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ORIGINAL ARTICLE

NITROGEN FERTILIZER RESPONSE OF GRAIN AND FORAGE YIELD OF BARLEY GENOTYPES

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ABSTRACT: The present research was aimed to study the effect of different levels of inorganic fertilizer N on the yield and yield components of barley varieties at Gorgan Research Station, Iran in 2011-2012 years. A split plot layout within randomized complete block design with 3 replications was used. Main plot were different level of nitrogen fertilizer (75,150 and 225 kg ha-1) from urea source, and sub plot were different cultivars (Gorgan//L.17//SAwsom/GC, GLLU/ Rusewll//Caeuva and FIBERDA/STE//L.527//SAwsom/GC). Condition represented the effect of nitrogen was significant on feed and grain yield, Protein yield, Plant height, HI. Maximum Plant height, HI and grain yield was recorded in sterling. The highest Feed yield, grain yield was observed in FIBERDA/STE//L.527//SAwsom/GC variety. Nitrogen applied at the rate of 225 kg ha-1 resulted in maximum Plant height, Harvest Index, feed yield, grain yield, Protein yield.
***keywords*:** Barley, Nitrogen, genotypes

INTRODUCTION

Barley (*Hordeum vulgare* L.) is the major cereal in many dry areas of the world and is vital for the livelihoods of many farmers. Barley is an annual cereal crop and grown in environments ranging from the desert of the Middle East to the high elevation of Himalayas (Hayes *et al*., 2003). It is the major food source in many North African countries. In Iran, it is mainly grown for grain and straw for small ruminants during winter, with green fodder sometimes used for winter grazing. Barley can replace wheat as the dominant crop due to its tolerance to drought and salinity. Barley assumes fourth position in total cereal production in the world after wheat, rice, and maize. Barley is more productive under adverse environments than other cereals. Barley serves as a major animal fodder, base malt for beer and certain other distilled beverages.

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 (1990b) reported that plant height of cereals increased significantly and linearly

with increased nitrogen application. 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.

The amount of nitrogen that a barley crop needs to maximize yield and quality will depend on the seasonal conditions, soil type, and rotational history of the soil as well as the potential yield of the crop. Nitrogen is needed for early tiller development of barley to set up the crop for a high yield potential. Ayoub *et al*., (1994) reported that spilt N application had little effect on yield, but decreased lodging and spike population with increased grain weight. Singh & Uttam (1992) recorded increased grain yield with increase in nitrogen level. However, increasing N fertility beyond a certain limit induced lodging and ultimately decreased grain yield and its components. The aim of this study is to determining yield on cultivars of barley in different levels of nitrogen.

MATERIALS AND METHODS

An experiment was conducted on the basis of split plot layout with completely randomized block design with 3 replications. Main plot were different level of nitrogen fertilizer 75,150 and 225 kg ha-1) from urea source, and sub plot were different cultivars (Gorgan//L.17//SAwsom/GC, GLLU/ Rusewll//Caeuva and

FIBERDA/STE//L.527//SAwsom/GC). This research was conducted in 2011-2012, at research farm of farming building of Gorgan Research Station, Iran . A plot size of 2.5 m x 2 m having 6 rows, 30 cm apart was used. Phosphorus at the rate of 30 kg ha-1 was applied as basal dose. All other input and agronomic practices was carried out uniformly. Nitrogen as urea (46.6% N) was applied at the above mentioned levels. It was added into three equal portions, the first part was applied in planting time and the second part was applied in double ridge Stage, and third part in booting stage. Other normal agronomic practices for barley production were followed. feed and grain yield, Protein yield, Plant height, Harvest Index was measured. All data are presented as mean values of three replicates. Data were analyzed statistically for analysis of variance (ANOVA) following the method described by Gomez & Gomez (1994). MSTATC computer software was used to carry out statistical analysis. The significance of differences among means was compared by using Least Significant Difference (LSD) test.

RESULTS AND DISCUSSION

N fertilizer had significant influence on feed and grain yield, Protein yield, Plant height, Harvest Index (Table 1). Our results are in line with Le Gouis *et al*., (1999) and Moselhy & Zahran (2002) who reported that nitrogen application had little or no effects on days to emergence. 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. Cultivar had significant influence on feed and grain yield, Protein content, Number of spike, 1000 grain weight (Table 1). 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.

The highest of feed and grain yield, Protein yield, Plant height was achieved in 225 kgN ha-1 fertilizer treatment. The lowest of them related to control (Table 2). Demonts and Jeuffroy (2001), reported that wheat varieties with spikes are larger and longer than the smaller and shorter grains, have greater power-sharing for photosynthetic material. Zidane (2007), showed that the highest levels in flag leaves of barley plants, the use of 75 kgN ha-1 respectively. The highest of feed and grain yield, Plant height, HI achieved in FIBERDA/STE//L.527//SAwsom/GC cultivar but the highest of Protein yield, related to GLLU/ Rusewll//Caeuva cultivar (Table 2). N fertilizer and cultivar interaction had significant influence on ear length (Table 1). The maximum of feed and grain yield, Protein yield, Plant height achieved in 225 kg N ha-1 and FIBERDA/STE//L.527//SAwsom/GC cultivar (Table 2).

More feed yield (2310 kg/ha), grain yield (4012 kg/ha) Plant height (86.4 cm), HI (37.3 %), Protein yield (110.5 kg/ha) was produced by the application of 225 kg N ha-1. Walter *et al*., (1995) who observed that nitrogen application significantly affected productive tillers m^{-2}. Cantero *et al*., (1995) and Oweis *et al*., (1999) observed similar results for grain spike-1 in barley. Weight and number of grains spike-1 was significantly increased with increasing N fertilization as reported by Moselhy & Zahran, **(**2002). They further revealed that application of nitrogen fertilizer significantly increased spike length, number of grains spike-1, 1000 grain weight, grain yield and N uptake by the crop (Chaudhary & Mehmood,; Ahmad & Rashid, (2004); Pervez *et al*., 2009).

CONCLUSION

The results showed that, with increasing in nitrogen fertilizer, the feed and grain yield, Protein yield, Plant height was increased and led to increased production of seed yield too. So, the results show that consumption of 225 kgN ha-1 , is sufficient for the plant needs and produce maximum yield. Ryan *et al* (2009), also reported similar results for barley and stated 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. Also, the maximum of seed yield, related to FIBERDA/STE//L.527//SAwsom/GC cultivar. Then, on the basis of the results obtained, the fertilizer treatment 225 kg N ha-1.

Table1. Analysis of variance (mean squares) for yield of barley genotypes

s.o.v	df	Feed yield (kg/ha)	Grain yield (kg/ha)	Protein yield(kg/ha)	Plant height(cm)	Harvest Index
Error a	6	43475	27532	166.7	17.6	5.31
Nitrogen	2	5558217**	325432**	43554**	1857**	76.4*
Genotype	2	11191223 **	172365 **	38694 **	4531 **	29.7**
Interaction	4	382356**	587358**	4693**	10.54 n.s	13.6 **
Error b	24	17892	45317	4624	14.6	6.78
CV	-	12.3	9.5	8.69	9.11	9.96

ns = Non-significant * = Significant at 5% level of probability

Table2. mean compare Nitrogen fertilizer for yield of barley genotypes

Treatment		Feed yield (kg/ha)	Grain yield (kg/ha)	Protein yield(kg/ha)	Plant height(cm)	Harvest Index
Nitrogen	N1	1876 c	3685 c	68.5 c	74.4 c	37.3 a
	N2	2255 b	3943 b	91.9 b	81.7 b	38.5 a
	N3	2310 a	4012 a	110.5 a	86.4 a	37.3 b
Genotype	G1	1805 c	3511 c	73.2 c	72.5 c	37.6 b
	G2	2240 b	3743 b	91.2 b	92.0 a	37.8 a
	G3	2762 a	4442 a	107.5 a	89.5 b	39.4 a

Means followed by different letter(s) in a row are significant at 5% level of probability

REFERENCES

Ahmad N, Rashid M. Fertilizer use in Pakistan, p: 74. NFDC, Planning and Development Division, Islamabad. 2004.

Anbessa Y, Juskiw P. 2012 Nitrogen Fertilizer Rate and Cultivar Interaction Effects on Nitrogen Recovery, Utilization Efficiency, and Agronomic Performance of Spring Barley. Research Article, International Scholarly Research Network. ISRN Agronomy,V: 2012: Article ID 531647, P:8.

Cantero MC, Villar JM, Romagosa I, Fereses E. Nitrogen fertilization of barley under semi arid rainfed conditions. *Eur. J. Agron.,* 1995: 4: 309-316.

Demotes-Mainard S, Jeuffroy MH. Partioning of dry matter and nitrogen to the spike growth period in wheat crops subjected to nitrogen deficiency. Field Crop Res. 70: 153-165

Gomez KA, Gomez AA. Statistical Procedures for Agricultural Research. 2nd Ed. John Willey & Sons, Inc. NewYork. 641. 1994.

haudhary AU, Mehmood R. Determination of optimum level of fertilizer nitrogen Ennin, S.A. and M.D. Clegg. 2001. Effect of soybean plant population in soybean and maize

Hayes PM, Castro A, Cedillo LM, Corey A, Henson C, Jones BL, Kling J, Matus D, Rossi I, Sato K. Geneticdiversity for quantitatively inherited agronomic and malting quality traits. Elsevier science publishers, Amsterdam. 2003.

Le Gouis J, Delebarre O, Beghin D, Heumez E, Pluchard P. Nitrogen uptake and utilization efficiency of two-row and six-row winter barley cultivars grown at two N levels. *Eur. J. Agron.,* 1999:10: 73-79.

Moselhy EI, Zahran MA. Effect of bio and mineral nitrogen fertilization on barley crop grown on a sandy soil.m*Egypt. J. Agric. Res.,* 2002: 3: 921-936.

Oweis T, Pala M, Ryan J. Management alternatives for improved durum wheat production under supplemental irrigation in Syria. *Eur. J. Agron.,* 1999: 11: 255-266.

Pervez K, Yousuf M, Imitas M, Islam M. Response of wheat to foliar and soil application of urea at different growth stages. *Pak. J. Agron.,* 2009: 41: 1197-1204.

rotation. *Agron. J.,* 1998: 93: 396-403.

Ryan J, Abdel Monem M, Amir A. Nitrogen Fertilizer Response of Some Barley Varieties in Semi-Arid Conditions in Morocco. J. Agric. Sci. Technol.2009: Vol. 11: 227-236.

Singh VP, Uttam SK. Effect of farmyard manure and nitrogen levels on crop yield and economics of rice-wheat cropping system. *Crop Res.,* 2000: 5: 82-86.

Sylvester-Bradley R, Stokes DT, Scott RK, Willington VBA. A physiological analysis of the diminishing response of winter wheat to applied nitrogen. - Theory. Aspects of Applied :Biology 1990b.25, 227-287.

Zeidan M S. 2007. Response of some Barley cultivars to nitrogen sources and rates grown in alkaline sandy soil. Res. J. Agriculture. Biol. Science, 2001: 3(6): 934-938.