

IMPACT OF DATE OF LAST CUT ON FODDER AND SEED YIELD OF BERSEEM UNDER IRRIGATED CONDITIONS OF BAHAWALPUR

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ABSTRACT

The field experiment was accompanied at Agricultural Research Station, Bahawalpur during rabi season 2018-19 to study the impact of date of last cut date on the green fodder and seed yield of Berseem (*Trifolium alexandrinum* L.). The set of treatments comprised on five last cutting dates were (T₁=No cut, T₂=1st February, T₃=15th Feb, T₄=1st March, T₅=15th March and T₆=1st April. Results revealed considerable differences in the No. of seeds per capsule, No. of capsules per plant, plant height, 1000 seed weight, green fodder yield as well as seed yield characters under different date of last cut. The last cut date on 15th March attained significantly higher plant height (116 cm), No. of capsules per plant (168), No. of seeds per capsule (44), 1000 seed weight (1.76 g), green fodder yield (26.10) as well as seed yield (581). Results indicated that 15th March last cut date is favorable for getting maximum green fodder yield and seed yield.

Keywords: Last Cut, Fodder yield, Quality parameters, Berseem.

INTRODUCTION

Berseem (*Trifolium alexandrinum* L.) is an important legume fodder crop. Due to high fodder producing capacity berseem is known as king of fodders. It is best for animal feeding due to its nutritional effects. It is used as hay and pallets during off seasons and green forage during the season (Nigam *et al.*, 2010a). All over the world, hay and pallets used for animal feeds during off season (Nigam *et al.*, 2010b). Leguminous fodders play important role in ecosystem and agricultural production that provides fodders for animals (Singh *et al.*, 2010). Keeping in view, the reduction in fodder yield that may be due to date of last cut, insects, diseases pest infestation and climatic, conditions (Karar *et al.*, 2021). Due to high number of cuttings slight time is available for seed setting and also because reproductive and vegetative phases occurs simultaneously leading to poor seed setting (Karjule and Shelar, 2021). In field conditions cutting of fodder continued to mid April and crop retained for seed production faces hot temperature and less foliage resulted in poor seed setting and less net profit in terms of seed production (El-nably *et al.*, 2002). The shortage of good quality seed of berseem may be due to more relative humidity and temperature during reproduction phases. Plummeting photosynthesis and respiration excites during flowering stage due to high temperature (Hayat *et al.*, 2012). Maximum seed yield and forage of berseem can be achieved through appropriate date of last cut (Mukharjee and Mandal, 2000). There are many factors for seed production last cut date considered important. Late last cut date permitted slight time for setting of seed and process of setting of seed completed quickly due to low humidity and high temperature resulting in poor fertilization and pollen abortion in developing seed (Singh *et al.*, 2019), resulting termination of developing seed, post fertilization abortion and pollens sterility. The phenology is genetically controlled character but it is influenced by climatic conditions and management practices specifically date of last cut in berseem resulted in increase in number of days to flowering from sowing (Yadav *et al.*, 2015). The delay in last substantially increased the reproductive phase i.e. from flower initiation to maturity due to more time for reproductive phase (Sardana and Narwal, 2000). Additionally, low humidity and extraordinary more temperature restricts pollination, consequently prominent to weak seed setting and poor pollination (Yadav *et al.*, 2015). Proper date of last cut is necessary for achieving good quality seed because low seed setting occurs due to harsh environmental and physiological factors at the time of seed setting. Therefore, appropriate date of last cut is necessary factor to accomplish maximum green fodder and seed yield of berseem.

MATERIAL AND METHODS

A field experiment was conducted at Agricultural Research Station, Bahawalpur (29°38'63" N, 71°65'32" E) during Rabi season 2018-19. An approved variety of berseem namely Punjab Berseem was used for experiment. The experimental site was prepared and plowed one time trailed by each time planking. The seed was sown using broadcast method in standing water keeping the seed rate of 8 kg ha⁻¹. The six treatments were comprised of T₁=No Cut, T₂=1st Feb, T₃=15th of Feb, T₄=1st March, T₅=15th March and 1st April. These treatments were replicated thrice. The plot size was 1.82 m * 3.9 m. The crop was sown on 22.11.2018. All the cultural practices were done for maximum productivity of berseem. The crop was leave for seed production after last cut. The seed rate was kept 8 kg acre⁻¹. The data was recorded using measuring tape and rod. The 1st cut for fodder was taken after 70 days after sowing. Subsequently the last cut date crop was left for seed production. Average number of capsules per plant and number of seeds per capsule calculated by arbitrarily selected three plants from each plot. At each cut green fodder yield per hectare was calculated. After threshing 1000 seeds were counted and weighed from bulk seed lot. The data was subjected to analysis of variance (ANOVA) using Statistix version 9. The means were separated by LSD.

RESULTS AND DISCUSSION

Plant Height (cm)

The results of the study (Table 1) indicated that plant height was statistically significant. Results revealed that maximum plant height (133 cm) was achieved in T₄ (1st March date of last cut) following T₅ (116 cm 15th March date of last cut) while minimum plant height (63 cm) was recorded in T₆ (1st April date of last cut) that might be due to more marked effect of accumulative more temperature during the date of last cut (Choudhary and Suri, 2014).

Number of Plants. m⁻²

The results of the study (Table 1) showed that maximum number of plants. m⁻² was documented in T₅ 15th of March (381) followed by T₄ 1st March (345) while minimum in T₁ No. cut (263) was recorded. Surinder *et al.*, (2019) also reported that the maximum number of shoots m⁻² on 25th March followed by 5th and 15th April cutting date.

Number of capsules per plant

The results (Table 1) showed that maximum number of capsules per plant were recorded in T₅ 15th of March (168) followed by T₄ 1st March (128) while minimum no. of capsules per plant were recorded in T₆ 1st April (77). The results are streamed with (Yadav *et al.*, 2015) who reported that early flushes contains extreme high numbers of flower heads and flowering occurs in flushes and while late flushes have reduced number of flower heads.

Table 1. Impact of last cut date on green fodder yield, seed yield and yield attributes of berseem.

Treatment	Plant height (cm)	No. of plants. m ⁻²	No. of capsules per plant	No. of seeds per capsule	1000 seeds weight (g)	Green fodder yield (t ha ⁻¹)	Seed yield (kg.ha ⁻¹)
T1 (No cut)	81 bc	263 b	83 cd	21 bc	1.25 c	-	326 cd
T2(1 st FEB)	112 ab	317 ab	117 bc	24 bc	1.50 b	18.39 b	411 bc
T3(15 th Feb)	93 bc	327 ab	104 bcd	27 bc	1.67 ab	19.17 b	496 ab
T4 (1 st Mrach)	133 a	345 ab	128 b	31 b	1.71 ab	20.68 ab	532 ab
T5(15 th Mrach)	116 ab	381 a	168 a	44 a	1.76 a	26.10 a	581 a
T6 (1 st April)	63 c	321 ab	77 d	19 c	1.74 a	16.59 b	258 d
LSD (0.05)	39.62	82.38	37.82	9.81	0.23	6.35	127.15

Number of seeds per capsule

The results of the study (Table 1) showed that maximum no. of seeds per capsule (44) were recorded in T₅ 15th of March while minimum no. of capsules were recorded in T₆ 1st April (19) that may be due to reduced growth and pollen viability resulted in low no. of seeds per capsule. The major factors responsible

for low seed yield of berseem reported as reduced capability of pollen grains due to more temperature and stumpy relative humidity at reproductive stage (El-nably *et al.*, 2002).

1000-seed weight (g)

The perusal of the data (Table 1) showed that date of last cut had significant on 1000 seed weight. The highest 1000 seed weight (1.76 g) was obtained in T₅ 15th March followed by T₄ 1st March while lowest 1000 seed weight (1.25 g) was recorded in T₁ (No. Cut). These results are in accordance with (Musa *et. al.*, 2021).

Green fodder yield (t. ha⁻¹)

The data (Table 1) showed that maximum green fodder yield (26.10) was obtained in T₅ 15th March followed by 1st March (20.68) while lowest green fodder yield (16.59) was obtained in T₆ which was statistically alike with T₁, T₂ and T₃ that may be due to less foliage resulted in less green fodder yield in as T₆ was delayed date of last cut. The low foliage retention obtained due to the factor that farmers continue fodder cutting till late March to mid-April. These results are similar with (Musa *et. al.*, 2021) that stated that total fresh fodder yield was improved progressively with each consecutive delay in the date of last cut.

Seed yield (kg. ha⁻¹)

The results of the study (Table 1) showed that highest seed yield (581 kg ha⁻¹) was recorded in T₅ 15th March followed by T₄ 1st March (532 kg ha⁻¹) while lowest seed yield (258 kg ha⁻¹) was obtained in T₆ 1st April date of last cut that may be due to late last date of cut resulted in poor vegetative growth and low seed yield. General practice is to endure fodder cutting till late March to mid-April, which resulted in poor flowering, low foliage retention and finally low seed production. Similar findings of yield reduction due to postponement in date of last cut were reported by numerous researchers (Puri *et al.*, 2007). Maximum growing period with favourable climatic conditions resulted in more seed yield might be due to accumulative effect of date of last cut (Sardana and Narwal, 2000). Due to delayed date of last cut lower seed yield reported by (Yadav *et al.*, 2015). The photoperiod and temperature distinguishly influence the seed yield. Due to delayed date of last cutting resulted in reduction in number of flowers per capsule, seed set percent and 1000 seed weight that might be the reason of last cut date indicating by less growth period for seed development (Karjule and Shelar, 2021). Karar *et al.* (2017) reported that deferred date of last cut of lucerne and berseem occasioned in decrease of seed production. Furthermore, low humidity and high temperature restricts bee activity, thus leading to poor pollination and weak seed setting (Yadav *et al.*, 2015).

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CONFLICT OF INTEREST

The authors declares no conflict of interest.

CONCLUSION

The pollination and fertilization of berseem crop affected due to time of last cut because of extended warm summers and reduced cool winters. In the scenario of climate change date of last cut seems to be important for the farmers for getting maximum seed yield. Similarly, low seed productivity weak blossoming and low foliage is the result of continuous cutting of berseem for fodder purpose upto 15th of April. Under Punjab conditions crop should be left for seed production till 15th of March of berseem. Anyhow seed production is low due to date of last cut till 15th April resulted in low seed production. From the results it is concluded that date of last cut of berseem for seed production can be manipulated depending upon the interests of farmers. The date of last cut of berseem should be taken on 15th of March for getting maximum seed yield of berseem.

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