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Short Note

Response of barley genotypes to nitrogen under mid-hill conditions of Himachal Pradesh

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Abstract

A field experiment was conducted during *Rabi* 2008-09 at Research Farm of Rice and Wheat Research Sub Station, Malan of CSK HPKV, Palampur to study the response of barley genotypes (BHS-380, BHS-169 and HBL-276) to nitrogen (20, 40 and 60 kg N/ha). BHS-169 being at par with BHS-380 recorded significantly higher no. of grains per spike and 1000-grain weight of barley than HBL-276. BHS-169 recorded significantly higher grain yield (20.87 q/ha) of barley followed by BHS-380 (18.57 q/ha) whereas, both genotypes were statistically at par to each other with respect to biological yield. Application of nitrogen at 60 kg/ha resulted in significantly higher grains/spike and 1000-grain weight, which was at par with 40 kg N/ha for 1000-grain weight. No significant effect of the nitrogen on grain and biological yield was found, whereas, 40 and 60 kg N/ha recorded 24.9 and 23.8% higher grain yield over 20 kg N/ha, respectively.

Key words: Nitrogen, genotypes, production, barley.

In Himachal Pradesh, barley (*Hordeum vulgare* L. Sansulata) is an important *rabi* season crop ranking next to wheat and occupies 23.51 thousand hectares with production of 30.67 thousand metric tonnes (Anonymous, 2010-11). Barley is the preferential crop of hill people to meet their requirement of food, fodder and beverages. Nitrogen is one of the primary plant food nutrients, which plays a vital role in plant system. Due to heavy pressure of cropping, the deficiency of nitrogen is universal. Nitrogen deficiency is wide spread in Kangra soils and it limits barley production considerably. The adequate amount of nitrogenous fertilizer is of utmost importance for the synthesis of protein and nucleic acid whereas, excessive nitrogen stimulate protein synthesis to such an extent that it results in the formation of more spongy and weak tissues. Thus, balanced nitrogen is essential for better harvest of the new barley genotypes with high yield potential. On account of genetic variability in different varieties, there has been differential growth, yield and quality responses to varying nitrogen levels (Lauer and Partridge, 1990). Similarly, development of new genotypes is a continuous process to replace the old genotypes that become susceptible to insect-pest, diseases and with reduced genetic yield potential. Therefore, new dual purpose barley genotypes were evaluated for their performance under varying levels of nitrogen *i.e* both under constraint and sufficient levels for further release in the state.

The field experiment was conducted under All India Coordinated Wheat & Barley Improvement Programme to evaluate three barley genotypes at graded nitrogen levels during *rabi* 2008-09 at Rice and Wheat Research Centre, Malan (76/2°E, 32/1° N & 950 m above mean sea level) of CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur. The experiment was conducted in split plot design replicated thrice, allocating three nitrogen levels (20, 40 and 60 kg/ha) in main plots and three genotypes *viz.* BHS-380, BHS-169 and HBL-276 in sub plots. The soil of the experiment site was silty clay loam in texture, acidic in reaction (pH 5.2), medium in available nitrogen (389

kg/ha) and low in available phosphorus (8.0 kg/ha) and potassium (105 kg/ha). The crop was sown on 25.11.2008 and harvested on 30.04.2009. The gross plot size was 12.88 m^2 and net plot yield was harvested from 8.05 m^2. The half dose of N as per treatments and full dose of phosphorus and potassium was applied at sowing. The remaining half N as per treatments was applied at maximum tillering stage (40-45 DAS). The efficient weed control was achieved by post emergence tank mix application of isoproturon @ 1.0 kg/ha + 2,4-D 0.5 kg/ha. Data on different yield and yield-contributing traits were recorded at harvest and analyzed statistically.

Application of nitrogen had significant influence on various yield attributes (*i.e.* plant count/m^2, grains/spike and 1000-grain weight) except earhead/m^2 (Table-1). Nitrogen application at 60 kg/ha resulted in significantly higher grains/spike and 1000-grain weight. However, application of nitrogen at 40 kg/ha was proved to be significantly superior for recording higher plant count/m^2 and statistically similar 1000-grain weight with 60 kg N/ha. This resulted in getting higher grain and biological yield with 40 and 60 kg N/ha and reported an increase of 24.9 to 23.8 % for grain yield and 13,0 to 14.8 % for biological yield, respectively over 20 kg N/ha application, however, it was not reflected significantly. Plavsic *et al.* (2008) also reported the similar results in winter wheat.

Among genotypes, BHS-169 recorded significantly higher no. of grains per spike and 1000-grain weight of barley, which ultimately contributed in getting significantly higher grain yield (20.87 q/ha) over BHS-380 and HBL-276. The magnitude of increase was 12.4 and 24.9 %, respectively. However, BHS-380 was at par with this genotype for the said yield attributes and was next best in recording significantly higher grain yield. In new genotypes, the superior performance of BHS-169 for dual purpose in hills was also ascribed in barley improvement porogramme of Directorate of Wheat Research, Karnal. The other genotype *i.e.* BHS-380 had recorded significantly higher plant count/m^2, earhead/m^2 and biological yield and BHS-169 also behaved statistically similar to it for biological yield (Table-1). Superiority of barley variety BHS-380 in term of biological and grain yield was also ascribed by Pal *et al.* (2011). The percent increase in the grain yield by genotype BHS-169 and BHS-380 over HBL-276 was 46.1 and 30.0%, respectively. Similarly, the corresponding increase in the biological yield was 21.0 and 25.3 per cent.

Table 1. Effect of treatments on yield and yield attributes of barley

Treatments	Plant count/m^2	Earhead/m^2	Grains/spike	1000-grain weight (g)	Grain yield (q/ha)	Biological yield (q/ha)
Levels of Nitrogen (kg/ha)						
20	197.12	234.60	38.51	40.12	15.41	45.97
40	176.50	257.66	37.53	46.45	19.24	51.93
60	155.69	275.07	44.94	43.98	19.08	52.79
CD (P=0.05)	28.17	NS	3.40	4.59	NS	NS
Genotypes						
BHS-380	199.29	286.82	43.38	44.48	18.57	54.54
BHS-169	161.07	257.42	40.94	46.58	20.87	52.64
HBL-276	168.96	223.08	36.67	39.49	14.29	43.52
CD (P=0.05)	29.94	19.33	4.21	2.87	1.63	5.60

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