Plant Archives Volume 20 No. 1, 2020 pp. 1417-1422 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

EFFECT OF CUTTING DATES AND DIFFERENT LEVELS OF NITROGEN ON THE YIELD OF GREEN FEED AND GRAIN YIELD FOR BARLEY CROP (*HORDEUM VULGARE* L.)

Hasan N. Mansoor* and Bushra A. Jeber

College of Agriculture, Al-Qasim green University, Babylon, Iraq.

Abstract

A field experiment was conducted during the winter season 2018-2019 in one of the fields belonging to the Hilla district / Babylon province. The split plot was used with randomized complete block design with three replication, the nitrogen levels (without fertilizer, 50, 100, 150, 200, 250) kg N.ha^{-1} were occupied. While the cutting dates (no-cutting, cutting after 45 days, cutting after 65 days, cutting after 85 days) were filled the subplots, the results conclude as follows: The third cutting dates (C3) (cutting after 85 days of sowing) was significantly higher than the average green fodder yield of 31.639 (tons.ha^{-1}), the treatment (C0) (without cutting) was significantly excelled which gave the highest average of grain yield, the number of spikes, Number of grains.Spike^{-1} and the 1000 grain weight, where amounted 5.728 (tons.ha^{-1}), 504.6 spike.m^{-2}, 48.44 grain. spike^{-1}, 42.532 g respectively. The level of fertilizer N5 (250 kg N.h^{-1}) gave the highest average for the green fodder yield, grain yield, number of spikes and Number of grains.Spike^{-1} where amounted 36.52 (tons.ha^{-1}), 6.196 (tons.ha^{-1}), 505.9 spike.m^{-2}, 50.66 grain.spike^{-1}, respectively. The results showed that there was a significant effect of the interaction values between the study factors. The treatment C3 N5 gave the highest mean of green fodder yield amounted 42.647 (tons.ha^{-1}) and the treatment C0N5 gave the highest average number of spikes and grain yield amounted 591 spike.m^{-2}, 7.607 ton.ha^{-1} respectively. It can conclude from the results of the study that there is a positive effect of the late cutting dates in increasing the yield of green fodder, it is also clear that the lack of cutting led to a positive increase in grain yield and most of its components, we conclude that high levels of nitrogen led to a positive increase in the yield of green fodder and grain yield.

Key words: green fodder, barely, number of spike, grain yield.

Introduction

Barley *Hordeum vulgare* L. is an important dual-purpose grain crop. It is grown for the purpose of obtaining green fodder and grains as well as entering various industries and is used in human feeding on a narrow scale. Barley is characterized by high nutritional value because it contains a high percentage of amino acids and protein and its ability to Tolerance to drought and salinity and rapid growth after cutting so most areas of Iraq are suitable for sowing as it is grown in the irrigated plains in the center and south, it's used exploited fields for cutting or direct grazing (Al-Qaisi, 2001), cutting is one of the important field treatments of barley crop and has many benefits, including the elimination of the lodging experienced by local sowing and increase the number of tillers by reducing the Influence of apical meristem and provide a good amount of green fodder during the winter season, which is characterized by the scarcity of green fodder. This depends on the cultivar and its ability to re-grow and the density of the total vegetative and the green fodder yield and protein ratio by different the cutting date (Al-Tikriti *et al*., 1981). Nitrogen is found in many vital compounds such as amino acids, protein and nucleic acids, so it is an important component of crop growth and productivity (Peltonen, 1995). There are many factors that affect the green fodder yield and grains in the barley crop, including the cutting date and nitrogen fertilizer levels. Khalil *et al*., (2011) reported that the dry matter yield was significantly affected by the cutting date as it increased with the cutting date delayed from 75 to 90 days after sowing. Tawfiq and Muhammed, (2014) was found after applying an experiment on three-grain crops, which included the use of four cutting dates (80, 90, 100 and 110) days after planting exceeded the date of mowing 110 days after sowing in the traits of green fodder yield

and dry matter yield of wheat, barley crops and Triticale. (Singh *et al*., 2014) indicated that the cutting date significantly affected the grain yield components. The cutting treatment after 60 days of sowing the highest mean yields, number panicles, number of grain in a panicle and 1000 grain Weight. While the cutting treatment after 90 days of sowing gave the lowest averages. (Alkarkhi, 2014) found that increasing the level of nitrogen fertilizer to 270 kg. E. 1-led to a significant increase in the traits of green fodder yield and dry matter yield. Alazmani, (2014a) indicated when using three levels of nitrogen fertilizer (75, 150 and 225 kg $N.h^{-1}$) Barley crop that increased nitrogen fertilizer led to a significant increase in grain yield and number of spikes. It also noted that increased nitrogen resulted in a significant decrease in 1000 grain Weight. This study was conducted to achieve the best combination between nitrogen and cutting date, which gives the highest yield of green fodder and grain.

Materials and Methods

A field experiment was conducted during the winter season 2018-2019 in one of the fields belonging to the Hilla district / Babylon province, in soil with silty loam, the Dumping process with water was conducted for the purpose of germinating thickets seeds and when the soil reached the appropriate moisture. The soil tillage by the Moldboard Plow and smoothing by Fixed harrows. After leveling, the land was divided according to the split-plot design (Randomized Complete Block Design). The main Plot included six treatments for nitrogen fertilization (without fertilizer 50, 100, 150, 200, 250) kg $N.h^{-1}$, which symbolized (N0, N1, N2, N3, N4, N5). Sub - Plot included four treatments for cutting dates (no-cutting, cutting after 45 days, cutting after 65 days, cutting after 85 days) after sowing, which symbolized (C0, C1, C2, C3) and three replicates, the area of the experimental unit was $6m^2$ with dimensions (2 × 3m), the Space 2 m was left between the replicates and the experimental units 1m to prevent nitrogen fertilizer leakage between the experimental units, Barley crop of Behooth 244 cultivar was sowing on 20/ 10/2018 in a broadcast method when winds stopped to ensure the distribution of grains on a regular basis. The first irrigation was conducted to immediately after sowing and the rest of the irrigation was given according to the need of the plant. Phosphate fertilizer was added in the form of (P_2O_5 46%) rate (40 kg $P.h^{-1}$), Latif *et al*., (1996) before plowing and used urea fertilizer (46% N) source of nitrogen where all levels were added in the form of batches after the first two weeks after sowing and the second after cutting to allow the plant to form a good total vegetative and the third when reaching the Booting Stage to ensure increased sedimentation of nutrients in the grain, the cutting process was conducted according to the dates studied and at the level (5-6) cm from the soil surface Latif *et al*., (1996) and harvested at the stage of full Maturity Stage.

Studies traits :

1. Green fodder yield (ton.h^{-1}): One square meter was cutting for all treatments at a height (5-6) cm and weighed in the field and then converted the weight to tons.

2. Number of spikes. m^2: The number of spikes from the square meters after harvesting from the middle of each experimental unit at the full maturity stage.

3. Number of grains.$Spike^{-1}$: Calculated as an average of ten spikes of the same square meter randomly selected for all experimental units.

4. The 1000 grain Weight (g): Calculated with a weight of 1000 grain taken randomly from the same square meter and weighed with a sensitive balance.

5. Grain yield (ton.ha^{-1}): the spikes collected from the same square meter and then Threshing for the extraction of grains and cleaned well and then the weight of grain yield and converted to tons.

Data were analyzed statistically by using the Genstat statistical program, the averages were compared according to the least significant difference (LSD), below 5% probability level (Alrawi and Khalaf Allah, 2000).

Results and Discussion

The Green fodder yield (tons.ha^{-1}).

The results in table 1, showed that there was a significant effect of cutting dates on the green fodder yield (tons.ha^{-1}). The treatment (C3) gave the highest average of 31.64 (tons.ha^{-1}), while treatment C1 gave the lowest average of amounted 17.81 (tons.ha^{-1}). The reason may be due to the late cutting dates gave sufficient time for the growth of plants and increase the green area and plant height (unpublished data), which reflected in the increase of photosynthesis and thus increase the green fodder yield. These results agree with Hussain *et al*. (2003), Tawfiq and Muhammed, (2014). The results in table 1, showed that nitrogen fertilizer levels significantly affected of green fodder yield. The treatment (N5) gave the highest average amounted of 36.52 (tons.ha^{-1}). While comparison treatment N0 gave the lowest average amounted of 12.39 (tons.ha^{-1}). The reason may be due to the positive role of nitrogen in increasing cell division and activity and increasing size, improving growth, increasing plant activity, plant height and number of leaves and areas, which is reflected in the increase of green fodder yield per unit area (Alkarkhi, 2014). These results

Table 1: Effect of cutting dates, nitrogen fertilization and their interaction on the average yield of green feed (tons.ha^{-1}).

Average	Cutting dates.day				nitrogen levels.kg h^{-1}
	C3	C2	C1	C0	
12.39	18.33	11.86	6.99	-	N0
19.15	24.68	18.42	14.34	-	N1
23.42	28.57	24.22	17.47	-	N2
28.63	35.17	31.43	19.30	-	N3
32.29	40.45	35.33	21.11	-	N4
36.52	42.65	39.24	27.68	-	N5
	31.64	26.75	17.81	-	Average
Interaction = 0.842; Cutting dates = 0.260; nitrogen levels = 0.710					LSD 0.05

Table 2: Effect of cutting dates, nitrogen fertilization and their interaction on the average Number of spikes. M^2.

Average	Cutting dates.day				nitrogen levels.kg h^{-1}
	C3	C2	C1	C0	
263.6	162.7	223.7	299.3	368.7	N0
327.4	199.0	302.3	384.7	423.7	N1
401.8	305.3	358.0	452.0	491.7	N2
463.8	346.0	408.0	535.0	566.0	N3
481.0	386.0	420.3	531.0	586.7	N4
505.9	408.0	439.0	585.7	591.0	N5
	301.2	358.6	464.6	504.6	Average
Interaction = 44.75; Cutting dates = 16.72; Nitrogen levels = 30.26					LSD 0.05

agree with Malakav *et al*., (2009), Kharub *et al*., (2013) and Alkarkhi, (2014). They found that increasing the level of nitrogen fertilizer leads to an increase in the green fodder yield due to the increase in the number of Tiller and plant height. The results in table 1, showed a significant interaction between cutting dates and nitrogen fertilizer levels in the green fodder yield. The treatment (N5C3) gave the highest average amounted of 42.65 (tons.ha^{-1}), while the treatment (N0C1) gave the lowest average amounted of 6.99 (tons.ha^{-1}). The reason may be due to the above-mentioned treatments of cutting dates and nitrogen fertilizer levels in the green fodder yield can be due to the availability of sufficient time to grow and form the largest area of leaves and tiller, which increased photosynthesis and thus increased the green fodder yield. As well as the role of nitrogen in increasing growth through its active contribution to many bioprocesses and its entry into the synthesis of most parts of the plant mainly such as chloroplasts, amino acids, nucleic acids and energy compounds (ATP and NADPH2) and mitochondria (Abu Dahi and AL Younis, 1988), it also works to encourage cell division, expansion and elongation leading to the formation of a root system and total vegetative able to make the most of the growth factors (light, water and nutrients), which is reflected in the increase of accumulated dry matter stored in plant parts and thus increase the total green fodder yield (Alkarkhi, 2014).

Number of spikes.M^2

The results in table 2, showed that cutting dates significantly affected the number of spikes.M^2, the treatment C0 gave the highest average amounted of 504.6 spikes.M^2, while treatment C3 gave the lowest average amounted of 301.2 spikes. M^2, the reason may be due to the non-cutting gave sufficient time for growth and formation of strong activities tiller of forming spikes, which increased the number of spikes per unit area. The non-cutting and early cutting also gave the high potential for re-growth and tiller formation, while the late cutting led to the death of some tiller due to competition for growth requirements. The late cutting did not give the plant sufficient Chance to re-growth (Saadi, 2005). These results agree with Delgado *et al*., (1984), Hussain *et al*., (2003), Munsif *et al*., (2013) who found the number of spikes increase with non-cutting or early cutting compared with late cutting. The results in table 2, showed a significant effect of nitrogen fertilizer levels in this trait. The treatment N5 gave the highest average amounted of 505.9 spikes. M^2, it did not significantly differ from treatment N4 while the control treatment N0 gave the lowest average amounted of 263.6 spikes. M^2. This may be due to the role of high levels of nitrogen in increasing vegetative growth of plants at different stages of growth, which is reflected by the increase of dry matter accumulated in the stages of plant growth and that the increase of vegetative growth increased the efficiency of the exploitation of solar radiation effective in photosynthesis (P.A.R) Especially at the beginning of plant life, which increased the amount of materials that support the formation of primers tiller and the success of their growth and continuity, which was reflected in the increase in the number of spikes per unit area (Usanova, 1986). These results agree with Munir, (2002); Allami, (2004); Shaker, (2014) and Alkarkhi, (2014) who found that increased nitrogen fertilizer leads to an increase in the number of spikes per unit area. Table 2, shows a significant interaction between cutting dates and nitrogen fertilizer levels. The treatment N5C0 gave the highest mean of 591.0 spikes. M^2, it did not significantly differ from the combinations N4C0, N5C1 and N3C0, while The treatment N0C3 gave the lowest average of 162.7 spike. M^2.

Number of grains.Spike^{-1}

The results in table 3, showed that there was a

Table 3: Effect of cutting dates, nitrogen fertilization and their interaction on the average Number of grains.Spike^{-1}.

Average	Cutting dates.day				nitrogen levels.kg h^{-1}
	C3	C2	C1	C0	
37.55	33.57	37.20	38.47	40.97	N0
42.43	38.53	40.87	44.30	46.03	N1
44.87	40.03	42.97	47.30	49.17	N2
49.63	46.23	48.60	52.20	51.47	N3
50.17	45.70	50.10	53.20	51.67	N4
50.66	47.27	51.20	52.83	51.33	N5
	41.89	45.16	48.05	48.44	Average
Interaction = 1.953; Cutting dates = 0.823; Nitrogen levels = 0.997					LSD 0.05

Table 4: Effect of cutting dates, nitrogen fertilization and their interaction on the average The 1000 grain Weight.(g).

Average	Cutting dates.day				nitrogen levels.kg h^{-1}
	C3	C2	C1	C0	
37.59	32.05	36.19	40.19	41.93	N0
38.29	33.03	38.57	40.75	40.82	N1
40.47	35.24	40.10	43.53	42.99	N2
41.20	37.27	40.95	42.63	43.93	N3
42.21	39.48	42.11	43.54	43.69	N4
40.48	38.33	39.93	41.83	41.83	N5
	35.90	39.64	42.08	42.53	Average
Interaction = 1.489; Cutting dates = 0.519; Nitrogen levels = 1.099					LSD 0.05

significant effect of cutting dates on the average number of grains in the spike.Spike^{-1}. The treatment C0 gave the highest average amounted of 48.44 grains.Spike^{-1} it did not differ significantly from treatment C1 while treatment C3 gave the lowest average of 41.89 grains. Spike^{-1}. This may be due to that the treatments were not exposed to the cutting have evolved normally and benefited from the food stored in their parts in the growth of spike primers and evolution, which increased the number of grain in the spike, While the treatments prone to the cutting exploited the food storage to compensate the vegetative part, the growth rate after the cutting is slow, which led to the reduction of the development period of the spikes due to lack of sufficient time, which was reflected in the decrease in the number of florets in the spike and thus the decrease in the number of grains (Dunphy, 1982). These results agree with Hadi *et al*., (2012); Singh *et al*., (2014), which indicate that no cutting or early cutting leads to an increase in the number of grains in the spike compared to late cutting. The results in table 3, showed that nitrogen fertilizer levels significantly affected this trait, where the treatment (N5) gave the highest average amounted of 50.66 grains.Spike^{-1}, it did not significantly differ from treatment N4, while the control treatment N0 which gave the lowest average of 37.55 grains.Spike^{-1}. This may be due to the positive role of high nitrogen levels, which improve the fertility status of most florets in the spikes, which makes their ability to grain formation compared to low levels (Langer and Hanif, 1973). The role of nitrogen in prolonging the evolution and development of spikes, which is a factor in increasing the number of grain structures and increasing the fertility of the lateral, basal and late florets (Langer and Liew, 1973). These results agree with Fayad *et al*., (2005); Ahmad *et al*., (2007) and Alawi, (2011) indicated that the increase in nitrogen fertilizer level leads to a significant increase in the number of grains in the spike. The results in table 3, showed a significant interaction between cutting dates and nitrogen fertilizer levels. The treatment N4C1 gave the highest average amounted of 53.20 grain.Spike^{-1} did not significantly differ from the interaction treatments N5C1, N3C1, N4C0, N3C0 and N5C0, while treatment N0C3 gave the lowest average of 33.57 grains.Spike^{-1}.

The 1000 grain Weight. (g)

The results in table 4, showed that cutting dates significantly affected on the 1000 grain Weight (g). The treatment C0 gave the highest average amounted of 42.53g. it did not differ significantly from treatment C1 while treatment C3 gave the lowest average of 35.90 g. The reason may be due to the availability of sufficient time for treatments that were not exposed to the cutting, increasing the accumulation of dry matter in the grain, the cutting caused the depletion of nutrients in the plants that were exposed to the cutting, As a result, there was reduce the accumulation of dry matter in it (Al-Saadi, 2005). These results agree with Eric *et al.,* (2010), Singh *et al.,* (2014); Alazmani (2014b). They found that not exposing the plant to the cutting leads to the increase the weight of grain. The results in table 4, showed that nitrogen fertilizer levels significantly affected in this trait, where the treatment (N4) gave the highest average amounted of 42.21g, it did not differ significantly from treatment N3, while the control treatment N0 which gave the lowest average amounted of 37.59g. This may be due to the increase in the number of spikes and the number of grains in the treatments with high fertilization rates, which led to a decrease in the share of the single grain of photosynthesis (accumulated dry matter) on the contrast to the low-fertilization treatments in which the number of spikes and the number of grains in the spike decreased, pushing the plant to the principle of compensation (Table 3 and 4), an increase in one component of the yield may also lead to a decrease in the other components due to the state of compensation (Jamal *et al*., 1996). These results agree with Munir, (2002) and Alazmani, (2014a).

Table 5: Effect of cutting dates, nitrogen fertilization and their interaction on the average grain yield (tons.ha^{-1}).

Average	Cutting dates.day				nitrogen levels.kg h^{-1}
	C3	C2	C1	C0	
1.85	0.96	1.36	2.23	2.85	N0
2.68	1.38	2.45	3.17	3.73	N1
3.87	2.35	2.58	4.72	5.84	N2
5.41	3.45	4.84	6.34	6.99	N3
5.93	3.93	5.62	6.83	7.36	N4
6.20	4.09	5.67	7.41	7.61	N5
	2.69	3.75	5.12	5.73	Average
Interaction = 0.499; Cutting dates = 0.144; Nitrogen levels = 0.421					LSD 0.05

They found that the increase in nitrogen fertilizer level resulted in an increase in the number of spikes and the number of grains in the spike with a significant decrease in the average the 1000 grain Weight. Table 4, shows a significant interaction between cutting dates and nitrogen fertilizer levels. The treatment N3C0 gave the highest mean of 43.93g. while, the treatments N4C0, N4C1, N3C1, N2C0 and N3C1 were not significantly different, while treatment N0C3 gave the lowest average of 32.05g. This may be due to an increase in the yield components of the number of spikes and the number of grains in the spike (Table 2 and 3), which was reflected in the decrease in grain weight.

Grain yield (tons.ha^{-1})

The results in table 5, showed that there was a significant effect on cutting dates on grain yield. The treatment C0 gave the highest average of 5.73 (tons.ha^{-1}), while treatment C3 gave the lowest average of 2.69 (tons.ha^{-1}). This may be due to that the cutting led to a shorter growth period for new growths, insufficient time for the production of Tillers and the formation of spikes. These results agree with Munsif *et al*., (2013); Alazmani, (2014a) and Singh *et al*., (2014) that the delayed cutting dates lead to a significant decrease in grain yield and its components compared with no cutting or early cutting. The results in table 5 indicate that nitrogen fertilizer levels significantly affected in this trait, the treatment N5 gave the highest average of 6.20 (tons.ha^{-1}) it did not significantly differ from treatment N4 while the control treatment N0 gave the lowest average of 1.85 (tons.ha^{-1}). This may be due to the significant effect of high nitrogen levels on both the number of spikes and the number of grains in the spike (Table 2 and 3). High nitrogen levels were considered to be important factors in increasing the number of spikes and the number of grains in the spike and then the grain yield (Oweis and Pala, 1998). These results agree with those of Alam *et al*., (2007); Malecka Blecharczyk, (2008); Iqbal *et al*., (2012); Alkarkhi, (2014) and Alazmani, (2014a). Table 5, shows a significant interaction between cutting dates and nitrogen fertilizer levels. The treatment N5C0 gave the highest average of 7.61 (tons.ha^{-1}),it did not significantly differ from the treatment N5C1 and N4C0 while the treatment N0C3 gave the lowest average of 0.96 (tons.ha^{-1})

References

Abu Dahi, Y.M. and M.A. Al-Younis (1988). Plant nutrition guide. Ministry of Higher Education and Scientific Research - University of Baghdad.

Al-Tikriti, R.A., T.Y. Rizk and H.A. Al-Roumi (1981). Fodder and Pasture Crops, Mosul University.

Alrawi, K.M. and A.M. Khalaf Allah (2000). Design and analysis of agricultural experiments. Dar Al Kutub Printing & Publishing Est. University of Al Mosul. Iraq.

Al-Saadi, I.L. Ramadan (2005). Effect of Nitrogen and Sulfur Levels and Number of cutting Proceeds and Quality of Green Fodder and Grain of Barley (*Hordeum vulgare* L.) in Ph.D. Dissertation - College of Agriculture - University of Baghdad.

Alawi, H.H. Mustafa (2011). Effect of nitrogen source and levels on wheat (*Triticum aestivum* L.) and some soil chemical properties. *Diyala. J. of Agric. Sci.,* **3(1):** 73-82.

A.O.A.C. (1975). Association of official Analytical chemists official Methods of Analysis A.O.A.C. 10th ed., republished by A.O.A.C. Washington D.C., U.S.A., **58(4)**.

Al-Qaisi, Abbas Latif Abdul Rahman (2001). Response of barley genotypes to stubble and grain production. Master Thesis - College of Agriculture - University of Baghdad.

Alkarkhi, A.H. (2014). Effect of nitrogen levels, sulfur and number of mites on some growth characteristics, green fodder yield and barley grain yield (*Hordeum vulgare* L.) Ph.D. Dissertation - College of Agriculture - University of Baghdad.

Allami, S.H.K. (2004). Effect of seeding rates, nitrogen levels and Herbicides mixture on growth and yield of wheat (*Triticum aestivum* L.). PhD thesis - College of Agriculture - University of Baghdad.

Ahmed, N., Amanullah, T. Jamal, I. Munir, A. Ali and M. Khan (2007). Residual effect of nitrogen applied to maize on yield of barley. *Sarhad. Agric.,* **23(3):** 550-553.

Alam, M.Z., S.A. Haider and N.K. Paul (2005). Effects of sowing time and nitrogen fertilizer on barley (*Hordeum vulgare* L.). Bangladesh. *J. Box.,* **34(1):** 27-30.

Alazmani, A. (2014a). Effect of nitrogen fertilizer on feed and grain yield of barley cultivar. *Intl. Res. J. Appl. Basic. Sci.,* **8(11):** 2013-2015.

Alazmani, A. (2014b). Effect of sowing dates and population on yield and yield components and forage in dual purpose sowing of hulless barley (Hordeum *vulgare* L.). *J. of Advanced Botany and Zoology.,* **2(3)**.

Delgado, I., J. Valderrabaro and G. Gomez (1984). Forage yield

from winter cereals. The effect of clipping on grain production. *Agric. J.* **(25):** 115-128. *C. A. Biological Abstracts.,* 1985.79 (12).

Dunphy, D.J., M.E. Mcdaniel and E.C. Hoit (1982). Effect of forage utilization on wheat grain yield. *Crop. Sci.,* **22(1):** 106-109.

Eric, A.D., F. Epplin, D. Peel, G. Horn and D. Lalman (2010). Wheat stocker decision tools. *J. of Extension.,* **48(3)**.

Fayad, S. Alaiwi., H.J. Hammadi and H.K. Saleh (2005). Effect of High Nitrogen Fertilizer Levels on Growth and Yield of Wheat. *Anbar. J. of Agric. Sci.,* **3(2)**.

Hadi, F., F. Hussan and M. Arif (2012). Effect of different nitrogen levels and cutting on growth behavior of dual purpose barley. *Scholarly Journal of Agricultural Science.,* **2(10):** 263-268.

Hussain, I., F.M. Epplin and E.G. Krenzer (2003). Planting date influence on dual purpose winter wheat forage yield grain yield and test weight. *Agron. J.,* **95:** 1179-1188.

Iqbal, A., K. Hayat., S. Hussain., A. Ali and M.A.H.A. Bakhsh (2012). Effect of seeding rates and nitrogen levels on yield and yield components of wheat (*Triticum aestivum* L.). Pakistan. *Journal of Natrition.,* **11(7):** 531-536.

Jamal, M., M.S. Nazir, S.H. Shah and N. Ahmed (1996). Varietal responses of wheat to water stress at different growth stages. Effect on grain yield, straw yield harvest index and protein content in grain. Rachis (ICARDA) Barley and Wheat News letter., **15:** 38-45.

Khalil, S.K., F. Khan, A. Rehman, F. Muhamad, A.A.Z. Khan, S. Wahab and H.Khan (2011). Dual purpose wheat for forage and grain yield in response to cutting, seed rate and nitrogen. *Pak. J. bot.,* **43(2):** 937-947.

Kharub, A.S., R.P.S. Verma, D. Kumar, V. Kumar, R. Selvakumar and I. Sharma (2013). Dual purpose barley (*Hordeum vulgare* L.) in India : performance and potential. *J. Wheat Res.,* **5(1):** 55-58.

Langer, R.H.M and F.K.Y. Liew (1973). Effects of varying nitrogen supply at different stages of the reproductive phase on spikelet and grain production and on grain nitrogen in wheat. *Aust. J. Agric. Res.,* **24:** 647-656.

Langer, R.H. and M. Hanif (1973). Astudy of floral development in wheat (*Triticum aestivum* L.). *Ann. Bot*., **37:** (C. F : R. H. Langer and F. K. Liew, *Aust. J. Agric. Res.,* **24:** 647-656 (1973).

Latif, A.A., I.L. Ramadan and E.M. Ragab (1996). The Effect of Mowing on Fodder and Cereal Grain of Shomar and Arifat Barley Cultivars. Fifth Scientific Conference for Higher Education and Scientific Research.

Malakar, B., S. Mondal, P.B Andopadhyay and C.K. Kundu (2009). Response of forage oat (Var. os – 6) to nitrogen and phosphate fertilizers in the new alluvial zone of west Bengal. *Journal of crop and weed.,* **5(2):** 36-38.

Malecka, I. and A. Blechorczyk (2008). Effect of tillage systems, mulches and nitrogen fertilization on spring barley (*Hordeum vulgare* L.). *Agronomy Research.,* **6(2):** 517-529.

Munir, A.T. (2002). Influence of varying seeding rates and nitrogen levels on yield and yield components of barley (*Hordeum vulgare* L.) in the semi - arid region of Jordon. *Die Bodenkultur*., **53(1)**.

Munsif, F., M. Arif, M. Jan and M.J. Khan (2013). Phenology of dual purpose wheat cultivars as influence by planting dates. *Scholarly. J. Agric. Sci.,* **3(9):** 340-350.

Owies, T. and M. Pala (1998). Response of bread and durum wheat varieties to supplemental irrigation, nitrogen application and planting date. In: Wheat prospects for Global Improvement. (H.J. Braun *et al.,* (Eds.)) 1998. 467-469.

Peltonen, J. (1995). Grain yield and quality of Wheat as affected by nitrogen fertilizer application timed according to apical development. *Acta. Agric. Scand. Sect. By soil and plant Sci.,* **45:** 2-14.

Shaker, E., M. Mojaddam and T.S. Nejod (2014). The effect of cycocel and different levels of nitrogen fertilizer on yield and yield components of barely. *Indian Journal of Fundamental and Applied life sciences.,* Issn : 2231-63459.

Singh, P., V. Sharma and Sh. Kaushal (2014). Effect of sowing dates and initial period of cutting on seed production of oats (*Avena sativa* L.). *Forage Res.,* **40(3):** 192-194.

Tawfiq, Sh. E. and S.R. Muhammed (2014). Response of three cereal crops to different clipping times for forage yield at two locations of sulaimani region. *Journal of Zankoy Sulaimani* - Part A, **Special Issue, Vol. 16**.

Usanova, Z.I. (1986). Yield formation of barley and oats sown at different date. C.F. Wheat, Barley and Triticale. abs., **3(4):** 426.