



## RESEARCH ARTICLE

### SEED YIELD RESPONSE OF BERSEEM (EGYPTIAN CLOVER) TO DIFFERENT LAST CUTTING DATES

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#### ABSTRACT

Egyptian clover (*Trifolium alexandrinum* L.) is a major fodder crop widely grown in Pakistan during winter season. Two years study was conducted at Agronomy (Forage Production) Section, Ayub Agricultural Research Institute, Faisalabad, Pakistan during 2013-14 and 2014-15. The primary objective was to find out the effect of last cutting on seed yield in Berseem. Two varieties Anmol and Super late were selected to compare for seed yield at three different last cutting dates i.e. 1<sup>st</sup> week of March, 3<sup>rd</sup> week of March and 1<sup>st</sup> week of April. The experiment was sown in split plot design having three replications with plot size 6m x 3m. Berseem seed @ 20 kg ha<sup>-1</sup> was broadcasted in standing water. In case of fertilizer, NP @ 30-60 kg ha<sup>-1</sup> were applied. K<sub>2</sub>O @ 35 kg ha<sup>-1</sup> was top dressed after last cutting. Data regarding no of leaves per plant, Number of tillers per meter square, green fodder yield (t/ha), number of seeds/capsule, 1000- grain weight (gm) and seed yield ( t/ha) were recorded accordingly. The results from the pooled data indicated that the maximum no of leaves per plant, Number of tillers per meter square, green fodder yield(t/ha), number of seeds/capsule, 1000- grain weight and seed yield ( t/ha) was recorded when the last cutting was performed in the first week of April.

**Key words:** Egyptian Clover, Green Fodder Yield, Seed Yield, Tiller, last cutting date.

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#### INTRODUCTION

Berseem is important Rabi fodder of Pakistan and covered an area of 78% among all other Rabi fodders sown. Fodder crop area of Pakistan is 2.11 million hectare and production is 45.77 million tons. It accounts for 3.2 percent in the value added in agriculture and 0.7 percent of GDP. Berseem is the largest Rabi season cattle fodder grown in the country, 88 per cent of which grows in Punjab, nine per cent in Sindh, two per cent in the NWFP and 0.5 per cent in Balochistan. It is a popular fodder for milch animals in South East Asia due to its rapid growth, good fodder recovery after cutting, multi cut nature, continuous fodder supply, high tonnage, excellent palatability and high nutritional value (Saini and Chowdhary, 1993). It provides superior and cheap nutrition for prolonged period to the cattle and helps enhancing milk production. In addition to this as it is a legume fodder hence it improves and maintain soil fertility and productivity. Berseem contains 2% proteins, 2.89% calcium and 0.4 % phosphate at the green stage. Production of Berseem seed is being neglected by farmers, Government organizations and private sectors (Dost, 1997). One of the major difficulties facing berseem cultivation is the low productivity of seed at the end of the growing season.

In a research it was declared that less attention has been paid by the farming community to its seed production because it is mainly cultivated for fodder (Haza and Rekeb, 1991). The number of cuttings and length of the growth period before flowering and seed harvest and the availability of pollinators are important factors affecting seed production. The highest seed yield was recorded by taking two or three cuts (Kassem and Aboul Ela, 1963; Hassan *et al.*, 1968; Radwan *et al.*, 1983; Abdel-Rahim *et al.*, 1984 and Geweifel and Rammah, 1990). However, Abdel-Gawad (1993 b) obtained the highest seed yield by taking four cuts from Giza 15 variety followed by the Ahaly variety. Seed production after two or three cuts resulted in the highest number of heads /m<sup>2</sup> and the highest seed index (Radwan *et al.* 1983; Geweifel and Rammah, 1990) Taking two and three cuts gave the highest values for number of heads/m<sup>2</sup> and seed index (Radwan *et al.*, 1983), also, increased number of heads/plant (Abdel-Rahim *et al.*, 1984) and increased number of stems/plant, number of heads/plant and seed weight/plant (Geweifel and Rammah, 1990). All the research work indicates the last cutting date/time has a key role in seed production of Egyptian clover. Ramadan *et al.* (1994) found that berseem seed production was significantly affected not only by sowing date, number of cuttings but also mainly by the date of the last cut. Taking two or three cuts resulted in the highest number of heads per m<sup>2</sup>, the highest seed index and highest seed yield (Radwan *et al.*, 1983; Geweifel and Rammah, 1990).

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Table seed yield response of berseem (Egyptian clover) to different last cutting dates

Treatment		Leaves/plant			Tillers/Meter square			Green Fodder Yield (t/ha)		
Varieties		2013-14	2014-15	Mean	2013-14	2014-15	Mean	2013-14	2014-15	Mean
	Anmol	12.111	13.222 A	12.667 A	143.89 A	161.11 A	152.50 A	47.692 A	45.93	46.813 A
	Faisalabad Super Late	11.000	12.000 B	11.500 B	137.56 B	150.56 B	144.06 B	39.599 B	42.199	40.899 B
	LSD (0.05)	N.S	0.9561	0.6360	1.6561	6.1036	2.0405	3.7081	N.S	1.8720
Last Cutting Dates		11.000 B	12.167	11.583 B	128.67 C	146.83 C	137.75 C	24.792 C	21.083 C	22.937 C
	1st Week of March	11.000 B	12.167	11.583 B	128.67 C	146.83 C	137.75 C	24.792 C	21.083 C	22.937 C
	3rd Week of March	11.500 AB	12.833	12.167 AB	139.83 B	158.00 B	148.92 B	40.017 B	45.875 B	42.946 B
	1st Week of April	12.167 A	12.833	12.500 A	153.67 A	162.67 A	158.17 A	66.128 A	65.240 A	65.684 A
	LSD (0.05)	0.9923	N.S	0.5947	5.2744	2.9101	2.7689	2.2855	2.7125	1.6304

  

Treatment		Seeds/capsule			1000 Grain Weight (g)			Seed Yield (t/ha)		
Varieties		2013-14	2014-15	Mean	2013-14	2014-15	Mean	2013-14	2014-15	Mean
	Anmol	51.333 B	38.889 B	45.111 B	1.9533 B	2.0156 B	1.9844 B	0.5478 B	1.0011	0.7744
	Faisalabad Super Late	57.000 A	45.444 A	51.222 A	2.2133 A	2.2500 A	2.2317 A	0.6189 A	0.9878	0.8033
	LSD (0.05)	3.7946	4.5605	1.9142	0.0994	0.0829	0.0418	0.0208	N.S	N.S
Last Cutting Dates		46.667 C	41.167	43.917 C	2.0600	2.0883 B	2.0742 B	0.5517 C	0.7567 C	0.6542 C
	1st Week of March	46.667 C	41.167	43.917 C	2.0600	2.0883 B	2.0742 B	0.5517 C	0.7567 C	0.6542 C
	3rd Week of March	53.500 B	42.333	48.250 B	2.0750	2.1150 B	2.0950 B	0.5800 B	1.0267 B	0.8033 B
	1st Week of April	62.333 A	43.000	52.333 A	2.1150	2.1950 A	2.1550 A	0.6183 A	1.2000 A	0.9092 A
	LSD (0.05)	2.8243	N.S	1.8890	N.S	0.0529	0.0354	0.0044	0.0425	0.0196

Furthermore, Sardana *et al.* (2000) also concluded from his experiment that last cutting time of berseem is highly influential in seed yield of berseem. They reported that higher seed yield of Egyptian clover can be produced by sowing on 15 November and giving the last fodder cutting on 2 March. Keeping in view the importance of berseem for dairying for maximum green fodder production, there is an urgent need to maximize the quality seed production which ultimately necessity to meet out the increasing demand of milk. The seed production of fodder crop is being neglected and becoming challenging as compared to other crops in Pakistan. The quality of seed produced depends upon the favorable climatic conditions and cultural practices. The date of last foliage cut to leave the crop for seed production is the key component for production of quality seed in forage crops. Therefore considering the above national facts, the present study was designed to determine the best last cutting date for maximum seed yield in Egyptian clover (Berseem) under Faisalabad conditions in Pakistan.

## MATERIALS AND METHODS

The experiment was conducted at the research area of Agronomy (Forage Production) Section, Ayub Agricultural research Institute, Faisalabad, Pakistan. The crop was sown in first week of November, 2013 and 2014 (on 04-11-2013 and 03-11- 2014 respectively). The crop was left for seed production after taking the last foliage cut. Two varieties Anmol and Super late were selected to compare for green fodder yield and seed yield at three different last cutting dates i.e. 1<sup>st</sup> week of March, 3<sup>rd</sup> week of March and 1<sup>st</sup> week of April. The experiment was sown in split plot design having three replications with plot size 6m x 3m. Berseem seed @ 20 kg ha<sup>-1</sup> was broadcasted in standing water.

In case of fertilizer, NP @ 30-60 kg ha<sup>-1</sup> were applied. K<sub>2</sub>O @ 35 kg ha<sup>-1</sup> was top dressed after last cutting. Data regarding green fodder yield (t ha<sup>-1</sup>), Number of tillers/m<sup>2</sup>, number of leaves per plant, number of seeds per capsule, seed yield (t ha<sup>-1</sup>) and 1000 seed weight (g) were recorded. From the harvested material of experiment at maturity, a sample of five capsules/heads was taken, threshed and number of seeds per capsule was recorded. For recording seed yield, the harvested material was threshed and cleaned properly. After threshing the crop, 1000 seeds were taken at random from the bulk seed lot of each replicated treatments and their weight was recorded. The data were statistically analyzed using analysis of variance for RCBD. Main and interactive effects were separated using LSD test to differentiate the treatments at 5% level of probability.

## RESULTS AND DISCUSSION

It was revealed from the data recorded that the berseem variety Anmol gave more no of leaves per plant, no of tillers per meter square and green fodder yield(t/ha)while the variety Faisalabad Super late gave more no of seeds per capsule,1000 grain wt (gm) and seed yield (t/ha).while the treatment where the last cutting was done on 1<sup>st</sup> week of April gave maximum no of leaves per plant, No of tillers per meter square, green fodder yield(t/ha), no of seeds per capsule,1000 grain wt(gm) and seed yield (t/ha).

### Leaves per Plant

The results of the experiments revealed that time of last cutting influenced the number of leaves of the Egyptian clover plants in both years. From the pooled data it is clear that in case

of varieties, Anmol had maximum (12.667) number of leaves. While in case of last cutting dates the treatment with cutting date 1<sup>st</sup> week of April produced maximum number of leaves per plant that was 12.5 which was followed by 3<sup>rd</sup> week of March i.e. 12.167. While in case of treatment with last cutting date 1<sup>st</sup> week of March gave the minimum value of number of leaves per plant 11.583.

#### No of Tillers/Meter Square

From the above mentioned pooled data results revealed the fact that Anmol produced statistically maximum number of tillers per meter square i.e. 152.5 while Faisalabad Super Late Egyptian clover produced lesser tillers per meter square. From the data it was also unveiled that last treatment for cutting date responded positively in case of tiller formation for maximum seed production. 158.17 tillers per m<sup>2</sup> were recorded in the third treatment i.e. first week of April which was followed by the treatment in which last cutting was taken in third week of March. While in case of first treatment when the crop was harvested in first week of March, it significantly reduced the production of tillers. The data trend showed that delay in the last cutting for berseem crop significantly influenced the production of number of tillers per m<sup>2</sup>. It is also crystal clear that number of tillers increased in each delay in last cutting of crop. These results were in line with the results of Sardana et al (2000) who reported that the last cutting date significantly affects the number of tiller.

#### Green Fodder Yield (t/ha)

Results from the pooled data indicate that maximum green fodder yield (46.813 t/ha) was obtained in Anmol as compared to Faisalabad Super Late Berseem that produced less green fodder.e. 40.899 (t/ha). While in case of last cutting dates it was observed that delay in last cut resulted in higher green fodder yield as maximum green fodder yield (65.684 t/ha) was recorded in last cutting date first week of April which was followed by second cutting date i.e. third week of March. While early last cutting date produced the minimum green fodder yield i.e 22.937t/ha. The same results were also reported by Sardana et al (2000) who reported that the last cutting date significantly increases the green fodder yield of Egyptian clover.

#### No of Seed per Capsule

From the above given data the results indicated that the maximum number of seeds per capsule i.e. 51.222 was recorded in Faisalabad Super Late as compared to Anmol. As far as the last cutting date was concerned the maximum number of seeds per capsule 52.333 were observed in the treatment which was left for seed purpose with last cutting date during first week of April. It was followed by the treatment in which crop was left for seed by taking last cut during third week of March.

#### 1000 Grain Weight (gm)

From the pooled data it is evident that the maximum 1000 grain weight was recorded 2.232 gm in Faisalabad Super Late, while Anmol gave lower 1000 grain weight i.e. 1.984 g. The crop which was left for seed purpose and last cut was taken during first week of April had maximum 1000 grain weight which was recorded as 2.155g.. While the treatments in which

last cut was taken during first and third week of March the similar results were recorded.

#### Seed Yield (t/ha)

The results from the pooled data indicated that almost similar seed yield was recorded in case of the both varieties, Anmol and Faisalabad Super Late. While in case of effect of last cutting dates the crop which was harvested during first week of April as last cutting resulted in maximum seed yield i.e. .909 t/ha which was followed by second treatment in which last cut was taken during third week of March. In case of treatment where last cut was taken during first week of March the minimum seed yield i.e. 0.654 t/ha was recorded.

#### Conclusion and Recommendations

The present study revealed that under Faisalabad, Pakistan conditions berseem fodder crop should be harvested during first week of April and then crop should be left for seed production and it will result in maximum seed yield (t/ha).

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