Grain Yield and Yield Components of Winter Barley

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Introduction

Barley cultivars that were in production until the end of the eighties were characterized by the lower yields, good technological quality and higher stem sensitive to lodging. Barley is globally cultivated on an area of about 47.5 million hectares, an average yield of 2.6 t/ha being realized making it the fifth grown crops. Barley is one of the oldest agricultural species, which has gone through genetic alterations during the process of domestication. The grain quality of barley is affected by genetic and environmental factors as well as their interaction (Dekić et al. 2011; Madić et al. 2014; Pržulj et al. 2014).

Materials and Methods

During the 2013/14 and 2014/15 growing seasons, three cultivars of winter barley (Grand, Zlatnik and Rekord) grown at the experimental field of the Small Grains Research Centre in Krageujevac (Serbia) were studied. The experiment was laid out in a randomised block design with five replications and a plot size of 50 m² (10 m x 5 m). In all years, winter barley was sown in the second half of October at a row spacing of 12.5 cm. Fertilizers have been used in the 300 kg/ha of form of complex NPK fertilizer 8:24:16, superphosphate (17% P2O5) and ammonium nitrate (AN) 34.4% N. The following traits were analysed: grain yield, 1000 grain weight and test weight.

Results and Discussion

Analysis of variance was found highly significant effect of year on the grain yield (F=10.351”), 1000 grain weight (F=240.215”) and test weight (F=42.373”). Based on the analysis of variance, it can be concluded that there are very significant differences in grain yield and 1000 grain weight regard the cultivar (Table 1).

The grain yield of winter barley significantly varied across years, from 5.324 t/ha in 2013/14 to 5.922 t/ha in 2014/15. The average two-year value of grain yield was 5.623 t/ha. Thousand grain weight were significantly greater in 2013/14 than in the 2014/15 year. The 1.000 grain weight of winter barley varied across cultivars, from 38.27 g in cultivar Grand to 42.92 g in cultivar Rekord. The average two-year value of 1.000 grain weight was 41.08 g. Test weight were significantly greater in 2014/15 than in the previous year. The average two-year value of test weight was 65.28 kg/hl (Table 2).

During the first year of investigations, cultivar Grand achieved the highest grains yield (5.761 t/ha), followed by Rekord (5.194 t/ha), while the lowest yield was at Zlatnik cultivar (5.017 t/ha). During the second year of investigations the yield of Grand cultivar was the highest with 6.394 t/ha (Table 3). Considerable variation in yield depending on years of research have established Popović et al. (2011) and Rajić et al. (2019). During the first year, cultivar Rekord achieved the highest average 1000 grain weight (51.93 g). During the second year of investigation 1000 grain weight observed was the highest at Zlatnik variety (34.17 g). Average test weight observed in the first and second year period was the highest at Zlatnik variety (64.70 kg/hl and 70.12 kg/hl). Malting barley is expected to have 1000 grain weight of 40 to 46 g and test weight of 68 to 75 kg/hl (Paunović et al. 2006).

Negatively and medium correlations were observed between grain yield and 1000 grain weight in the 2013/14 (r=0.687), in the 2014/15 (r=0.582) and investigation period (r=0.684). Positively correlations were observed between 1000 grain weight and test weight in the first year (r=0.178) and second year (r=0.731”), Table 4.

Conclusions

More favourable conditions in 2014/15 resulted in a higher average the grain yield value (5.922 t/ha) compared to 2013/14 (5.324 t/ha). Based on these results, it can be concluded that several traits have a decisive role in the formation of grain yield. The contribution of each individual feature can be different for different genotypes and the various environmental conditions so that this results from the interaction between the features within each genotype and genotype interactions with environmental factors.