Vol.10 No. 2, Page No. 100–103 (2021)
Received: July, 2021; Accepted: September, 2021

Effect of Different Nitrogen Levels on Growth and Yield of Barley Crop in Upper Gangatic Plain of India

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Abstract

The present research was aimed to study the effect of different levels of inorganic fertilizer N on the yield of barley varieties at RMS College, Dhampur, Bijnor. The experiment was laid out in randomized block design. Barley variety k-141 were sown and different nitrogen levels (i.e. 0, 40, 80 and 120 kg ha1) used. The results showed that among different nitrogen levels 80 kg /ha was found best and also shows significance.
Key Words: *Barley, Hordeum Vulgare, Dates After Sowing, Nitrogen, weeds.*

Introduction

Barley assumes fourth position in total cereal production in the world. Industrial use of Barley as base malt for beer in different distilled beverages along with being served as a major animal fodder. Nitrogen plays a very important role in the major world's agricultural areas and therefore adoption of good N management strategies often result in benefits to farmers[1,6]. Among the different plant nutrients, it plays a very important role in crop productivity[4,5,7]. To avoid contamination of environment from hazardous use of nitrogen it is important to use it properly. It was reported that increase in N fertility beyond a certain limit also induced lodging and decreases grain yield and its components[6]. Nowadays, to avoid detrimental effect of nitrogen on soil and environment farmers have to judicially use of nitrogen fertilizer. Efficient farming techniques should be used but also by using plant varieties that have better nitrogen use efficiency[3]. In maize interaction between genotype x nitrogen fertilization level also observed[2]. The present study was carried out to investigate the response of barley to different nitrogen levels.

Material and Methods

The present study was conducted at R.S.M. college farm, Allehpur Dhampur (Bijnor), using randomized block design replicated four times. Four levels of nitrogen (0, 40, 80 and 120 kg N ha-1) with barley varieties (K-141) was studied during the present experiment. A plot size of 8.0 m x 3.45 m having 6 rows, 30 cm apart was used. Phosphorus and potash at the rate of 30 kg ha-1 was applied as basal dose. All other input and agronomic practices was carried out uniformly.

Procedures for data recording: Data on days to emergence was recorded by counting the days taken by each treatment from the date of sowing till the completion of emergence. Data were analyzed statistically for analysis of variance (ANOVA) following the statistical method. The significance of differences among means was compared by using Least Significant Difference (LSD) test.

Result and Discussion

Table 1 Crop emergence (Number of plants/ metre row length)

Treatments	Days after sowing	
Nitrogen levels	**10**	**20**
N_0	14.77	20.00
N_1	13.61	22.00
N_2	12.38	22.66
N_3	11.22	20.88
S.E. ±	--	--
CD at 5%	0.55	0.62

The data presented in Table 1 indicates that in case of first stage (10 days after sowing) the nitrogen fertilizer affected the crop emergence adversely. Here, the highest crop emergence was noted under control at 10 days stage after sowing. Although the crop emergence was not affected with the nitrogen application at 20 days stage.

Table 2 Crop stand/metre row length at successive stages of crop as influenced by different treatments

Treatments	Days after sowing				
	30	**60**	**90**	**120**	**at harvest**
Nitrogen levels					
N_0	31.16	59.5	53.27	48.33	47.38
N_1	38.44	83.33	66.61	63.72	61.83
N_2	46.05	98.77	73.88	75.83	72.94
N_3	36.11	80.16	66.22	62.77	61.22
CD at 5%	1.94	2.36	1.41	2.27	1.11

It is evident from table 2 that in general the number of shoots per metre row length at most of the various stages of crop growth. At harvest stage the number of shoots per metre row length were significantly increased with nitrogen application. However, 80 kg N/ha produced being on a par with its lower doses, thereafter the decrease trend was observed 80 kg N/ha is statistically superior over its lower and higher doses.

Table 3 Plant height (cm) at various stages of crop growth

Treatments	Days after sowing				
	30	**60**	**90**	**120**	**at harvest**
Nitrogen levels					
N_0	11.38	19.61	61.72	83.11	83.16
N_1	13.05	22.61	74.27	103.3	104.6
N_2	14.16	25.16	78.33	109.72	110.16
N_3	15.16	26.88	85.55	117.11	118.94
CD at 5%	0.93	1.92	2.15	1.32	3.23

A perusal of the data set out in above table 3 also points out that in general nitrogen fertilization improved the plant height at most of the stages of crop growth. At harvest stage the height of shoot was found to be significant and the plant was tallest when the crop was fertilized 120 kg N/ha.

Table 4 Dry matter accumulation per plant (g) at successive stages of crop growth

Treatments	Days after sowing				
	30	60	90	120	at harvest
Nitrogen levels					
N_0	0.132	1.14	2.43	4.57	5.34
N_1	0.201	1.78	3.82	5.57	7.62
N_2	0.236	2.47	4.59	7.10	10.31
N_3	0.177	1.81	3.87	6.51	9.37
SEm ±	--	--	--	--	--
CD at 5%	0.11	0.10	0.51	2.36	3.87

It may be also seen from the table 4 that in case of levels of nitrogen, the increasing trend in dry matter accumulation was observed up to the application of 80 kg N/ha.

The application of nitrogen cause significant variations in dry matter accumulation per plant at harvest stage. Increasing levels of nitrogen from N_0 to N_1 and N_1 to N_2 increased the dry matter per plant significantly but further increase from N_2 to N_3 brought about a reduction in per plant dry matter accumulation. Obviously 80 kg N/ha is significantly better to all other rates of nitrogen application.

Table 5 Total biomass production (q/ha), grain yield (q/ha), straw yield (q/ha) and harvest index (%) as affected by different treatments.

Treatments				
	Biomass (q/ha)	Grain Yield (q/ha)	Straw Yield (q/ha)	Harvest Index (q/ha)
Nitrogen levels				
N_0	68.64	31.59	37.05	46.35
N_1	74.01	33.85	40.19	46.78
N_2	87.42	40.28	47.52	47.36
N_3	76.89	36.89	41.42	48.97
S. Em ±	--	--	--	0.47
CD at 5%	3.5	4.36	2.93	N.S.

Conclusion

From the all tables it is evident that nitrogen N_2 is best among all the levels of nitrogen.80 Kg N /ha is the best treatment it also have highest biomass, grain yield, straw yield and harvest index.

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