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The Effect of Cutting Time under Different Amounts of Nitrogen on Yield and Yield Components of Barley

By Alireza Alazmani
Agricultural Research, Iran

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The Effect of Cutting Time under Different Amounts of Nitrogen on Yield and Yield Components of Barley

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I. 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). Sylvester et al.(1990) reported that plant height of cereals increased significantly and linearly with increased nitrogen application. 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 (Ahmad and Rashid, 2004). 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. Cantero et al.(1995) reported that spilt N application had little effect on yield, but decreased lodging and spike population with increased grain weight. Singh and Uttam (2000) 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.

II. 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 35,70 and 105 Kg N ha^{-1}) from urea source, and sub plot were different Genotypes (G1), (G2) and (G3). This research was conducted in 2014-2015 year, 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 N 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

Author: Master of Science in Agricultural and Natural Resources Research Center of Golestan Province, Iran.
e-mail: Alireza_Alazmani@yahoo.com

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, 1994). SAS computer software was used to carry out statistical analysis. The significance of differences among means was compared by using Least Significant Difference (LSD) test.

Table1 : Pedigree genotypes at different levels of nitrogen

Genotypes	Pedigree
G1	SAHRA
G2	GLLU/ Rusewll//Caeuva
G3	FIBERDA/STE//L.527//SAwsom/GC

III. 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 and Zahran (2002) who reported that nitrogen application had little or no effects on days to emergence. Pervez et al. (2009) 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 (Table 1). Singh and Uttam (2000) 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 105 kg N ha^{-1} fertilizer treatment. The lowest of them related to control (Table 2). Haudhary and Mehmood (1998) reported that wheat varieties with spikes are larger and longer than the smaller and shorter grains, have greater power-sharing for photosynthetic material. Demotes and Jeuffroy (2001) showed that the highest levels in flag leaves of barley plants, the use of 35 kg N ha^{-1} respectively. The highest of feed and grain yield, Plant height, HI achieved in Line7 cultivar but the highest of Protein yield, related to Line 17 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 105 kg N ha^{-1} and Line7 cultivar (Table 2).

More feed yield (2793 kg ha^{-1}), grain yield (4238 kg ha-1) Plant height (84/2 cm), HI (37/5 %), Protein yield (97/3 kg ha^{-1}) was produced by the application of 105 kg N ha^{-1}. Oweis et al. (1999) who observed that nitrogen application significantly affected productive tillers m^{-2}. Zeidan (2007) 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 and 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 (Demotes and Jeuffroy., 2001).

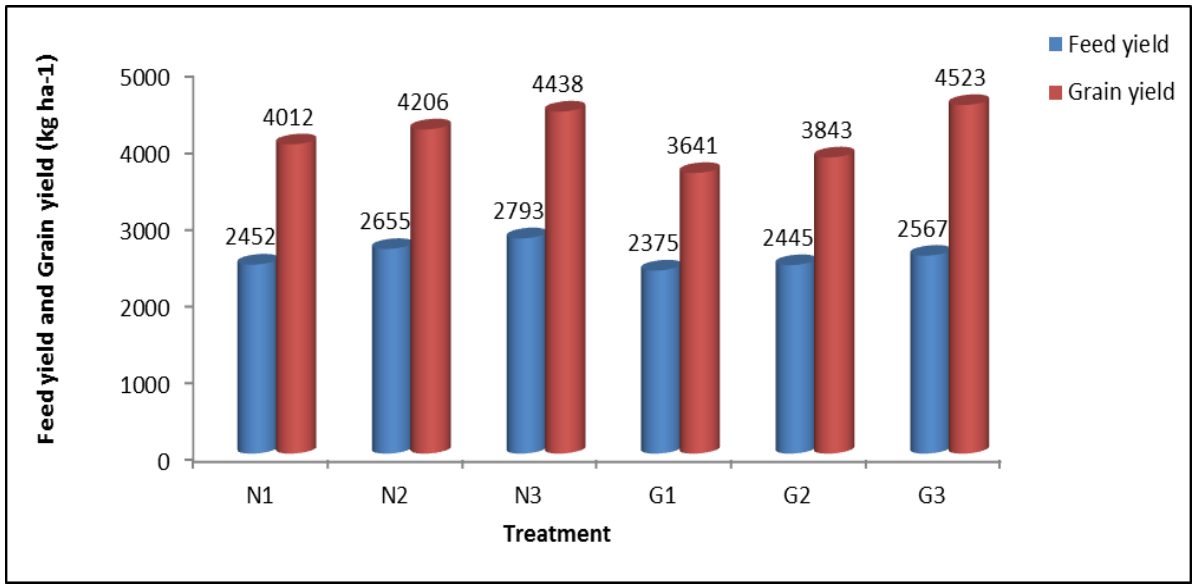

Figure 1 : The effect of nitrogen on the yield of forage and grain yield of barley

IV. 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 105 kg N ha^{-1}, is sufficient for the plant needs and produce maximum yield. 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 Line7. Then, on the basis of the results obtained, the fertilizer treatment 105 kg N ha^{-1}.

Table 1 : Analysis of variance (mean squares) for yield of barley genotypes 2012-2013, 2013-2014

s.o.v	Df	Feed yield (Kg ha^{-1})	Grain yield (Kg ha-1)	Protein yield (Kg ha-1)	Plant height(cm)	Harvest Index
Error a	6	60786	28654	321/4	20/6	10/3
year	1	595234 n.s	2593987 n.s	2114 n.s	308/3 n.s	73/7 n.s
Nitrogen	2	6008218 **	405431 **	41532 **	2054 **	80/2 **
Genotype	2	9591589**	21234 **	41672 **	5245 **	31/7 **
Interaction	4	397355 n.s	614354 n.s	4871 n.s	43/6 n.s	16/4 n.s
Error b	24	18791	50317	5224	16/6	5/45
CV	-	12/4	11/5	14/6	5/27	7/76

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

Table 2 : mean compare Nitrogen fertilizer for yield of barley genotypes 2013-2014

Treatment		Feed yield (Kg ha-1)	Grain yield (Kg ha-1)	Protein yield (Kg ha-1)	Plant height(cm)	Harvest Index
Nitrogen	N1	2452 c	4012 c	82/5 c	80/2 c	38/3 a
	N2	2655 b	4206 b	90/9 b	82/6 b	38/8 a
	N3	2793 a	4438 a	97/3 a	84/2 a	37/5 b
Genotype	G1	2375 c	3641 c	85/2 c	80/5 c	38/8 b
	G2	2445 b	3843 b	90/2 b	84/0 a	39/7 a
	G3	2567 a	4523 a	99/5 a	87/5 b	39/4 a

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

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