YIELD AND QUALITY OF SPRING BARLEY GENOTYPES IN THE TRANSYLVANIAN PLATEAU

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INTRODUCTION

Barley (Hordeum vulgare) is one of the oldest cultivated crops, with multiple uses in human nutrition, animal feed, and especially in the brewing industry, where seed quality directly impacts the malting process (Harwood, 2019; Kok et al., 2018, cited by Quin et al., 2021). The crop is well adapted to water and heat stress conditions, making it a promising option in the context of climate change. Additionally, barley grains represent a valuable feed source due to their high protein content and easily digestible starch (Anderson et al., 1999).

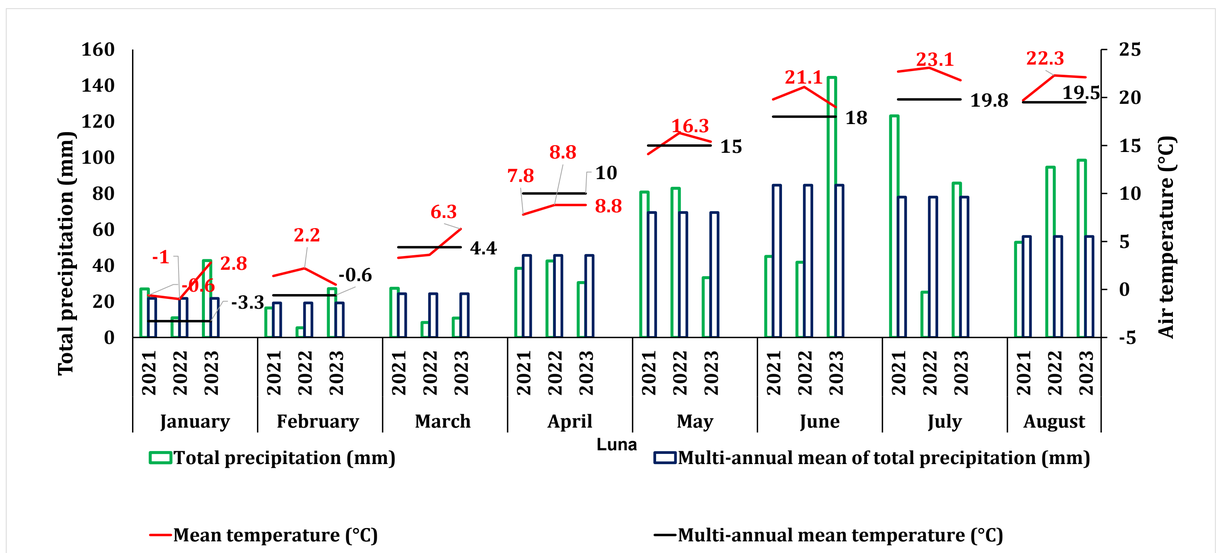
The yield of barley crops is determined by the interaction between genotype, environment, and cultivation technology, including fertilization, sowing time, and water regime. Recent studies report a modest genetic gain in spring barley yield (≈1.07% per year), with production traits strongly influenced by abiotic stress. Grain quality, crucial for the malting industry, is highly sensitive to environmental factors and fertilization, and progress in breeding requires precise phenotypic and genomic data.

In this context, the Transylvanian Plateau, characterized by high pedoclimatic variability, represents a relevant environment for evaluating barley genotypes. This study aims to analyze yield, yield components, and quality traits (protein content) of a set of genotypes cultivated locally to identify high-performing and well-adapted forms for the region.

MATERIAL AND METHODS

In the context of current climate change, evaluating the yield and quality of spring barley genotypes under different pedoclimatic conditions is essential for determining optimal cultivation areas. At the Agricultural Research and Development Station (SCDA) Turda, a comparative trial was conducted over three consecutive growing seasons (2021–2023) involving established varieties and promising breeding lines from the spring barley breeding program. Two of these lines (To 2033/18 and To 1990/18) were recently registered as varieties under the names Ioana and Dumbrăvița. The experiment was set up using a randomized block design with five replications and included 25 spring barley genotypes. Additionally, yield stability of the new varieties was evaluated across a range of environmental conditions encountered at four ISTIS testing sites (Hărman, Dej, Rădăuți, and Sibiu).

RESULTS AND DISCUSSIONS



Source of primary data: Turda meteorological station (longitude: 23 ° 4´; latitude: 46 ° 35´; altitude: 427m)

Figure 1. Climatic conditions at SCDA (Agricultural Research Development Station) Turda during 2021–202

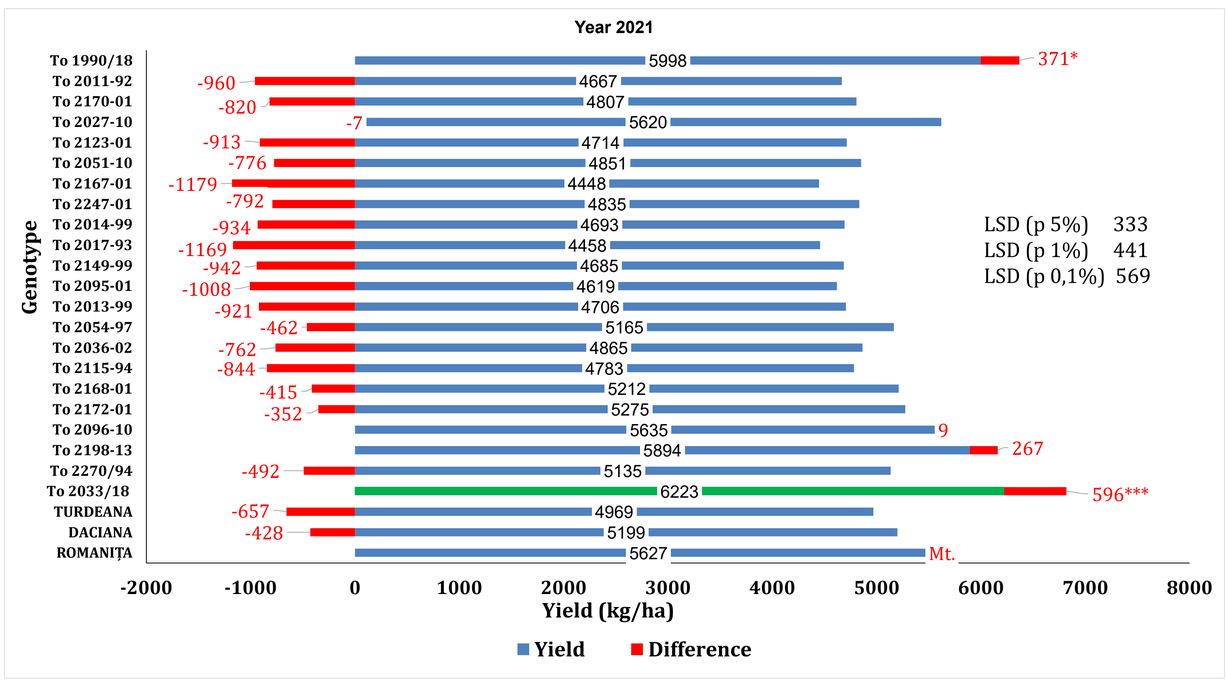


Figure 2. Yields obtained in the comparative crop in 2021 at Turda

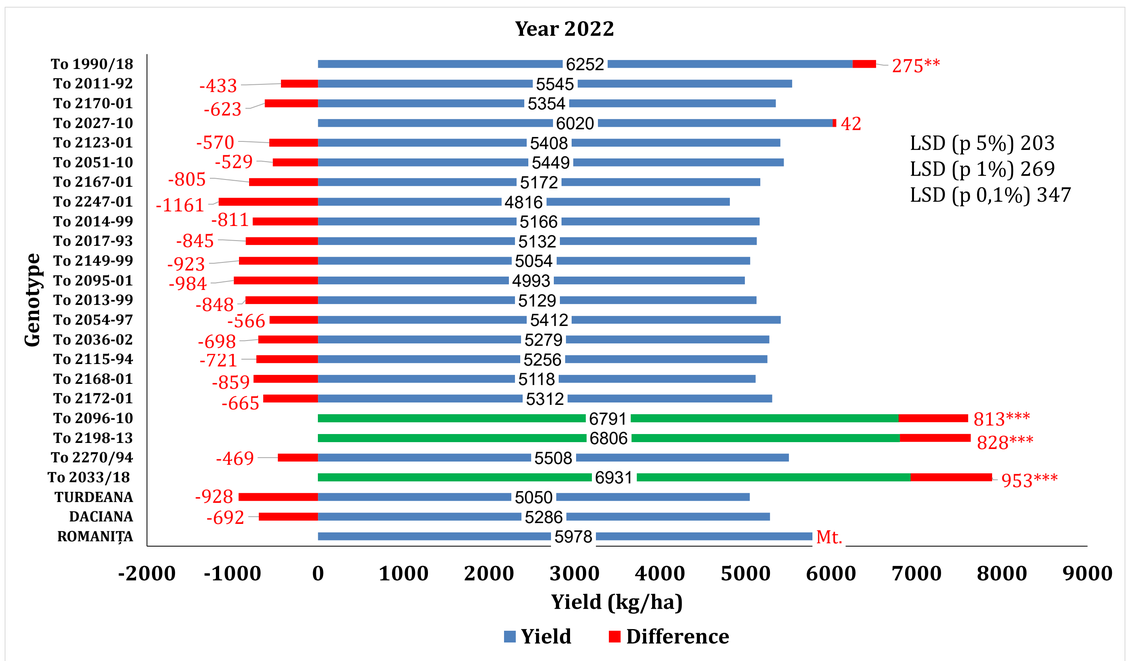


Figure 3. Yields obtained in the comparative crop in 2022 at Turda

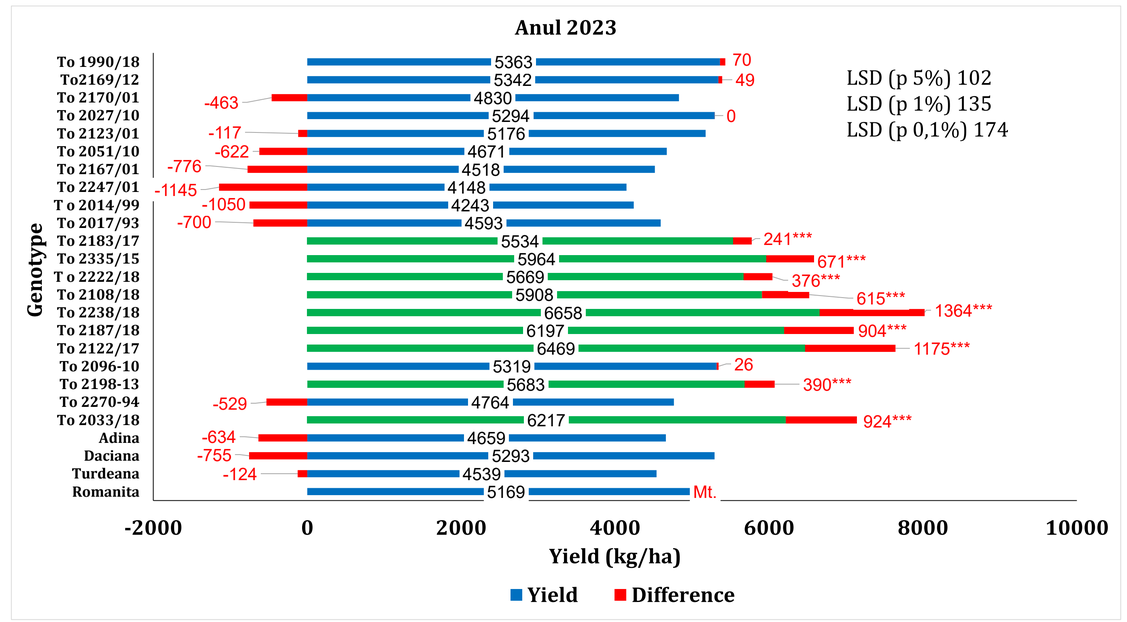


Figure 4. Yields obtained in the comparative crop in 2023 at Turda

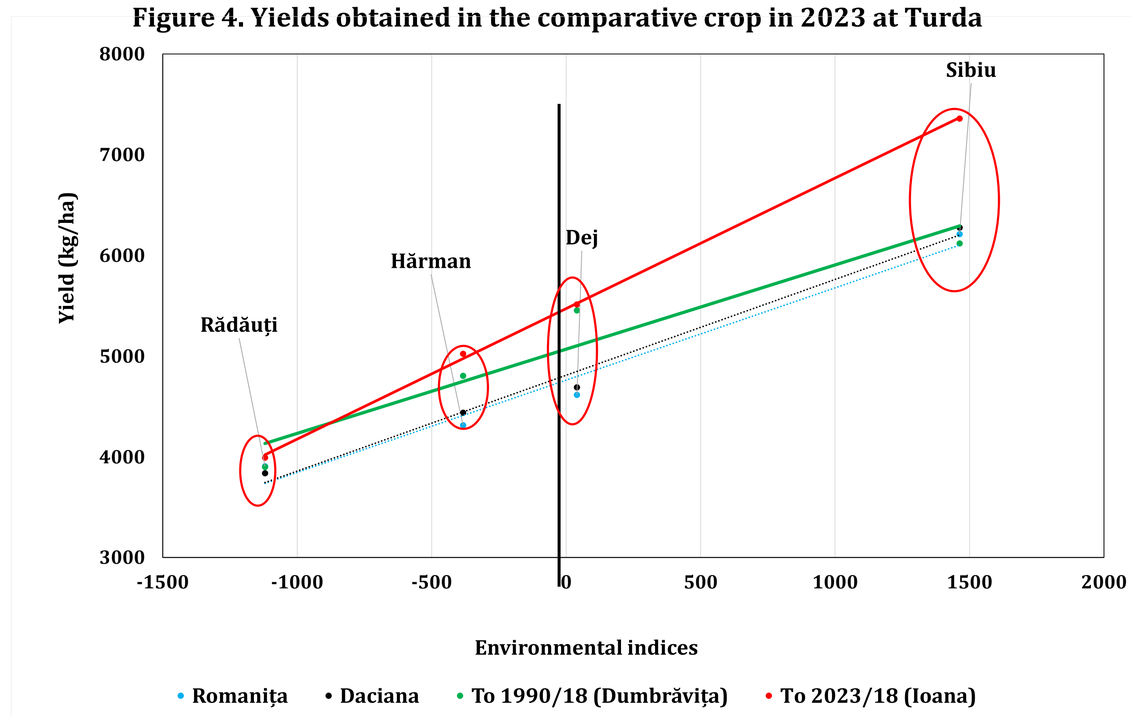


Figure 5. Grain yields at Ioana and Dumbrăvița across of environmental conditions in the national testing network

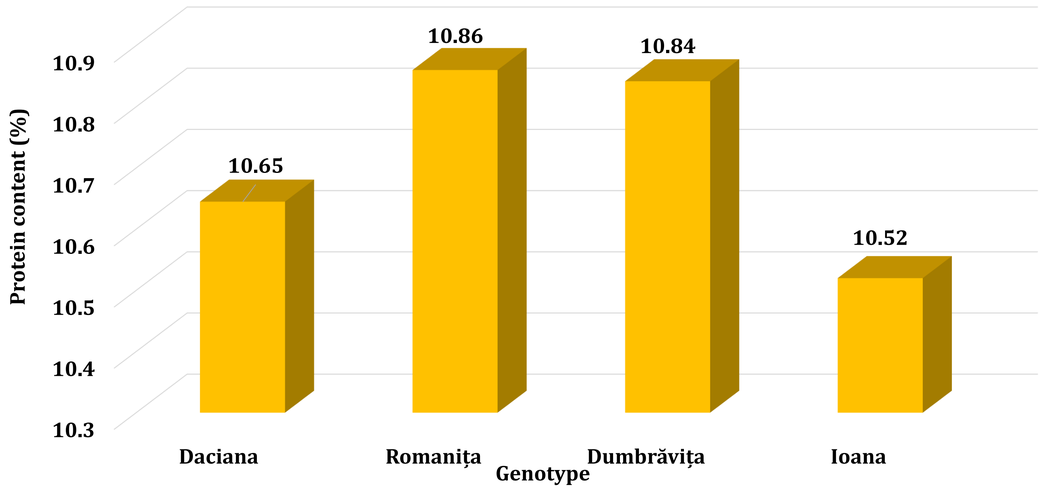


Figure 6. Mean protein content in spring barley varieties

CONCLUSIONS

- ✓ Climatic conditions during 2021–2023, characterized by warmer winters, dry springs, and heat stress in summer months, directly influenced the potential of spring barley genotypes, highlighting differences in stability, adaptability, and yield potential among them.
- ✓ The genotype To 1990/18 (Dumbrăvița) maintained consistent yields across all environments, demonstrating broad adaptability and good tolerance to unfavorable conditions.
- ✓ The line To 2033/18 (Ioana) stood out with very high yields in favorable conditions, consistently ranking among the top genotypes, except at the Rădăuți site.
- ✓ Daciana and Ioana showed low and stable protein content, while Romanița recorded the highest values, followed by Dumbrăvița.
- ✓ Genotypes To 2238/18, To 2122/17, To 2033/18 (Ioana), and To 2335/15 significantly outperformed the Romanița control, confirming their superior genetic and agronomic potential for cultivation and inclusion in future breeding programs.