CLIPPING IN WHEAT: IMPACT OF VARIETIES AND STAGE OF HARVEST ON GREEN FODDER, CROP GROWTH AND YIELD OF WHEAT

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ABSTRACT

To study the effect of different varieties and clipping intervals on dual purpose wheat, a field trial was carried out at the Agricultural Research Institute, Dera Ismail Khan, Khyber Pakhtunkhwa (KPK) during the year 2013-2014. The experiment was laid out in a randomized complete block design replicated thrice. Wheat varieties tested were Dera-98, Zam-04, Gomal-8 and Hashim-8. Fodder harvesting was done to check the cutting effect on wheat 45 and 60 days after sowing (DAS). There were 12 rows in each treatment, 6 were cut (three rows 45 days and other three rows 60 days after sowing) for forage + grain purpose while rest of the six rows were un-cut for grain purpose only. This study revealed that, among wheat varieties, Hashim-8 produced higher forage as well as grain yields than other varieties. It was also found that cut I (clipping wheat 45 days after sowing) was better than cut II (60 days after sowing) and no-cut, respectively in terms of cost benefit ratio. Variety Hashim-8 can be harvested 45 days after sowing for green fodder and therefore recommended for dual purpose (forage + grain purpose).

Keywords: *Clipping in Wheat, Varieties & Stage, Green Fodder, Growth & Yield*

INTRODUCTION

Around the world wheat is ranked as king of cereal and chief source of daily dietary requirements. In Pakistan wheat is fulfilling the food necessity of the major population. It meets about 73% protein and calories of average diet (Hossain, Epplin & Krenzer, 2003). Pakistan is facing fierce shortage of food and feed due to rampant increase of population. To bring more area under cultivation is a universal remedial measure in order to increase wheat production. Wheat has the capacity to fulfill food and feed necessities of rapidly increasing livestock and human populace under optimum modern management practices.

Wheat used as forage and grain (dual purpose crop) is intended at decreasing competition between area used for grain and forage. The out put of this practice brings stability due to the availability of livestock and wheat goods in markets. In many countries, dual purpose system is used widely including Argentina, Austria, Morocco, Pakistan, Syria and Uruguay (Epplin, Hossain & Krenzer, 2000). Although the varieties sown for double-purpose are native varieties for grains produced intended to masses diet. Rabi crop

permits high quality of fodder for the livestock during the harsh wintertime, by fulfilling the supplies both in terms of qualitative and quantitative perspectives (Khalil, Carver, Krenzer, MacKnown, Horn & Rayas-Duarte., 2002). Zahid, Mufti, Khan and Bhatti (1997) testified that better wheat agronomic practices created 34516 kg ha^{-1}green pastures in comparison to indigenous practices (1732 kg ha^{-1}) resulted excess gains of Rs. 2557 kg ha^{-1} to growers.

LITERATURE REVIEW

Wheat is typically cut as green pasture for cattle or used as grazing purpose in Rodh Kohi area (Kot Tagga, Gara Abdullah, Kot Musa, Gara Mamriaz) of Dera Ismail Khan District and other areas of Pakistan during December and January, when other green pastures are unavailable in the areas. Cattle rearing being main livelihood of the communities in that region, people tackle limitations of grasslands both in Rabi and Kharif seasons. During Rabi due to limited choices of fodders the communities have no choice except to graze on wheat (Khan, Amir & Sarwer, 2003). Wheat covers 37% of total cultivated area and shares 70% of Rabi area in Pakistan. In Pakistan, wheat occupies 8.8 million hectares and produces 24.2 million tons annually with a standard harvest of 2750 kg ha^{-1} (Anonymous, 2011). Mostly dual purpose (DP) wheat gives more income than the crop sown for grain purpose. Timely sowing of wheat has shown better results both in forage as well as grain production (Arzadun, Arroquy, Laborde & Brevedan, 2006). Wheat pasture gives palatable and nutritious feed for livestock. The forage is succulent, rich in protein, energy and other nutrients although low in fiber.

Sowing time has an enormous consequence in the autumn season on the economic gains and the quantity of available pasture. Delay in planting results in sluggish growth, low production, whereas grain outcome can still be very appreciable. Selection of wheat variety plays an important role in decisive potential whether to use for grain purpose or fodder + grain. Winter (Rabi) wheat is commonly used for three main purposes dual purpose, grain only and forage only, in the Southern plains of USA and other winter wheat growing areas of world. In the DP system, winter wheat is fed by cattle and sheep from November until producing of first hollow stem in late February to early March. Farmers selecting a dual purpose have higher flexibility and more economical benefits compared with those farmers who select wheat as pasture or fodder only, and grain only crop. In order to produce large amount of green pasture, dual purpose wheat is usually cultivated earlier (Hossain et al., 2003).

Keeping all this in view, it was felt imperative to initiate a research trial on time and extent of wheat cutting on growth, green fodder and yield of different wheat varieties for developing a feasible dual-purpose wheat technology.

MATERIALS AND METHODS

The present trial was conducted at the Agricultural Research Institute (ARI), Dera Ismail Khan, KPK, during cropping year 2013-2014. Well adopted wheat varieties viz. Dera-98, Zam-04, Hashim-8 and Gomal-8 were used as test cultivars. The study comprised of two cutting dates of each variety. First cut was given 45 days and second cut 60 days after sowing. Wheat sowing was done in mid-November by a manual drill using recommended seed amount of 100 kg ha^{-1}. Randomized complete block design with three replications were used in the study with subplot size of 5 m × 3.6 m. The recommended nutrients (fertilizer) dosage of 150: 120: 90 kg (NPK) ha^{-1} was applied to all plots. Phosphorous and potash fertilizers were entirely applied at sowing whereas nitrogen was split applied by dividing it into two equal differences i.e. first half at seeding and rest half was top dressed at first irrigation. Weeds were controlled by using Buctril Supper @1250 (mL ha^{-1}) for broad leaved weeds and Puma Supper @750 (mL ha^{-1}) for narrow leaved weeds. Irrigation was applied at all critical growth stages viz. 2-3 weeks after seedling emergence, tillering, booting, earing and grain formation stages.

Data were recorded on fresh forage yield (kg ha^{-1}), dry forage yield (kg ha^{-1}), plant height at maturity (cm), number of tillers (m^{-2}), spike length (cm), number of grains ($spike^{-1}$), days to maturity, 1000-grain weight (g). grain yield (kg ha^{-1}), biological yield (kg ha^{-1}) and benefit cost ratio (BCR). The data were statistically analyzed through analysis of variance techniques (Steel, Torri and Dickey., 1997) and least significant difference test (LSD) was then conducted in order to compare the difference between treatment means through MSTATC computer software.

RESULTS AND DISCUSSION

Fresh forage yield (kg ha^{-1})

The Table 1 data showed that fresh forage produce was non-significantly impacted by different wheat varieties. However, significant difference was noted in clipping intervals. Higher fresh forage yield (4359.4 kg ha^{-1}) was noted by cutting wheat 60 days after propagating (DAS) as compared to 3449 kg ha^{-1} forage yield obtained 45 days after sowing.

The interaction of wheat varieties and clipping intervals had significant effect on fresh forage yield. Maximum fresh forage yield (4419.3 kg ha^{-1}) was recoded in wheat variety Hashim-8 (60 days after sowing) and minimum yield (3341.7 kg ha^{-1}) in Gomal-8 (45 days after sowing). Higher forage production 60 days after sowing was due to extended growth period, which increased biomass production. These findings are supported by Lyon, Baltensperger and Siles. (2001) who said that later cutting gives maximum fresh

forage yield. Khalil, Khan, Rehman, Amanullah, Khan, Wahab, Akhtar, Zubair, Khalil, Shah and Khan. (2011) also stated that forage yield increases with delay in cutting.

Dry forage yield (kg ha^{-1})

The data given in Table 1 showed non-significant difference among different wheat varieties for dry forage yield. However, significantly higher dry forage yield (902.25 kg ha^{-1}) was noted 60 days after sowing as compared to dry forage yield of 783.42 kg ha^{-1} recorded 45 days after sowing. The interaction of varieties and clipping intervals showed that Hashim-8 produced significantly higher dry forage yield (917.33 kg ha^{-1}) 60 days after sowing than the yield (777.33 kg ha^{-1}) obtained 45 days after sowing from the same wheat variety. These results are in line with Hastenpflug, Braida, Barbosa, Zeilinski, Rafatti and Rosana. (2011) who stated that early cutting of wheat gives low dry forage yield.

Plant height at maturity (cm)

The data given in Table 2 revealed that wheat variety Dera-98 attained maximum height of 96.03cm. It was, however, statistically at par with Gomal-8 with plant height of 89.28cm. Similarly in cut vs. no-cut treatments, taller plants of 106.34cm were produced in no-cut treatments while short statured plants of 86.20cm were noted in treatments where wheat was cut 60 days after sowing. As far as interaction of crop varieties and cut vs. no-cut treatments are concerned, wheat variety Zam-04 attained maximum plant height (111.07cm) in no-cut treatment that was statistically at par with Dera-98 (110.50cm) in the same treatment. Hashim-8 (60 days after sowing) produced short statured plants of 80.87cm. The production of taller plants in no-cut treatment was due to their uninterrupted growth and utilization of all available resources throughout their vegetative growth stages. The present results for plant height are supported by Naveed, Khan, Baloch, Awan, Khan and Arif. (2011a) who stated that cutting of wheat terminates the plant germination and hinders the new twigs development so in result the plant height is affected adversely.

Number of tillers (m^{-2})

The data indicated that number of tillers was significantly affected by different wheat varieties (Table 2). Maximum number of tillers (506.67 m^{-2}) was noted in wheat variety Dera-98 as compared to Hashim-8 and Gomal-8 that produced 487.00 and 448.00 tillers m^{-2}, respectively. Zam-04 produced minimum number of tillers (429.67 m^{-2}). The data further showed significantly higher number of 526.50 tillers m^{-2} in no-cut plots compared with cut plots, which produced 448.50 and 429.17 number of tillers 45 and 60 days after sowing, respectively. The interaction of wheat varieties and cut vs. no-cut treatments was non-significant statistically. In the present study, less number of tillers was produced 60

days after sowing as compared to other treatments. It was probably due to their poor re-generation and re-growth on account of tillering shock and/or tillers mortality after cutting and vice versa. These results are supported by Zhu, Midmore, Radford and Yule. (2004) who stated that grazed or cut treatments produce less number of tillers as compared to non grazed treatments.

Spike length (cm)

The data revealed that wheat varieties and cutting vs. non-cutting treatments significantly affected spike length (Table 2). Maximum spike length of 9.81cm was recorded in Zam-04 followed by Gomal-8 and Hashim-8 with spike length of 8.32 and 8.33cm, respectively. Wheat variety Dera-98 had statistically similar spikes length (9.32cm) to that of Zam-04. In cut vs. no-cut treatments, maximum spike length (9.92cm) was recorded in no-cut treatment as compared to spike length (9.04 and 7.87cm) noted 45 and 60 days after sowing, respectively. The interaction between wheat varieties and cut vs. no-cut treatments showed significantly maximum spike length (11.16cm) in wheat variety Zam-04 in no-cut treatment while minimum spike length of 7.26cm was recorded in Gomal-8 (60 days after sowing). Longer spikes obtained in no-cut plots were possibly due to uninterrupted supply of assimilates towards the final spike (Naveed, Khan, Baloch, Nadim, Awan, Khan and Arif, 2011b).

Number of grains (spike^{-1})

Many factors affect grains production like soil fertility, seed rate, planting time, air, moisture, soil water etc. The data presented in Table 2 showed non-significant difference among different wheat varieties. However, in no cut treatment the determined number of grains (49.00) per spike observed, followed by 37.50 and 33.70 number of grains recorded 45 and 60 days after sowing, respectively. The interaction of varieties and cut vs. no-cut treatments showed statistically similar number of grains per spike in all wheat varieties in no-cut treatment but significantly higher than that recorded in cut treatments 45 and 60 days after sowing, respectively. The higher number of grains per spike was possibly due to maximum nutrient absorption, in the absence of decapitation stress, and also increased spikes length in no-cut treatment as compared to cutting treatments. These results are supported by Shahzad, Din, Sahi, Khan, Ullah and Ahmad. (2007) who stated that continued growing period has better development of grain per spike. Arif, Khan, Akbar, Sajjad and Ali. (2006) also indicated that high number of grin yield recorded with plots in no-cut plots while in cut plots limited yield was noticed.

Days to maturity

The said data significantly influenced via different wheat varieties in dual purpose wheat (Table 3). The data indicated earlier maturity (145.11 DAS) in wheat variety Hashim-8,

whereas other wheat varieties (Gomal-8, Zam-04 and Dera-98) took more number of days (146.78, 148.11and 148.22) to maturity. In cut vs. no-cut treatments, less numeral of times to maturity (144.25) in no-cut conduct than that recorded 60 (149.42 DAS) and 45 (147.25 DAS) days after sowing, respectively. The interaction between wheat varieties and cut vs. no-cut treatments had substantial touch in terms of maturity timings. Maximum number of days to ripening (151.67) was noted in wheat variety Zam-04 in cut treatment (60 days after sowing) while minimum days (142.67) were taken by Hashim-8 in no-cut treatment. In the present research, delay in maturity in cut treatment might be due to reduction in leaf range that affect the photosynthesis in result more time requirements needed for regrowth in order to attain maturity. These results are in line with Naveed et al. (2011b) who findings showed that wheat cuts (60) days after sowing ensued more number of spam to attain maturity due to decapitation/clipping stress, which prolonged vegetative growth period.

1000-grain weight (g)

The grain bulk was non-significantly affected via dissimilar wheat varieties in dual-purpose wheat. However, significant effect was noted in cut vs. no-cut treatments (Table 3). Maximum grains weight (42.00 g) was recorded in no-cut treatment than that noted in cut treatments, which produced statistically similar grain weight (39.583 and 38.833 g) 45 and 60 days after sowing, respectively. The data further indicated that interaction of wheat varieties and cut vs. no-cut treatments had significant effects on grains weight. Maximum grain weight (43.00 g) was recorded in Dera-98 in no-cut treatment while minimum (38.00 g) was noted in wheat variety Gomal-8 (45 days after sowing) and Zam-04 in 60 days after sowing treatments. The parameter outcomes are also similar to the findings by Arif et al. (2006) shared that grains weight was less expressively lower in cut plots, comparison with no or zero-cut plots.

Grain yield (kg ha^{-1})

The Table 3 data indicated that wheat varieties had substantial effect on grain yield. Wheat variety Hashim-8 formed high grains (4404.4 kg ha^{-1}) though statistically at par with Dera-98 and Zam-04, which produced grains yield of 4385.6 and 4121.1 kg ha^{-1}, respectively. Lowermost grain harvest (4025.6 kg ha^{-1}) was gotten in wheat variety Gomal-8. The data also showed significant effect of cut vs. no-cut treatments on grain yield. Maximum grain yield (4490.8 kg ha^{-1}) was documented in treatment of no-cut than that obtained in cut treatments (4304.2 and 3907.0 kg ha^{-1}), respectively. Interaction of wheat varieties and cut vs. no-cut was non-significant statistically. These results are supported by Hossain et al. (2003) who stated that cutting had adverse affect on grain yield of wheat crop, that's why Dharam and Sanjay (2009) recommended single and earlier forage cutting for getting additional advantage of the crop for fodder production as

it had least effect on grain yield. In the present study, lower wheat yield in 60 days after sowing treatment could be due to reduction in leaf area and removal of the growing points, which ultimately reduced grain yield (Naveed et al., 2011a).

Biological yield (kg ha^{-1})

Data of Table 3 revealing that there were non-significant difference in biological yield of wheat varieties. However, significant difference was found in cut vs. no-cut treatments. Determined biomass yield (13000 kg ha^{-1}) was noted in no-cut conduct as compared to cut I (45 DAS) and cut II (60 DAS) treatments which produced 12542 and 11958 kg ha^{-1} biological yield, respectively. The interaction of wheat varieties and cut vs. no-cut treatments had non-significant effects on biological yield. In clipping treatments, comparatively higher biological yield 45 days after sowing could be due to rapid canopy development and establishment of leaf area than late clipping, which reduced leaf area and plant height considerably. The highest biological yield was due to better plant biomass production in no-cut treatment in the absence of clipping stress. These results are supported by Arif et al. (2006) who stated that no-cut treatment produced additional biomass gains as compared to cut treatments.

Harvest index (%)

This table pertains to the physiological competence of plant to convert photosynthates into economic gains. The data recorded showed maximum harvest index (34.77%) in wheat variety Dera-98 (Table 3). It was, however, non-significantly different from all other varieties used in this experiment. The data further revealed that no-cut treatment had maximum harvest index (34.66%) which was statistically at par with cut I (34.25%) 45 days after sowing. The interaction of wheat varieties and fodder cuttings showed that Dera-98 in no-cut had maximum harvest index (37.00%) that was statistically similar to Zam-04 and Hashim-8 both in no-cut and cut I plots (45 days after sowing). Francia, Pacchioni, Nicosia, Paoletta, Taibi, Franco, Odoardi, Stanca and Delogu. (2006) also stated that harvest index was significantly reduced in dual purpose crop but no such reduction was found in the sole crop. Moreover, yield was drastically reduced after two grazing in comparison to un-grazed treatment.

Benefit cost ratio (%)

The data revealed that dual purpose wheat had greater net income and benefit cost ratio in comparison to grain only wheat (Table 4). Highest benefit cost ratio (2.18%) was obtained in 45 days cut plots whereas the lower benefit cost ratio was obtained in no-cut plots (2.08%). The more net income and benefit cost ratio in cut schemes might be due to additional income obtained from fodder production and economical yield as associated to other subversions. These outcomes are sustained by Sij, Pinchak, Malinowski, Robinson,

Bevers, Baughman and Gill. (2007) who stated that grazing + grain scheme was better to grazing only scheme in obtaining upper net income. These findings are also in line with Arif et al. (2006) who stated that greater net income was obtained from cut plots than no-cut plots.

CONCLUSION

This study concluded that wheat variety Hashim-8 produced higher forage as well as grain yields than other wheat varieties. It was also found that cut I (clipping wheat 45 days after sowing) was better than cut II (60 days after sowing) and no-cut, respectively in terms of cost benefit ratio. It is, therefore, recommended that among the different wheat varieties, Hashim-8 was the utmost appropriate for double drive and can be cut after 45 & 60 days after sowing for green fodder as cutting it at both stages gave higher grain and fodder yields, thus securing fodder and food production in the area. Based on the results obtained, it is recommended that such type of research trials needs to be carried out in both irrigated and rainfed areas across the country.

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Table 1. Fresh and dry forage yield (kg ha^{-1}) as affected by fodder cutting of different varieties in dual purpose wheat.

Treatments		Fresh forage yield (kg ha^{-1})	Dry forage yield (kg ha^{-1})
Cutting			
Cutting I (45 DAS)		3449.3 b	783.42 b
Cutting II (60 DAS)		4359.4 a	902.25 a
$LSD_{0.05}$		105.26	15.77
Varieties			
Dera-98		2572.0^{NS}	557.22^{NS}
Zam-04		2652.4	568.78
Gomal-08		2571.3	556.67
Hashim-08		2615.8	564.89
$LSD_{0.05}$		----	----
Cutting x Varieties			
Cutting I (45 DAS)	Dera-98	3485.3 b	787.67 b
	Zam-04	3541.7 b	790.67 b
	Gomal-08	3341.7 b	778.00 b
	Hashim-08	3428.3 b	777.33 b
Cutting I (60 DAS)	Dera-98	4230.7 a	884.00 a
	Zam-04	4415.7 a	915.67 a
	Gomal-08	4372.3 a	892.00 a
	Hashim-08	4419.0 a	917.33 a
$LSD_{0.05}$		243.95	38.10

NS= Non-significant

Means followed by different letter(s) in a column are statistically significant at 5% probability level.

Table 4. Benefit cost ratio (%) as affected by fodder cutting of different varieties in dual purpose wheat.

Clipping effect	**Cost (Pak Rs. ha^{-1})**			**Income (Pak Rs. ha^{-1})**				**Net income (Rs. ha^{-1})**	**BCR**
	Fixed	**Variable**	**Total**	**Grain**	**Fodder**	**Straw**	**Total**		
Cut I (45 DAS)	72079	1800	73879	129126	17245	15200	161571	88692	2.18
Cut II (60 DAS)	72079	1800	73879	117225	23797	13674	154696	80817	2.09
No cut	72079	--	72079	134724	--	15715	150439	78360	2.08

Rate of wheat seed = Pak Rs. 22.60 per kg
Rate of wheat straw = Pak Rs. 300 per 100 kg grains
Rate of wheat fodder = Pak Rs. 5 per kg
Cutting of wheat fodder = Pak Rs. 1800 ha^{-1}

Table 2. Plant height (cm), number of tillers (m^{-2}), spike length (cm) and number of grains ($spike^{-1}$) as affected by fodder cutting of different varieties in dual purpose wheat.

Treatments		Plant height (cm)	Number of tillers (m^{-2})	Spike length (cm)	Number of grains ($spike^{-1}$)
Cutting					
No cut		106.34 a	526.50 a	9.92 a	49.00 a
Cutting I (45 DAS)		87.80 b	448.50 b	9.04 b	37.50 b
Cutting II (60 DAS)		86.20 c	429.17 c	7.87 c	33.70 c
$LSD_{0.05}$		**3.508**	**8.949**	**0.460**	**1.781**
Varieties					
Dera-98		96.03 a	506.67 a	9.32 a	40.11[NS]
Zam-04		89.28 b	429.67 b	9.81 a	40.22
Gomal-08		90.20 a	487.00 ab	8.32 b	39.11
Hashim-08		89.26 b	448.89 ab	8.33 b	40.88
$LSD_{0.05}$		**5.461**	**62.445**	**0.687**	----
Cutting x Varieties					
No cut	Dera-98	110.50 ab	599.33[NS]	10.30 ab	48.33 a
	Zam-04	111.07 a	472.00	11.16 a	49.33 a
	Gomal-08	101.07 c	535.00	9.16 cd	49.00 a
	Hashim-08	102.73 bc	499.67	9.06 cde	49.33 a
Cutting I (45 DAS)	Dera-98	87.73 d-g	466.00	9.60 bc	38.66 b
	Zam-04	92.73 d	416.33	9.73 bc	38.00 b
	Gomal-08	86.53 d-g	476.67	8.53 def	35.33 bc
	Hashim-08	84.20 efg	412.00	8.30 def	38.00 b
$LSD_{0.05}$		**243.95**			
Cutting I (60 DAS)	Dera-98	89.87 def	454.67	8.06 efg	33.33 c
	Zam-04	91.07 de	400.67	8.53 def	33.33 c
	Gomal-08	83.00 fg	449.33	7.26 g	33.00 c
	Hashim-08	80.87 g	435.00	7.63 fg	35.33 bc
$LSD_{0.05}$		**7.894**	----	**1.015**	**4.361**

NS= Non-significant

Means followed by different letter(s) in a column are statistically significant at 5% probability level.

Table 3. Days to maturity, 1000-grain weight (g), grain yield (kg ha^{-1}), biological yield (kg ha^{-1}) and harvest index (%) as affected by fodder cutting of different varieties in dual purpose wheat.

Treatments		Days to maturity	1000-grain weight (g)	Grain yield (kg ha^{-1})	Biological yield (kg ha^{-1})	Harvest index (%)
Cutting						
No cut		144.25 c	42.00 a	4490.8 a	13000 a	34.66 a
Cutting I (45 DAS)		147.50 b	39.58 b	4304.2 b	12542 b	34.25 a
Cutting II (60 DAS)		149.42 a	38.83 b	3907.5 c	11958 c	32.75 b
$LSD_{0.05}$		**1.0550**	**1.376**	**155.34**	**239.20**	**1.398**
Varieties						
Dera-98		148.22 a	40.88^{NS}	4385.6 a	12556^{NS}	34.77^{NS}
Zam-04		148.11 a	39.77	4121.1 ab	12556	33.44
Gomal-08		146.78 a	39.77	4025.6 b	12278	32.88
Hashim-08		145.11 b	40.11	4404.4 a	12833	34.44
$LSD_{0.05}$		**1.436**	----	**306.36**		----
Cutting x Varieties						
No cut	Dera-98	146.33 c-f	43.00 a	4793.3^{NS}	13000^{NS}	37.00 a
	Zam-04	144.33 efg	40.66 bc	4346.7	12833	34.00 ab
	Gomal-08	143.67 fg	42.33 ab	4196.7	12833	33.00 b
	Hashim-08	142.67 g	42.00 ab	4626.7	13333	34.66 ab
Cutting I (45 DAS)	Dera-98	150.00 ab	40.33 bc	4473.3	12667	35.00 ab
	Zam-04	148.33 bc	40.66 bc	4166.7	12333	33.66 ab
	Gomal-08	146.67 cde	38.00 d	4026.7	12333	32.66 b
	Hashim-08	145.00 d-g	39.33 cd	4550.0	12833	35.66 ab
$LSD_{0.05}$						
Cutting I (60 DAS)	Dera-98	148.33 bc	39.33 cd	3890.0	12000	32.33 cd
	Zam-04	151.67 a	38.00 d	3850.0	11833	32.66 d
	Gomal-08	150.00 ab	39.00 cd	3853.3	11667	33.00 cd
	Hashim-08	147.76 bcd	39.00 cd	4036.7	12333	33.00 cd
$LSD_{0.05}$		**2.1811**	**2.696**	----	----	**32.505**

NS= Non-significant

Means followed by different letter(s) in a column are statistically significant at 5% probability level.