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Response of barley (*Hordeum vulgare*) varieties to nitrogen under dry temperate conditions

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ABSTRACT

A field experiment was conducted during the summer season of 1990 and 1991 to find out the response of barley (*Hordeum vulgare* L. s.l.) varieties to N levels. Among the varieties, 'Dolma' registered significantly higher number of effective tillers/m row length, harvest index and grain yield than 'HBL 233' and 'Local'. Almost all the yield attributes and grain yield increased significantly with each successive increase in N levels up to 90 kg/ha.

Key words: Barley, Dry temperate, Cultivars, Nitrogen, Grain yield

Barley is a main crop in higher elevation under rainfed conditions and in high hill dry temperate zone of Himachal Pradesh where late maturing of wheat does not permit the feasibility of double cropping. It has got great importance for hill people as food and local beverages but the average yield is quite low as compared to the potential yield level. Lack of the information on suitable cultivars and judicious nutrient management are the basic reasons for low yield. Hence present investigation was carried out to study the effect of improved varieties and nitrogen on the production of barley under dry temperate conditions.

MATERIALS AND METHODS

A field experiment was conducted during the summer season of 1990 and 1991 at Millets Research Sub-Station, HPKV, Leo, Kinnaur, which represents the high hill dry temperate zone of Himachal Pradesh. This research station is located in trans-Himalayas where monsoon fails to reach and rainfall is almost negligible. Bright sun-shine raises day temperature to 25–40°C during summer crop season providing *in-vivo* aerial moisture stress conditions. Frequent irrigations (at least 1 in 15 to 20 days) were given to keep the crop growing. The experiment was laid out in randomized block design with 3 replications, consisting of 3 varieties ('Dolma', 'HBL 233' and 'Local') and 4 N levels (0, 30, 60 and 90 kg/ha). The crop was sown on 16 April and harvested in last week of August during both the years. Basal application of 30 kg P_2O_5 and 20

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Table 1. Effect of treaments on plant height, yield attributes and yield of barley

Treatment	Plant height (cm)		Effective tillers/ m row length		Grains/ spike		1,000-grain weight (g)		Harvest index		Grain yield (q/ha)		
	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991	Pooled
Variety													
'Dolma'	80.0	78.2	74.2	71.9	45.4	45.9	43.8	45.8	45.8	32.4	32.3	29.1	30.7
'HBL 223'	79.5	79.7	69.6	67.3	43.2	44.7	42.7	46.2	43.3	30.0	28.8	25.4	27.1
'Local'	90.7	86.8	55.2	54.9	36.8	36.1	40.5	38.3	35.3	31.7	23.9	20.8	22.3
CD (P = 0.05)	4.6	2.1	3.2	2.9	2.8	1.9	1.4	1.6	1.9	2.2	2.4	2.7	1.7
N (kg/ha)													
0	74.7	68.5	49.4	45.6	32.6	31.5	38.2	41.0	32.5	29.4	18.2	15.2	16.7
30	81.4	77.8	63.6	62.5	38.5	41.0	42.4	43.4	40.3	36.6	6.8	22.6	24.7
60	89.2	88.3	70.5	72.3	47.8	48.2	44.5	45.8	46.6	42.8	31.9	29.5	30.7
90	89.4	91.6	81.8	78.4	48.3	48.2	44.2	45.5	46.4	41.7	34.7	31.2	33.0
CD (P = 0.05)	5.2	2.6	5.5	4.6	3.5	2.8	1.1	1.8	2.4	3.1	2.6	3.6	2.1

kg K_2O/ha was done uniformly to all the plots at the time of sowing. Half of the nitrogen dose was applied basal at the time of sowing and the remaining half was top-dressed at tillering stage of the crop. The soil was sandy loam in texture, low in organic carbon (0.28%), available N (210 kg/ha) and P (6.5 kg/ha) and medium in available K (192.0 kg/ha).

RESULTS AND DISCUSSION

Varietal performance

'Local' strain of barley registered remarkably and significantly higher plant height than 'Dolma' and 'HBL 233' which were statistically at par (Table 1). The yield attributes, viz. effective tillers/m row length and harvest index, were significantly highest in 'Dolma'. The values of grains/spike and 1,000-grain weight were also higher in 'Dolma' but could not differ significantly from 'HBL 233'. The 'Local' recorded significantly lowest values of all the yield attributes. Because of highest values of all the yield attributes, 'Dolma' resulted in significantly highest grain yield during both the years. 'Local' variety gave significantly lowest grain yield which is attributed to significantly lowest yield attributes. Similar trend was observed in pooled data.

Nitrogen

Plant height increased significantly with an increase in N level up to 90 kg/ha. However, the difference between 90 and 60 kg N/ha during first year of study was not significant (Table 1). Number of effective tillers/m row length increased successively and significantly up to 90 kg N/ha. The yield attributes, viz. grains/spike, 1,000-grain weight and harvest index, increased significantly with every increase up to 60 kg N/ha; beyond which the differences were not significant. The results confirm the findings of Jha *et al.* (1981) and Biswas and Singh (1982). Because of succes-

sive increase in almost all the yield attributes, grain yield also increased significantly up to 90 kg N/ha. However, during first year, 60 and 90 kg N/ha did not differ significantly. In the pooled data, 90kg N/ha gave significantly highest yield over all other levels of N. Biswas and Singh (1982) and Dwivedi *et al.* (1987) also reported the response up to 80 kg N/ha.

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