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EFFECT OF NITROGEN AND CULTIVARS ON SOME OF TRAITS OF BARLEY (*HORDEUM VULGARE* L.)

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ABSTRACT

In order to study effects of nitrogen fertilization and cultivars on some of traits of different barley an experiment was conducted at Isfahan in 2012. The experimental was split plot in a randomized complete block design with three replications. In this experiment, different levels of nitrogen in the main plots included four levels (0, 50, 100 and 150 N kg/ha (urea)) and barley cultivars including Nosrat, Reyhan and Bahman were placed in the subplots. Results showed that the effect of nitrogen on plant height, number of tillers, number of fertile tillers, number of fertile tillers, length and peduncle length were significant. Treatment fertilizer of 150 kg/ha nitrogen maximum number of tillers, number of fertile tillers per square meter, plant height, peduncle length and length compared to the other treatments. Also Nusrat cultivars had the highest average in all traits.

Keywords: Fertilizer, Height, Peduncle length and Nosrat cultivar.

1- INTRODUCTION

Barley (*Hordeumvulgare* L.), a member of the grass family, is a major cereal grain. It was one of the first cultivated grains and is now grown widely. Barley grain is a staple in Tibetan cuisine and was eaten widely by peasants in Medieval Europe. Barley has also been used as animal fodder, as a source of fermentable material for beer and certain distilled beverages, and as a component of various health foods. It is used in soups and stews, and in barley bread of various cultures. Barley grains are commonly made into malt in a traditional and ancient method of preparation. In a 2007 ranking of cereal crops in the world, barley was fourth both in terms of quantity produced (136 million tons) and in area of cultivation (566,000 km²) (Fao, 2009).Cereal forages have the potential to supply large amount of energy for animals (Yolcu et al., 2009). Wheat and barley are strategic crops, important for food and feed security. The two crops are widely grown but in contrasting agro-ecologies. Wheat is a major food staple while barley is mostly used for livestock feed (Bishaw, 2004). Nitrogen is a key factor in achieving at optimum yield in cereals and in their growing period requires lot amount of absorbed nitrogen. Excess nitrogen increased leaf area, tiller formation, leaf area index and leaf area duration and this increasing is led to much greater production of dry matter and grain yield (Ryan et al,. 2009). Sylues-Bradley (1990) reported that plant height of cereals increased significantly and linearly with increased nitrogen application.

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Anbessa and Juskiw (2012), in an experiment on the effects of nitrogen on barley cultivars concluded the biomass-related trait of leaf area was also increased by the application of N fertilizer. Also, percent increase in lodging incidence over the unfertilized treatment was assessed. The lodging data was so variable, and it was not statistically different between treatments. Alam et al. (2007), in a similar experiment on seed yield of barley stated seed yield is a complex character depending upon a large number of environmental, morphological and physiological characters. Grain yields also depend upon other yield components. Ryan et al (2009), in an experiment on barley stated as expected, the main factors N and variety were significantly affected either on the yield parameters, but The interactions were less consistent. Nitrogen deficiency decreased spike and number of grains per spike, but had no significant effect on grain yield. The effects of nitrogen fertilizer and the split were studied. Zero level of nitrogen fertilizer, 180, 120, and 90 kg N ha results showed that with increasing nitrogen up to 120 kg per hectare, number of stalks fertile area index and grain yield and number of Paws closely correlated with grain yield increased with increasing N up to 180 kg per hectare, but the difference was not significant (Samsuna and Povafisanovich, 1997; Mi et al., 2000). The aim of this work was survey effects of nitrogen fertilization and cultivars on some of traits of different barley an experiment was conducted at Isfahan.

2- MATERIALS AND METHODS

This experiment in year 2012 at Isfahan, and located at latitude 32 degrees 40 minutes north and longitude 51 degrees 48 minutes East, with an altitude of 1555 m the sea level was implemented. The area under a very hot arid climate classification coupons and hot dry summers and cold winters are part.

Table 1. Physical and chemical properties of experimental field soil.

Depth of soil (cm)	Clay (%)	Soil (%)	Silt (%)	K (%)	P (%)	N (%)	OC (%)	pH	EC (ds)
0-30	39	22	39	412	10	0.12	1.79	7.9	3.6

The experimental split plot in a randomized complete block design with three replications. In this experiment, different levels of nitrogen in the main plots included four levels (0, 50, 100 150 N) kg/ha and barley cultivars including Nosrat, Reyhan and Bahman were placed in the subplots. Elements needed to strengthen land and plant fertilizer according to soil test results of 100 kg /ha fertilizer urea (46% N) was on the ground before planting. 300 kg of nitrogen per hectare as well as the transition from vegetative to reproductive roads were down. November 14, 2012 and the planting density of 400 plants (m2). Each sub-plot consisted of 10 lines with a planting distance of 15 cm and a length of 5 meters and implants lines in order to prevent any water mixing between the main plots 1.5 m in distance, was considered significant. The first irrigation was done immediately after planting other plants need watering by rainfall during the growing season was time. During the growing season to control weeds and herbicides in early spring due to rain outbreaks were sporadic. Planting the beginning and end of each line, half a meter as marginal effects was removed of 10 lines in each plot planting, plot 3 lines along both sides can be removed and 4 formed the center line of the test population. To determine the plant height in physiological maturity stage, 10 plants randomly selected edge of the ground (the crown) to the top of the main spike regardless awn per cm were measured. Peduncle length, flag leaf node to the head from a distance of 10 randomly selected plants in compliance with the terms of the cm of the margin was measured by the ruler. Infertile and fertile tillers and the tillers counted in 10 randomly observing the periphery of the plant was determined at maturity. A probability value of $P \leq 0.05$ indicated that the difference was statistically significant. MSTATC and SPSS software using statistical calculations and plotting graphs were done using EXCEL software.

3- RESULTS AND DISCUSSION

The analysis of variance of data showed significant effects of N and cultivars on peduncle length was significant at 5% level (Table 2). The highest peduncle length by treatment of 150 N kg/hand lowest peduncle lengths was obtained by treatment of N0. Also the highest peduncle length by treatment of Nosrat and the lowest peduncle length were obtained by treatment of Bahman (Table 3). The analysis of variance of data showed that effect of N and cultivars on spike length was significant at 1% level (Table 2). The highest spike length was obtained by treatment of150N kg/ha just different from the100N kg/ha treatment had no significant difference with other treatments significantly. The lowest length was obtained by treatment of N0 fertilizer treatments simply the difference was not significant, but showed a significant difference with other treatments. Our results indicate that nitrogen deficiency causes slow growth, decreased cell division and ultimately the length is short. The highest peduncle length by treatment of Nosrat and the lowest peduncle length were obtained by treatment of Bahman (Table 3). Significantly reduced due to compression of the number of spike length and decreasing the distance between them. Genotypic differences between cultivars in terms of their length are concerned. (Zare, 2006) in their study on barley, differences observed between varieties in terms of length.

The analysis of variance of data showed that effect of N on No-fertile tillers was significant at 5% level (Table 2). The lowest number of no-fertile tillers was obtained in treatment N150 and by treatment of N0different from merely 50 N kg/ha treatments were not significant (Table 3). The results show that increasing the intake of 100 and 150 N kg/ha of No-fertile tillers were significantly decreased. Reducing the number of No-fertile tillers plant affected by competition within and outside the plant struggling to access resources such as water, air, food, and especially light. Also the analysis of variance of data showed that effect of cultivar on the number of No-fertile tillers was not significant (Table 2). However the lowest number of No-fertile tillers per square meter was obtained by Nosrat cultivar (Table 3).

The analysis of variance of data showed that effect of N on Number of total tillers was significant at 1% level (Table 2). The highest number of tillers obtained by treatment of 150 N kg/ha was 100 kg/ha treatment differences were not significant, but no significant difference was observed. The lowest total tillers were obtained by treatment N0 (Table 3). (Shahsavari and Saffari, 2005) observed experimentally that increasing N fertilizer increased wheat tillers. Increasing nitrogen levels increased to a certain extent of fertile and non-fertile tillers respectively. The total number of tillers was significant at the 1%level (Table 2). The highest number of tillers was obtained by Nosrat there was no significant difference with other treatments. The lowest number of tillers was obtained by Bahman only difference was not significant (Table 3).

The analysis of variance of data showed that effect of Non plant height was significant 1% probability level (Table 2). The highest plant height was obtained by treatment of 150 N kg/ha significant difference with other treatments was the lowest plant height was achieved by treatment N0 (Table 3). The results show that the highest height is achieved by 150 N kg/ha. More precocious varieties produce less height. Plant height was affected by genotype and conditions were significant differences between different varieties of the plant exist (AtaieKachoei, 1998; Demotes-Mainarda and Jeuffroy, 2004).

Table 2. Analysis of variance of traits.

SOV	Mean square						
	df	Peduncle length	Spike of length	Number of no-fertile tillers	Number of fertile tillers	Number of total tillers	Height
Replication	2	3.17	8.67	0.18	0.09	0.02	9.25*
N (A)	3	13.22*	19.29**	0.66*	5.55*	3.64**	60.42**
Ea	6	0.72	2.16	0.21	0.226	0.25	10.14
Cultivar (B)	2	11.91*	14.45**	0.09	0.518	1.33**	14.78
A×B	6	2.63	1.01	0.47	0.834	0.19	5.19
Eb	16	0.21	2.19	0.08	0.06	0.05	2.73
CV (%)	-	8.9	8.9	6.1	6.6	6.7	7.9

* and ** are significant at 5 and 1 % probability levels, respectively.

Table 3. Mean morphological characteristics of different barely cultivars under different levels of nitrogen.

Treatment	Peduncle length (cm)	Spike of length (cm)	Number of no-fertile tillers (m2)	Number of fertile tillers (m2)	Number of total tillers (m2)	Height (cm)
N						
N0	11.5^{c}	10^{c}	3.5^{a}	2.33^{a}	5.8^{b}	95^{d}
N50	13.1^{b}	11.7^{b}	3^{b}	3^{b}	6^{b}	101^{c}
N100	14.5^{a}	11.9^{b}	2.9^{b}	3.2^{b}	6.5^{a}	108^{b}
N150	14.8^{a}	13^{a}	2.3^{c}	4^{a}	6.9^{a}	117^{a}
cultivars						
Nosrat	14.5^{a}	12.9^{a}	2.4^{a}	3.4^{a}	6.7^{a}	106^{a}
Reyhan	13^{b}	12^{b}	2.6^{a}	3.2^{a}	6.2^{b}	104^{a}
Bahman	12.7^{c}	11.1^{c}	2.9^{a}	3.1^{a}	6.1^{b}	103^{a}

Means in each column, followed by similar letter are not significantly different using Duncan's Multiple Range Test at P≤0.01.

CONCLUSION

Efficient N fertilization is crucial for profitable barley production and environmental protection. Plant growth and N uptake patterns form the basis for developing an efficient N fertilization program, and N fertilizer applications should be made at times when the plant can utilize the applied N. The N fertilization program must be flexible because optimum N rates vary for soil and season (temperatures and rainfall) conditions.

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