. Thousand kernel weight (TKW) and test weight (TW) of winter wheat cultivars under the pedoclimatic conditions of the Western Plain (2025)

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Table 1.

Morphological and phenological characteristics of the winter wheat cultivars (Western Plain, 2025)

Cultivar	Emergence	Heading	Maturity	Plant height (cm)	Density (plants/m²)	TKW (g)	TW (kg hl⁻¹)
Glosa	06.11	03.05	21.06	82	480	42	81
FDL Miranda	06.11	04.05	22.06	92	840	42	78
Pitar	07.11	03.05	01.06	81	840	46	81

Table 2.

Grain yield and moisture content of the winter wheat cultivars (Western Plain, 2025)

Cultivar	Grain yield (kg ha⁻¹)	Grain moisture (%)
Glosa	7180	9.9
FDL Miranda	7500	9.97
Pitar	7100	9.27

CONCLUSIONS

The results of the field experiment carried out in the Western Plain of Romania during the 2024–2025 growing season highlight the distinct behavior of the tested winter wheat cultivars under local pedoclimatic conditions.

The cultivar FDL Miranda achieved the highest yield (7500 kg ha⁻¹), associated with vigorous vegetative growth and a tall plant stature. However, it also showed the highest susceptibility to *Septoria tritici*. The cultivar Pitar was characterized by early maturity and the highest thousand kernel weight (46 g), together with good tolerance to foliar diseases. Glosa displayed stable yield performance (7180 kg ha⁻¹), balanced morphological traits, and uniform ripening, confirming its adaptability to the temperate continental conditions of the Western Plain.

Overall, all cultivars exhibited very good winter hardiness, drought tolerance, and foliar health, which, together with the favorable climatic regime, contributed to stable and high yields. The results recommend FDL Miranda for high-yield systems with integrated disease control and Pitar and Glosa for environments requiring early maturity and yield stability.

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