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EFFECT OF CLIPPING TREATMENTS ON FORAGE AND GRAIN YIELD OF BARLEY GENOTYPES

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ABSTRACT

Although clipping or grazing of barley (*Hordeum vulgare* L.) during the early period of the growing cycle is a common practice in many parts of the world, little information is known about the efficacy of barley as a dual-purpose crop in Iraq. The objective of this study was to evaluate the effect of clipping managements on forage and grain production, and growth of barley genotypes adapted to the region. Six genotypes, i.e five promising lines and one cultivar, were used in this study. Two clipping treatments were used, single- and double-clipping treatments. A check treatment was not harvested for forage. Plants were clipped at stubble height 3 or 6 cm above the ground. All treatments were clipped when plant height reached 30 to 35 cm. Clipping was performed before the onset of the terminal shoot apex. All treatments were harvested for grain yield at maturity, including a check that was not harvested for forage. Results showed that forage yield was affected by number and height of clipping. Forage yield ranged from 5.8 to 11.2 ton/ha, and from 11.9 to 18.2 ton/ha for the single- and double-clipping treatments, respectively. While the forage yield of the unclipped treatment ranged from 32.8 to 54.3 ton/ha fresh weight. Response of genotypes for grain yield after forage removal did not follow a particular pattern. Three genotypes showed decrease in grain yield after clipping. While, Line 99 showed higher tolerance to clipping treatments, yielded 7.2 and 6.7 ton/ha in the single- and double-clipping treatments at close cutting height, 3 cm, respectively. The results suggest that line 99 and 265 can be grown as dual-purpose crop for both forage and grain yield.

Key words: *Hordeum vulgare* L.; Clipping frequency; Stubble height; Forage; Grain

INTRODUCTION

The use of cereal crops for dual production of grain and livestock forage is a common practice to some extent in most area of the world where these crops are grown when water is not a limiting factor. Most of the barley in Iraq is grown primarily for grain production. Even though, the general practice is grazing or hand-clipping during the early crop development stages in order to

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provide part of their green forage needs from the late of December to the end of January. In these two winter months there is a shortage of green fodder. The stand is then left for grain production. In the past, farmers, mostly livestock and sheep owners, used old landraces varieties. These landraces varieties have proven themselves to be fodder barley and amenable to clipping and grazing practices **(Al-Rawi and Al-Shamma 1991)**. These landraces varieties of barley were replaced by new spring-type, short-season and grain producing varieties. Information are needed on the effect of forage utilization management on barley grain production to enable farmers to make management decisions that may maximize the economic value of the barley crop.

Reported results on the effect of clipping or grazing on grain yield of different cereal crops ranged from a decrease to substantial increase in grain yield **(Miller *et al* 1993)**. This wide variation is probably because of genotypes, environmental conditions, management practices, soil fertility and water availability **(Winter & Thompson, 1987 and Dunphy *et al* 1982)**. It has been reported that grain yield after clipping was inconsistent for wheat and triticale although clipping treatment markedly reduced grain yield of rye **(Bishnoi, 1980)**. Others found a remarkable increase in grain yield after forage removal **(Day *et al* 1968 and Sharrow & Motazedian, 1987)**. In their study on cv. Harlan, **Day *et al*** (1968) reported that a spring-type variety of barley clipped twice during the growing season produced a comparable yield to the no clipping treatment. In another study on wheat, barley , oat, rye and triticale it was found that after a single clipping treatment all species behaved as well as the non-clipping treatment in their respective grain yield **(Muldoon, 1985)**. However, grain yield declined drastically after the second and the following clipping treatments in wheat and triticale and to a lesser degree in barley, oat and rye. The reduction in grain yield in barley came as a result of reduction in number of kernels/head, whereas the reduction in wheat grain yield resulted from the reduction in all yield components. Clipping or grazing wheat should be terminated by the early jointing (the stage when the growing points being to elevate above ground level) or earlier to alleviate the risk for reductions in grain yield **(Dunphy *et al* 1982 and Miller *et al* 1993)**.

The popularity of barley is due to several factors. It is adapted to wide range of soil types and adverse climate. The potential for barley to be used as a dual-purpose crop in Iraq has not been evaluated. Unfortunately, selecting a barley cultivar on the basis of forage or grain yield alone seldom resulted in the greatest economic return because high grain yielding cultivars are not always among the highest forage yielding cultivars **(Krenzer *et al* 1996)**.

The objectives of this study were to determine the effect of forage removal at different clipping height and frequency on grain and forage yield and yield components of barley, and to search for a dual-purpose barley genotype adapted to the prevailing environment conditions.

MATERIAL AND METHODS

A field experiment was conducted at the Fudilia Experiment Station, Baghdad, Iraq during the 1994-95 growing season. The soil of the trial site is silty clay, pH= 7.3, with EC of soil extract measured at 1.4 mmhos. Conventional cultural practices were followed in establishing the plots. Six barley genotypes (SRCH 108, Numar, SRCH 96, SRCH 99, SRCH 95 and SRCH 265) were used in this study. Supplier of the genotypes were ICARDA and CIMMYT. Five of the genotypes used in this study were a promising lines selected from preliminary trials for few years.

Experimental design was a split-split plot arrangement of treatments in a complete randomized block design with three replications. Genotypes were assigned to whole plots. Clipping treatments (no clipping, single clipping and double clipping) were assigned to the subplots. Two stubble height treatments, close 3 cm **(Laude and Fox, 1982)**, and 6 cm above the soil line were entered as the sub-subplot. The size of the individual plot was 1.2 x 4 m. Plots were planted on 3 November 1995 at a seeding rate of 100 kg/ha in row spaced 30 cm apart. Fertilizer in the form of N-P-K (27-27-0) was applied at seeding time at a rate of 86 kg N and P2O5/ha, then 60 kg/ha at the early tillering stage for unclipped plots. After each round of clipping (single or double) fertilizer of the same kind was applied at a rate of 30 kg N and P2O5/ha on 30 January 1996. Clipping treatments were performed when stands (on extended leaf stage basis) reached between 30 and 35 cm in height. Clipping height of plants was stabilized through the use of a 4 m long by 6 cm wide plank held firmly and vertically next to rows to be clipped. An ordinary hand sickle was used for clipping treatments.

Forage of barley plants of the single-clipping treatment were taken between 10 and 12 December 1995, and the second clipping between 28 December 1995 and 9 January 1996. Plant of all genotypes were not harvested at the same time, but were harvested at the same developmental growth stage. Green forage yield was determined after clipping all plants in the central two rows of each plot. At seed maturity grain yield and number of spikes per meter square were determined after harvesting the central two rows of each plot. Ten spikes from each treatment were selected randomly to determine the number of kernels per head. Later grain weights (g/1000-kernel) were determined from samples from each treatment. Forage yield, grain yield and dry matter were converted to ton/ha basis. Table (1) shows the average maximum and minimum temperature during the growing season.

Analysis of variance (ANOVA) was used to determine whether yield of green forages, grain yield and yield components caused by treatments and their interactions were statistically significant at $P<0.05$ level. Differences among means were determine by LSD test at $\alpha = 0.05$ **(Steel and Torrie, 1980)**.

RESULTS

Forage yield

There were significant differences of genotype, clipping treatments, stubble height, genotype X clipping frequency, genotype X stubble height, and genotype X clipping frequency X stubble height on forage green yield (Table, 2). Genotypes included in this study differed

Table 1. Average minimum and maximum temperature (°C) during the growing season and 10-years average

Month	1995/96		10-years average	
	Min.	Max.	Min.	Max.
Oct. 1995	18.9	25.2	17.6	29.4
Nov. 1995	14.6	23.8	12.3	22.6
Dec. 1995	7.6	16.1	5.7	17.6
Jan. 1996	6.3	19.2	5.0	16.1
Feb. 1996	7.0	21.4	5.9	18.6
Mar. 1996	9.6	21.0	9.0	21.7
Apr. 1996	13.7	29.0	15.1	29.2
May 1996	19.9	34.9	21.0	35.7
June 1996	24.7	40.4	23.9	40.2

Table 2. Effect of clipping treatments on forage yield (ton/ha) of six barley genotypes

Genotype	None	Clipping				Average for genotype
		Single		Double		
		3 cm	6 cm	3 cm	6 cm	
108	32.8	8.6	5.8	15.6	15.6	18.5
Number	54.3	7.9	6.9	14.2	14.8	25.5
96	38.4	8.3	5.9	16.0	12.0	19.8
99	40.1	9.2	7.0	16.7	11.9	20.8
95	33.4	11.2	7.8	18.2	15.5	19.7
265	46.1	9.9	7.7	18.2	15.5	23.9
Average for						
Height of CL		9.2	6.8	16.5	14.2	
CL. Freq.	40.9		8.0		15.4	
LSD 0.05 for Genotype (G)				2.6		
Clipping Frequency (CL F)				1.4		
Stubble Height (St H)				0.3		
G X CL F				3.4		
G X St H				0.8		
G X CL F X St H				1.3		

significantly in their overall performance in green forage production, Numar and line 265 exceeded all other genotypes. The lowest forage yield was produced from line 95, 108 and 96. The double-clipping treatment significantly out-yielded the single-clipping treatment by about 47%. Forage yield of the unclipped treatment was substantially higher than the single or double clipped treatments. Lower stubble height significantly contributed to higher green forage yield for all entries in the single clipping treatment. However, for the double clipping treatment, Numar showed a significant reduction in green forage yield at 3 cm stubble height whereas line 108 produced similar forage yields in the double-clipping treatment for both stubble heights. Lines 96, 99, and 265 showed a significant increase in green forage yield when clipped twice at the lower stubble height, and produced 16.7, 18.2, and 18.2 ton/ha, respectively.

Grain Yield

Genotypes, clipping frequency, genotype X clipping frequency, and genotype X stubble height and genotypes X frequency X stubble height interactions (Table, 3) significantly influenced grain yield. When grain yield was averaged over all clipping frequencies and stubble heights, forage removal resulted in grain yield differences among genotypes. Line 99 significantly out-yielded all other entries, followed by line 265. On the other hand, line 95 (two-rowed barley) produced the lowest grain yield. Mean grain yield (across treatments) of line 99 and 265 were heavier by 72% and 67% compared with line 95, respectively. Grain yield comparison of six-rowed genotypes showed that line 99 and 265 produced significantly higher grain yields than line 96 and 108. However, grain yield of Numar did no differ from all six-rowed barley genotypes. Of all lines, line 99 showed the best tolerance for clipping, its grain yielded 7.2 ton/ha in the single-clipping treatment and 6.7 ton/ha in the double-clipping treatment at the close stubble height (3 cm) as compared to 6.8 in the control. On the other hand, line 95 showed a significant reduction of grain yield in the single-clipping treatment with 3 cm stubble height, and in the double-clipping treatment with 3 and 6 cm stubble height. The cultivar Numar also showed a marked reduction in grain yield in double-clipping treatment with 3 and 6 cm stubble height. Other genotypes, line 108 and 96, showed inconsistent performance to clipping treatments, while line 265 showed no response to clipping treatments.

Yield Components

There were no significant differences among genotypes in the number of spikes per meter square (Table, 4). The number of fertile tillers at maturity was reduced significantly by clipping frequency treatments. However, there were no differences in fertile tillers between single and double-clipping treatments. The response of genotypes was consistent across clipping and stubble height treatments. Clipping treatments resulted in sizable reduction in fertile tillers in all genotypes, except line 108, compared with the unclipped treatments. Numar showed the greatest reduction in the number of fertile tillers (37%) in double clipping at 3 cm stubble height treatment. On the other hand, line108 showed a

Table 3. Effect of clipping treatments on grain yield (ton/ha) of six barley genotypes

Genotype	None	Clipping				Average for genotype
		Single		Double		
		3 cm	6 cm	3 cm	6 cm	
108	4.8	5.6	4.1	4.6	4.2	4.7
Number	8.2	5.4	6.9	3.3	3.7	5.5
96	6.7	4.6	4.0	3.7	4.8	4.8
99	6.8	7.2	5.2	6.7	5.4	6.2
95	4.1	4.1	2.9	3.0	3.9	3.6
265	7.8	5.6	5.7	5.1	5.9	6.0
Average for						
Height of CL		5.4	4.8	4.6	4.7	5.1
CL. Freq.	6.4		5.4		4.7	
LSD 0.05 for G				0.93		
CL F				0.60		
G X CL F				1.47		
G X St H				0.56		
G X CL F X St H				0.98		

Table 4. Effect of clipping treatments on the number of tillers (tiller/m^2) of six barley genotypes

Genotype	None	Clipping				Average for genotype
		Single		Double		
		3 cm	6 cm	3 cm	6 cm	
108	386	401	361	465	400	403
Number	544	381	460	389	341	423
96	481	431	376	359	449	419
99	447	384	399	432	380	408
95	430	349	343	374	433	386
265	417	392	364	349	415	387
Average for						
Height of CL		390	384	395	403	
CL. Freq.			387		399	
LSD 0.05 for GL F				28		
G X CL F				69		
G X CL F X St H				67		

significant increase (20%) in the number of fertile tillers in double -clipping at 3 cm stubble height.

Data on the average number of kernels per head are presented in Table (5). There was a significant difference among genotypes in the number of kernels per head. Line 96, a two-rowed barley genotype had the lowest number of kernels per head, and showed similar response to all treatments of clippings. When a comparison is made between the six-rowed barley genotypes, line 96 gave significantly higher number of kernels per head (51.1 kernels/head) than the other genotypes. There was no significant differences in the number of kernels per head between line 108, 99, 265 and Numar. Number of kernels was affected significantly by clipping treatments, it was reduced by about 14% and 13% in the single and double-clipping treatments, respectively. Interactions showed that line 96 had the highest number of kernels per head (55 kernels/head) in double clipping treatment at 3 cm stubble height, while Numar gave the lowest number of kernel per head (36.3 kernels/head) in single clipping treatment at 6 cm stubble height.

Genotypes included in this study differed significantly in their overall performance of 1000-kernel weight (Table, 6). As it was mentioned earlier that line 95 is a two-rowed barley, and is expected to give the highest 1000-kernel weight. On the other hand, when comparing six-rowed barley genotypes, line 99, 265 and Numar had the highest 1000-kernel weight, while line 96 and 108 had the lowest 1000-kernel weight. Significant differences were observed between clipping frequency treatments. Single cutting of forage did not reduce the 1000-kernel weight, while double clipping had a significant reduction in 1000-kernel weight. The performance of genotypes did not follow the same pattern at different clipping treatments. Line 99 showed significant increase in 1000-kernel weight (51.9 gm/1000-kernel) in single-clipping treatment at 3 cm stubble height. Line 108, on the other hand, showed a marked reduction in 1000-kernel weight (27.3 gm/1000-kernel) in double clipping treatment at 3 cm stubble height.

DISCUSSION

The genotypes used in this investigation represented a range of growth habits. The maintenance of higher grain yield after forage removal in the single- or double-clipping treatment in some lines of barley was a function of yield components especially number of kernels/head and kernel weight. The prevailed environmental growing conditions were generally favorable for good forage and grain yield production. The central and southern irrigated plains of the country is characterized by seasonal climatic conditions (Table, 1), that are conducive to an almost continuous and uninterrupted growth and development. Water was adequate for near maximum growth of barley in all treatments. Under good weather and conditions for growth and heavy irrigation, grain yield of wheat was reduced only by lodging (**Day *et al* 1968; Winter & Thompson, 1987; Christiansen *et al* 1989 and Winter *et al* 1990**). Lodging did not differ among treatments in the present study.

Results of this investigation suggest that barley plants can be clipped or grazed twice without any deleterious

Table 5. Effect of clipping treatments on the number of kernels/spike of six barley genotypes

Genotype	None	Clipping				Average for genotype
		Single		Double		
		3 cm	6 cm	3 cm	6 cm	
108	45.7	43.7	49.3	45.3	53.0	47.4
Number	49.0	50.0	36.3	39.0	41.3	43.1
96	52.7	49.0	50.3	55.0	50.7	51.1
99	59.3	40.7	34.7	40.3	37.3	42.5
95	29.1	26.7	24.3	24.7	25.3	26.0
265	49.7	47.0	41.7	44.7	42.0	45.0
Average for						
Height of CL		42.7	39.4	41.5	41.6	
CL. Freq.	47.6		41.1		41.6	
LSD 0.05 for G				7.4		
CL F				4.2		

Table 6. Effect of clipping treatments on grain weight (g/1000-grain) of six barley genotypes

Genotype	None	Clipping				Average for genotype
		Single		Double		
		3 cm	6 cm	3 cm	6 cm	
108	36.7	34.8	32.8	27.3	30.0	32.3
Number	48.5	42.5	44.3	40.3	40.1	43.1
96	39.2	42.8	36.4	36.1	33.3	37.6
99	43.6	51.9	44.5	43.9	46.3	46.0
95	50.8	42.9	46.8	48.0	50.9	49.1
265	41.6	46.9	46.8	42.0	44.9	44.4
Average for						
Height of CL		44.8	41.9	39.6	40.9	
CL. Freq.	43.4		43.4		40.3	
LSD 0.05 for Genotype				3.23		
CL. Freq.				2.63		

effect on seed yield for some genotypes. The efficiency of grain production after forage removal in some genotypes such as line 99 and 265 is probably related to abundance of carbohydrate reserve in the crowns and roots of the clipped plants **(Bokhari & Singh, 1974 and Perry & Chapman, 1974)**. It has been reported that grazing reduces leaf area, and has no effect on total dry matter production measured at seed maturity, suggesting that grazing may increase net assimilation rate of the canopy. Growth in ungrazed treatments resulted in early shading and perhaps poorer utilization of sun light energy. It has been reported that newer leaves in the grazed treatments or that develop after clipping showed greater net carbon exchange, which is a characteristic of younger leaf tissue **(Sosebee & Weibe, 1971 and Fisher, 1975)**. In this study it took 14 to 17 days to fully develop after the first round of clipping. **Bokhari and Singh (1974)** reported that total nonstructural carbohydrates in the shoot, crown and roots of western wheatgrass *Agropyron smithii*) was highest at 24/13°C day-night temperature and regrowth was better at or slightly above 13/7°C day-night temperatures. Since all genotypes of barley in this study were subjected to temperature similar to those, it is suggested that differences in tolerance to clipping among genotypes are due to differences in their genetic makeup. **Perry and Chapman** (1974) found that rapid depletion of carbohydrate reserves in basin wild rye (*Elymus cinerus*) explains of its lack of tolerance to continue grazing whereas tolerance to intensive clipping in wheat grass is related to maintenance of higher total nonstructural carbohydrates in plants. In our experiment no terminal apex was damaged or removed in any treatments, because clipping of all treatment was accomplished before the jointing stage. The single clipping treatments were clipped 37 to 42 days after planting depending on the genotype. However, the second clipping treatments were taken 21 to 28 and 16 to 19 days after the first clipping date for 3 and 6 cm stubble height, respectively. **Young *et al* (1996)** reported no decrease in seed yield of ryegrass if animals were taken away after the primary tillers were grazed off. Many investigators reported that the number of reproductive tillers at harvest was lower on grazed compared to ungrazed treatments **(Dunphy *et al* 1982 and Pumphrey, 1970)**. Previous research showed that clipping or grazing after the onset of stem elongation resulted in grain yield reduction **(Dunphy *et al* 1982 and Pumphrey, 1970)**. Much emphasis has been placed on the importance of the flag leaf in determining grain yield, and most leaf area duration studies have centered on LAD after anthesis and not before. Under normal conditions a large portion of the assimilate used in grain formation comes from the flag leaf **(Simpson, 1968; Hsu & Walton, 1971; Mohiuddin & Croy, 1980 and Dunphy *et al* 1984)**. Although conditions during the post-anthesis period have a profound effect on grain yield, most of the potential of the plant for yield expression is largely determined prior to anthesis. In a study on the effect of forage removal on flag leaf area, it was concluded that flag leaf area was reduced by delaying forage utilization from early to late joint stage in only one of five cases, and showed no correlation with grain yield **(Dunphy *et al* 1984)**. They concluded that when leaf area produced during the vegetative phase of growth has been largely removed as harvested forage, grain yield will be limited by those genetic, environmental, or management factors that control tiller survival and the speed of development of new leaf area during the period preceding anthesis.

It has been reported by some researchers that removal of all leaf tissues may affect wheat grain yield mainly through changes in the number of kernels per head (**Fisher, 1975 and Dunphy** ***et al*** **1982**). However in another study, spikelets per head was the yield component that positively correlated to grazing (**Sharrow and Motazedian, 1987**). Others reported that semi-dwarf wheat cultivars require maximum photosynthetic tissue to produce maximum grain yield (**Redmon** ***et al*** **1995**). For semi-dwarf cultivars, net return was maximized when grazing terminated when hollow stem can first be identified above the crown (**Redmon** ***et al*** 1996). However, beyond an optimum leaf area index, excess foliage showed no contribute to increased grain yield in taller wheat cultivars (**Redmon** ***et al*** **1995**).

Superior production strategy is one that provides the highest profit with least amount of risk. On the basis of profit, this study identifies that lines 99 and 265 produced higher forage and grain yields than the others in the case of double-clipping treatment, and therefore were more tolerant to close clipping. Therefore, it seems obvious that genotype selection is an important decision to make for this dual-purpose production system. Furthermore, as cropping systems and management operations changes over time, knowledge on intensive forms of direct grazing must be updated, particularly with regard to the timing and duration of grazing.

REFERENCES

Al-Rawi, B.A. and A.M. Al-Shamma (1991). Fate of grain yield and its morphological yield components in barley (*Hordeum vulgare* L.) ***Journal of IPA Agrc. Res. Cent. 1 (1): 16-31.***

Bishnoi, U.R. (1980). Effect of seeding rate and row spacing on forage and grain production of triticale, wheat and rye. *Crop Sci., 20: 107-108.*

Bokhari, U.G. and J.S. Singh (1974). Effect of temperature and clipping on growth, carbohydrate reserves and root eduction of western wheat grass in hydroponic culture. ***Crop Sci. 14:790-794.***

Christiansen, S.; T. Svejcar and W.A. Phillips (1989). Spring and fall cattle grazing effects on components and total grain yield of winter wheat. ***Agron. J. 81: 145-150.***

Day, A.D.; R.K. Thompson and W.F. McCaughey (1968). Effect of clipping on the performance of spring barley (*Hordeum vulgare* L. emend Lam) seeded in October. ***Agron. J. 60: 106-109.***

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

Dunphy, D.J.; E.C. Holt and M.E. McDaniel (1984). Leaf area and dry matter of wheat following forage removal. ***Agron. J. 76: 871-874.***

Fisher, R.A. (1975). Yield potential in a dwarf spring wheat and the effect of shading. ***Crop Sci. 15: 607-613.***

Hsu, P. and P.D. Walton (1971). Relationships between yields and structures above the flag leaf node in spring barley. *Crop Sci. 11:190-193.*

Krenzer, E.G.; A.R. Tarrant; J.D. Bernardo and G.W. Horn (1996). An economic evaluation of wheat cultivars based on grain and forage production. *J. Prod. Agric. 9: 66-73.*

Laude, H.M. and R.E. Fox (1982). Tillering differences after close clipping in Russian wildrye and tall fescue. *Crop Sci. 22: 978-980.*

Miller, G.L.; R.E. Joost and S.A. Harrison (1993). Forage and grain yield of wheat and triticale as affected by forage management practices. *Crop Sci. 33: 1070-1075.*

Mohiuddin, S.H. and L.I. Croy (1980). Flag leaf and peduncle area duration in relation to winter wheat grain yield. *Agron. J. 72: 299-301.*

Muldoon, D.K. (1985). Simulation of the effect of forage cutting on subsequent grain yields of temperate cereals. *Agric. Systems 17(4): 231-242.*

Perry, L.H. and S.R.Jr. Chapman (1974). Effects of clipping on carbohydrates reserves in basin wildrye. *Agron. J. 66: 67-69.*

Pumphrey, F.V. (1970). Semidwarf winter wheat response to early spring clipping and grazing. *Agron. J. 62: 641-643.*

Redmon, L.A.; G.W. Horn; E.G. Krenzer and D.J. Bernardo (1995). A review of livestock grazing and wheat grain yield: Boom or bust ? *Agron. J. 87: 137-147.*

Redmon, L.A.; E.G. Krenzer; D.J. Bernardo and G.W. Horn (1996). Effect of wheat morphology stage at grazing termination on economic return. *Agron. J. 88: 94-97.*

Sharrow, S.H. and I. Motazedian (1987). Spring grazing effects on components of winter wheat yield. *Agron. J. 79: 502-504.*

Simpson, G.M. (1968). Association between yield per plant and photosynthetic area above the flag node in wheat. *Can. J. Plant Sci. 48;253-260.*

Sosebee, R.E. and H.H. Weibe (1971). Effect of water stress and clipping on photosynthate translocation in two grasses. *Agron. J. 63:14-16.*

Steel, R.G.O. and J.H. Torrie (1980). *Principles of Statistics: A Biometric Approach*, 2nd Ed. McGraw-Hill Book Co., New York.

William, C.Y.; D.O. Chilcote and H.W. Youngberg (1996). Annual ryegrass seed yield response to grazing during early stem elongation. *Agron. J. 88: 211-215.*

Winter, S.R. and E.K.Thompson (1987). Grazing duration effects on wheat growth and grain yield. *Agron. J. 79: 110-114.*

Winter, S.R.; E.K. Thompson and J.T. Musick (1990). Grazing winter wheat : II. Height effect on response to production system. *Agron. J. 82: 37-41.*

Young, W.C.; D.O. Chilcote and H.W. Youngberg (1996). Annual ryegrass seed yield response to grazing during early stem elongation. *Agron. J. 88: 211-215.*

مجلة حوليات العلوم الزراعية ، كلية الزراعة ، جامعة عين شمس ، القاهرة ، م٤٨ ، ع(١)، ١٨٥-١٩٦ ، ٢٠٠٣

تأثير معاملات الحش على حاصل علف وحبوب تراكيب وراثية من الشعير

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٢- مركز البحوث الزراعية - بغداد - العراق

بالرغم من أن حش ورعي الشعير خلال القسم الأول من موسم النمو يعد تطبيقاً شائعاً في أجزاء مختلفة من العالم، إلا أن المعلومات والدراسات المتوفرة حول إمكانية استعمال الشعير كمحصول ثنائي الغرض لإنتاج العلف الأخضر والحبوب قليلة في العراق. وقد أجريت هذه الدراسة بهدف تقييم تأثير معاملات الحش المختلفة على حاصل العلف الأخضر والحبوب ونمو تراكيب وراثية مختلفة من الشعير تم الحصول عليها من CIMMYT وICARDA.

استعملت ثلاث معاملات حش (بدون حش، حشه واحدة، حشتان)، تم حش النباتات على ارتفاع ٣ أو ٦ سم من مستوى أسطح التربة، أجريت جميع معاملات الحش عند وصول النباتات إلى أرتفاع ٣٠-٣٥سم، وذلك قبل ظهور القمة النامية للساق الرئيسي، وعند النضج تم حصاد جميع المعاملات لتقدير حاصل الحبوب.

أظهرت النتائج وجود تأثير معنوي لمعاملات الحش المختلفة على حاصل العلف الأخضر وتراوح حاصل العلف الأخضر من ٥,٨ إلى ١١,٢ طن/هـ، ومن ١١,٩ إلى ١٨,٢ طن/هـ لمعاملات الحش مرة واحدة ومرتين على التوالي، بينما تراوح حاصل العلف الأخضر للمعاملة بدون حش (الحش في مرحلة التزهير) من ٣٢,٨ إلى ٥٤,٣ طن/هـ. لم تكن هناك استجابة واضحة لحاصل الحبوب للتراكيب الوراثية المختلفة بعد معاملات الحش، فقد انخفض حاصل حبوب ثلاث تراكيب وراثية، بينما أنتجت السلالة ٩٩ أعلى حاصل لمعاملات الحش، وأنتجت ٧,٢ و ٦,٧ طن/هـ عند الحش مرة واحدة ومرتين على ارتفاع ٣سم، على التوالي. تشير هذه الدراسة إلى أن السلالتين ٩٩ و٢٦٥ يمكن زراعتها كمحصول ثنائي الغرض لإنتاج كلا العلف الأخضر والحبوب.

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