

Winter and spring barley assortment evaluation for yield and quality parameters under different pedoclimatic conditions in 2023 – 2024 year

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Introduction

The adaptability of barley (*Hordeum vulgare* L.) to the pedoclimatic conditions in Romania makes it one of the most important cereal crops in the country. Romania benefits from a variety of climatic conditions and soil types, which allows the cultivation of barley in different regions, from plains to hilly and mountainous areas.

Material and methods

During 2023 – 2024 year, an assortment of 25 variants of winter barley and 25 spring barley were experimented in 8 different pedo-climatic regions of Romania (Fig 1). The analysed parameters were yield potential (kg/ha), thousands grain weight (g), protein and starch content (%) both for winter and spring genotypes. Beta-glucans content was assessed only for spring varieties in 2 experimental sites (NARDI Fundulea and ARDS Turda). In addition to field testing, at NARDI Fundulea the winter barley assortment was tested for drought resistance by inducing drought artificially in seedling stage, and the root and shoot length were assessed to evaluate the drought resistance of each genotype.

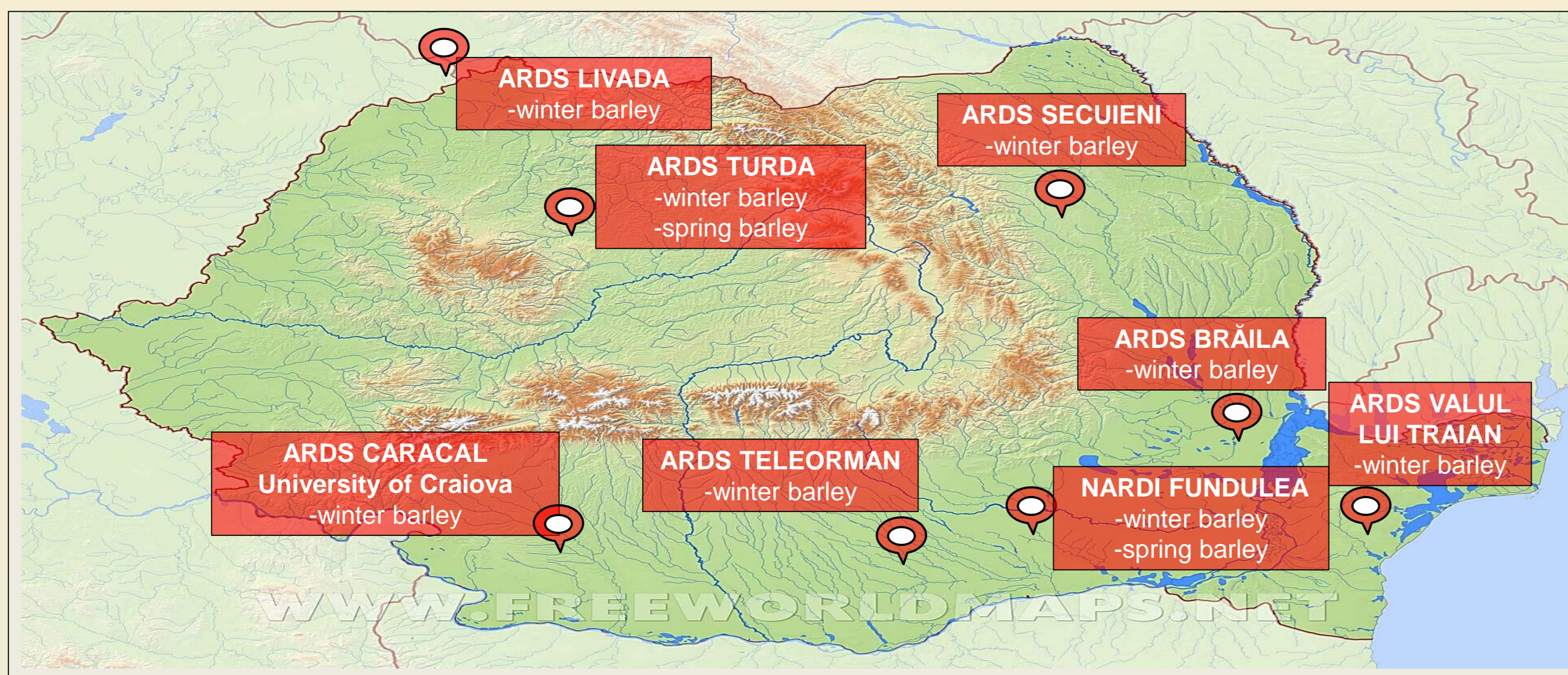


Figure 1. Experimental sites in different pedoclimatic regions of Romania

Results and discussions

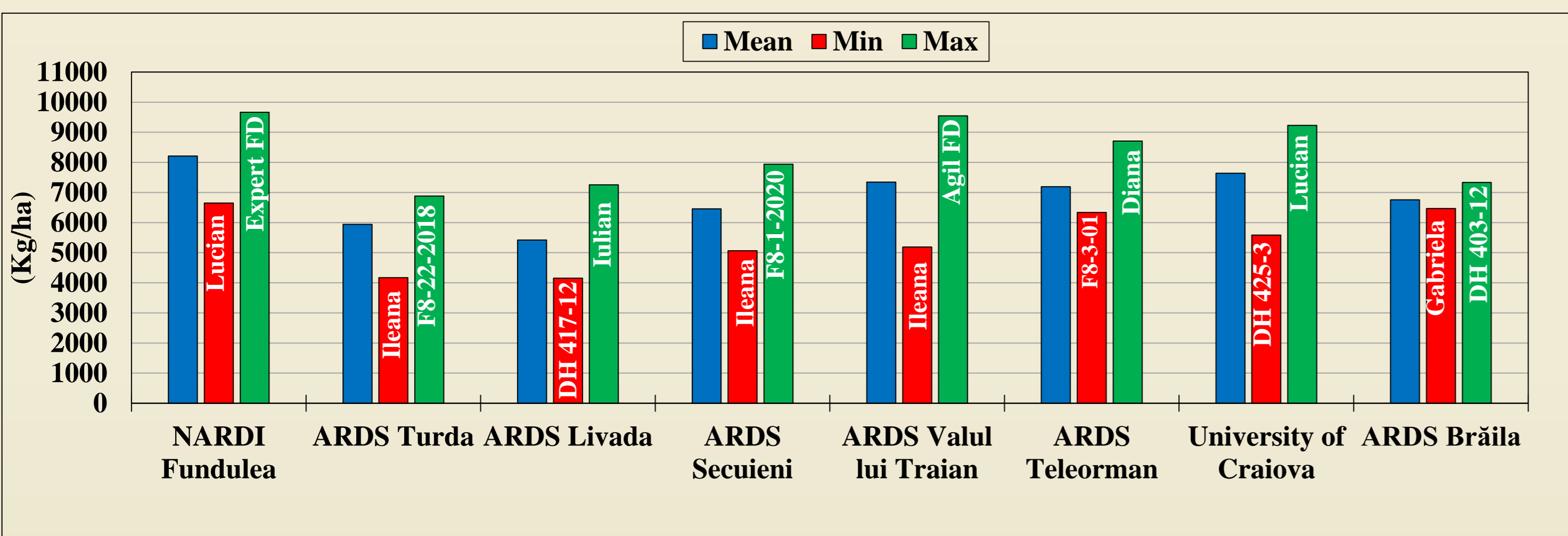


Figure 2. Winter barley yield registered in 8 experimental sites, 2023 -2024

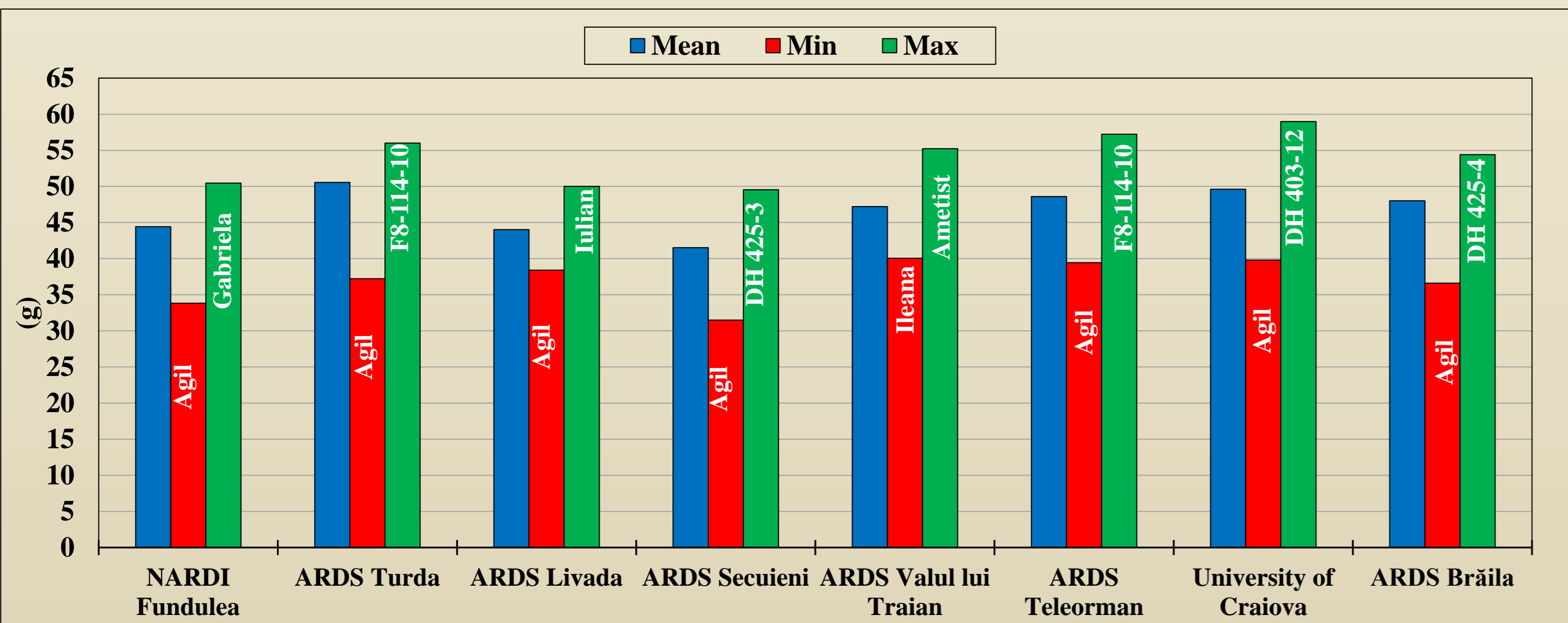


Figure 3. Winter barley thousands grain weight (g) in 8 experimental sites, 2023-2024

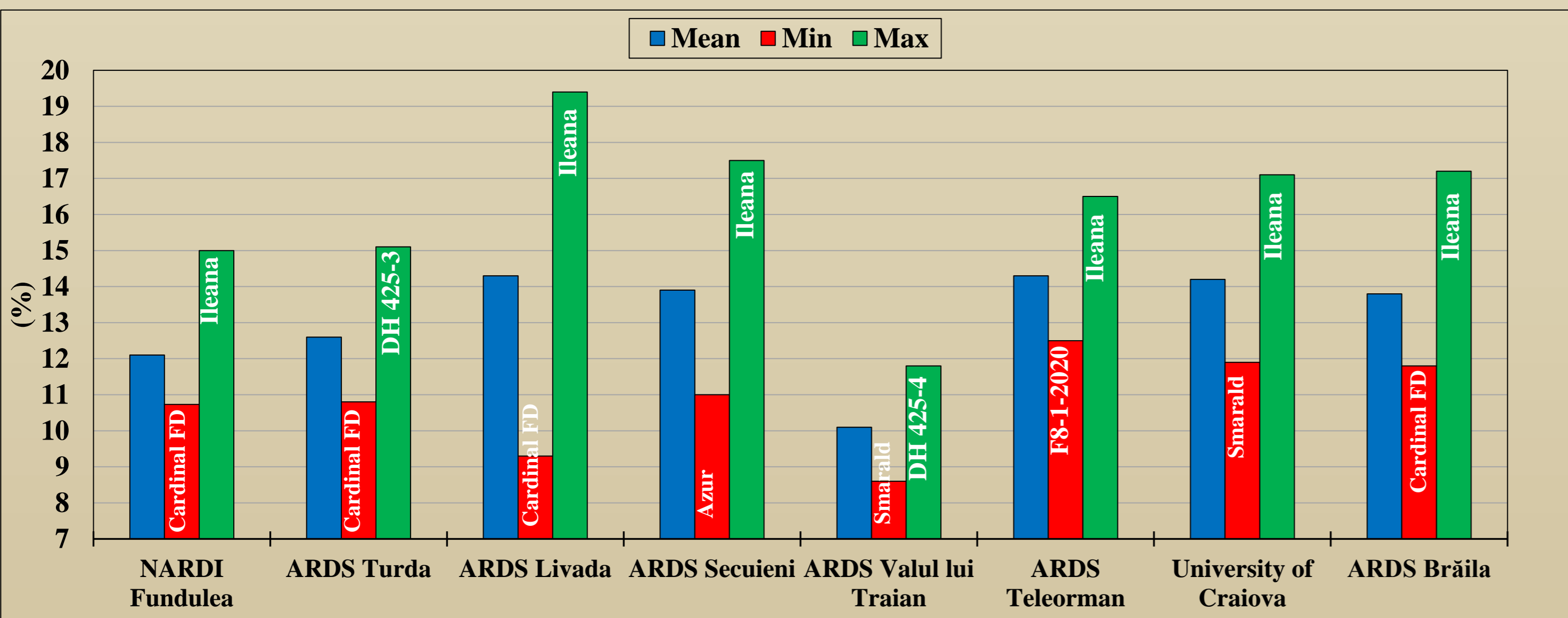


Figure 4. Winter barley protein content (%) in 8 experimental sites, 2023-2024

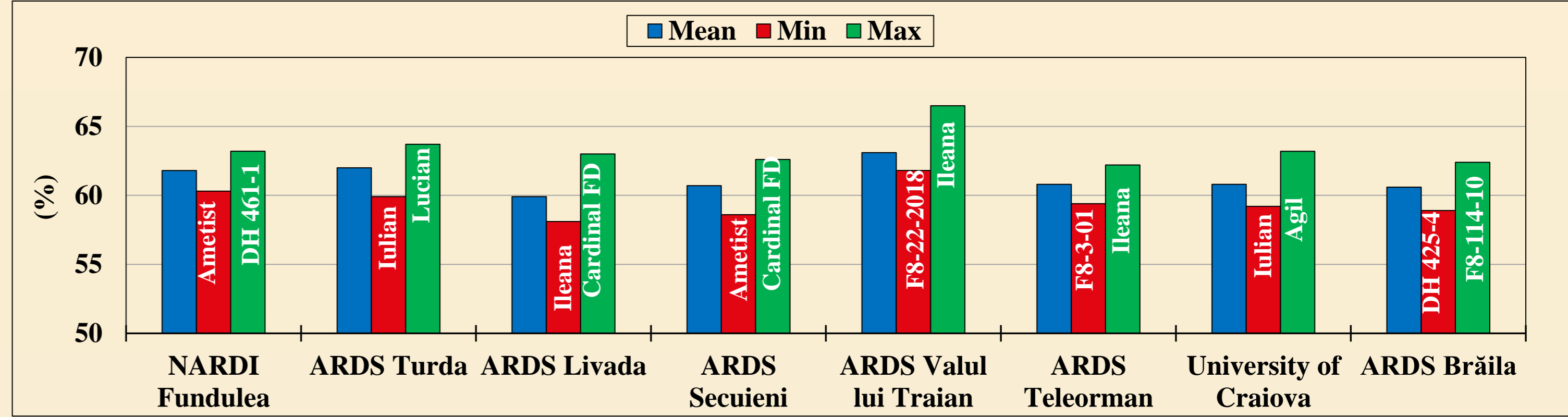


Figure 5. Winter barley starch content (%) in 8 experimental sites, 2023-2024

The obtained results are revealed as the mean, minimum, and maximum values, for all parameters. Expert FD variety registered the highest value (9662 kg/ha) of winter barley assortment at NARDI Fundulea, meanwhile, the lowest yield value has been registered for the Ileana variety (4172 kg/ha), at ARDS Turda (fig. 2). Protein content had the best response for Cardinal FD, Azur, and Smarald with a protein content of less than 11% (fig. 4). Also, the Ileana variety was the single genotype that succeeded in over 65% of starch content at ARDS Valul lui Traian (fig. 5). The lowest value of TGW was constant for the Agil variety in almost all regions except ARDS Valul lui Traian (fig. 4.), meanwhile the highest value was obtained at ARDS Livada, 19.4 g (Ileana variety). After being removed from the growth chamber, one roll was considered a control (green-colored), and the other was exposed to polyethylene glycol (PEG 6000), which induces water stress (red-colored). The lower difference (yellow colored) between the control and drought-induced sample highlights a better drought tolerance (fig. 6). For shoot length, the smallest differences were registered for the Expert FD variety (16 mm) and Diana (3 mm). The root length had a better response for Smarald (3 mm), Cadril (10 mm), Dh 420-3 (16 mm), F8-1-2020 (20 mm), and Diana (20 mm).

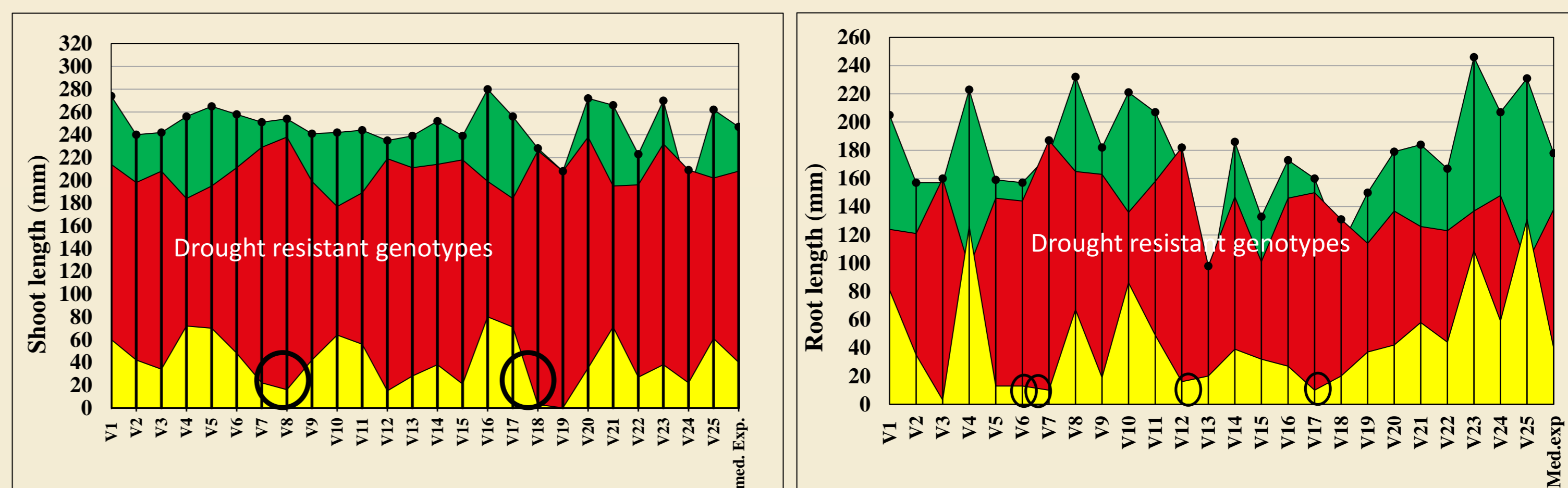


Figure 6. Effect of water stress on the shoot length (left) and root length (right) of tested genotypes in the seedling stage, 2023 - 2024

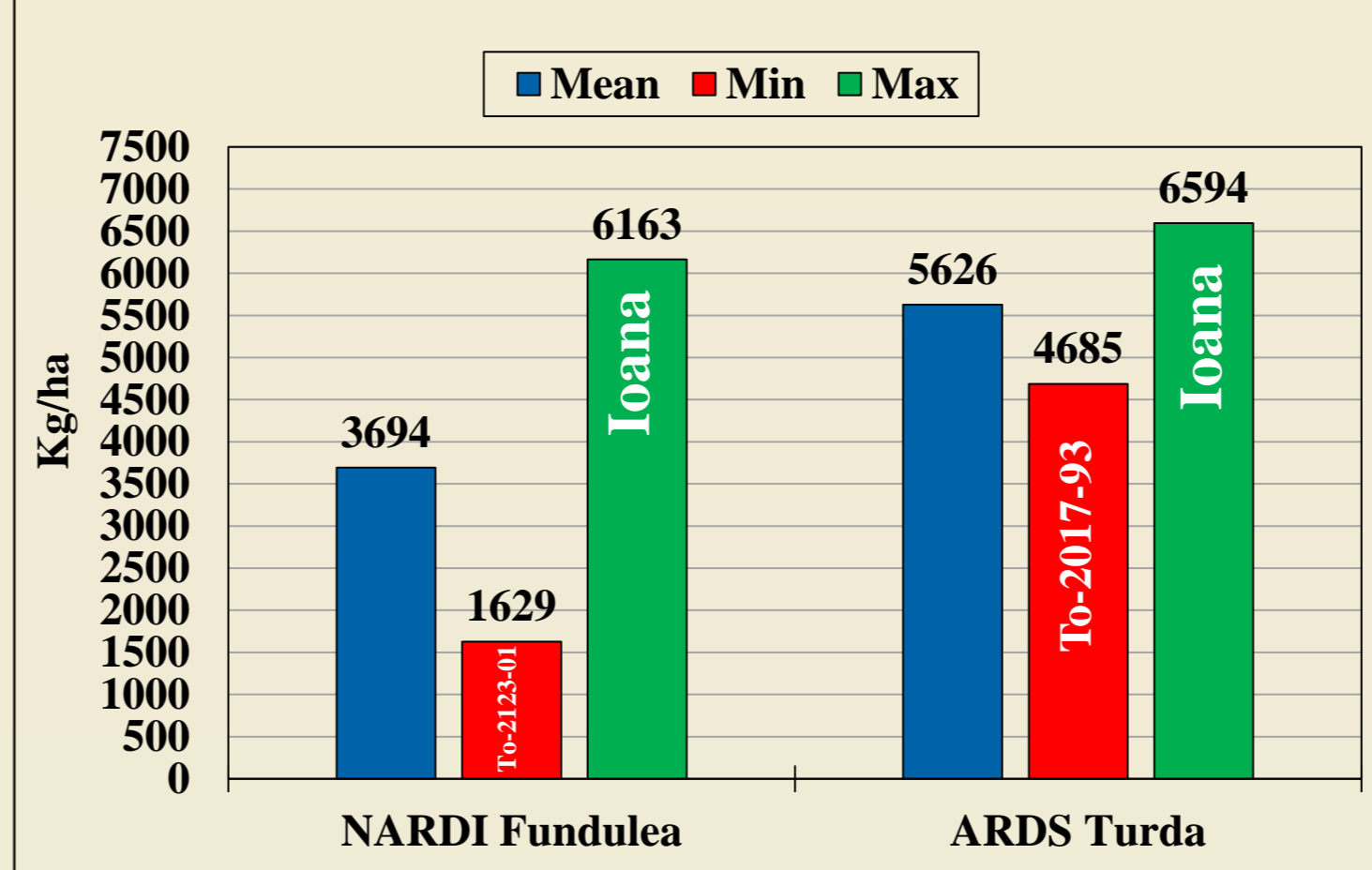


Figure 7. Spring barley yield registered in 2 experimental sites, 2023 -2024

The yield of spring barley varieties (fig. 7) and quality parameters (fig 8) are presented as mean, minimum, and maximum values. The difference in registered mean value in the two experimental sites is 1932 kg/ha. The Ioana variety registered the maximum value in both experimental locations with a maximum of 6945 kg/ha at ARDS Turda. The difference in minimum value between the experimented varieties is 3056 kg/ha.

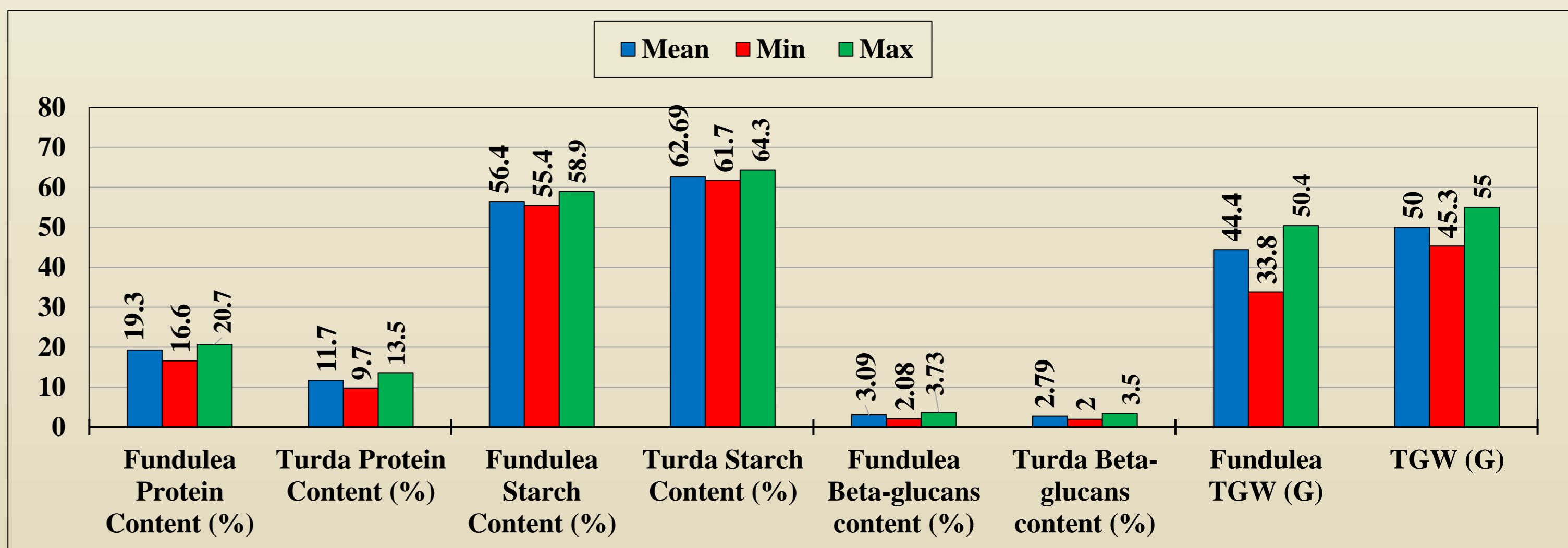


Figure 8. Spring barley quality parameters in 2 experimental sites, 2023-2024

Conclusions

During research activities for project proposal, the second year of ADER 1.1.4 research project, the obtained results between studied traits are very different from one region of another for yield potential and quality parameters, for both growing seasons of barley (winter and spring). The best varieties for yield and quality traits will be promoted as adaptable varieties in specific pedo-climatic growing region.

Perspective

In future activities of the project, the results will be correlated continuously every year to have a better background about the genotypes adaptability in different pedoclimatic regions of Romania. Thus, 2 selected perspective lines (at NARDI Fundulea) for drought resistance were added to the main experimental assortment of winter barley genotypes.

Acknowledgements

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