ISSN: 0975 -8542

Journal of Global Pharma Technology

Available Online at: www.jgpt.co.in

RESEARCH ARTICLE

Effect of Cutting Frequency and Potassium Levels on Seed Yield and its Components for Berseem (*Trifolium alexandrium* L.)

Mahmood Abbas Abd Salama[1], Hamdi Jassim Hammadi[2], Salam Turki Asal[1]

[1.] *Dept. of Field Crops - College of Agriculture-University of Anbar.*

[2.] *Dept. of Biology-Collage of Education for Girls - University of Anbar.*

Abstract

A study was conducted at one locations in the AL-Jazeera region at north of Ramadi city for winter season (2017) to investigate the affect number of cutting and different levels of potassium on seed yield and its components in berseem. Four cutting treatments (once ,twice, three and four times) with potassium levels included (0,80,160 and 240 kg/he.$^{-1}$).Were applied in a split plot design with three replication in which potassium levels were the main plots and cutting treatments were sub-plots . The results showed that significant effect on seed yield and its components, added potassium at levels (160) kg/ha produced significant higher means for all components higher seed yield (38.96 no. of seeds/flower, 2.90g. and 2.06 ton/ha.$^{-1}$) was obtained from treatments received (160)kg/ha.$^{-1}$ of potassium . Number of cutting stage had significant effect on seed yield and all components in winter season plants cut once gave higher seed yield (1.74 ton/ha.$^{-1}$)the 1st cut showed be don in 1st week of march . It was concluded that addition of potassium at a rate of (160) kg/ha.$^{-1}$ and cut the crop four times when the 1st cut showed be done in 1st week of March gave higher seed yield of berseem.

Keywords: *Berseem, Cutting treatments, Potassium levels, Head length, Grain yield.*

Introduction

Berseem (*Trifolium alexandrinum* L.) is important cereal (Fabaceae) and forage crop, grown during winter season. It is also rich in forage and contained 62 % total digestible nutrient [1].This crop provides fodder for a lunge season from Jan. To may through multiple cutting, Berseem cultivation aids in substantial improvement in soil fertility. Thus one of the major limiting factor in the cultivation of fodders is the non- availability of seed desirable quality [2]. Frequent cutting of Berseem for green fodder may adversely effect of seed production Potential and quality.

Seed production depends on many factors and time of harvest is one among them. The suitable period of last cut for quality .The success of any crop production depends mainly on the availability of the seed. Which is one of the critical inputs for Agriculture .Quality seeds will enhance the yield and its components [3]. In general the seed yield in forages is comparatively low due to their excessive vegetative grown as well as reduced seed production there are several factors, which effect the productivity and quality of forage Berseem one of them, Potassium can play the vital role in the Number of tillers per plant and increase the weight dry matter 2% [4]. It is also play a major role in early establishment of the crop, potassium useful for improvement of the traits of plant and increased seed weight, seed yield and its components [5]. It provides superior and cheap nutrition for prolonged period. The cattle and helps enhancing milk production, Berseem is a legume fodder hence it improves and maintain soil fertility and productivity.

Berseem contains 2% protein, 2.79%calcium and 0.4% phosphate at the green stage, one of the major difficulties facing Berseem cultivation is the low productivity of seed at the end of the growing season. The seed yield of Berseem is usually obtained from regrowth after forage Utilization in Iraq very little attention has been given to the improvement of the seed of forage production potential of Berseem compared to other crops, therefore due to difficult artificial hybridization and high self sterility so that, breeders have used

mainly selection procedures for improving forage and seed yield in this crop .The success of any program of selection to improve seed yield and its components will depend on the genets variation existing within the initial population heritability of seed yield [6]. The objective of this study was to determine the effect of different cutting and potassium levels on seed yield its components and the effect of data of last cut on seed yield in Berseem.

Material and Methods

Field Experiment was carried out at one location in the AL-Jazeera region at North of Ramadi city during winter season from November to MAY of (2017) to determine the effect of different levels of potassium and number of cutting on seed yield and its components in cultivar of Berseem. Potassium levels (0, 80, 160 and 240 kg/ha) with four cutting treatment (once, twice, three and four times) were analyzed as a randomized complete block design with three replication Split plot design, potassium levels were main-plots, cutting treatments Sub-plot, seed was sown at the rate of 25 kg/ha in twelve rows at 50 cm distance in (3×6) plots [3].

The characteristics of soil were studied in (Table 1) .Potassium level was fond in soil 245 mg/kg several traits were studied during the growth period of clover [4, 8].

Table 1: Showed some physical and chemical properties of the soil of the experiment during 2017 season

Trait	Value of agricultural season
Soil Texture	Clay mixture
PH	8.3
Electrical conduction($ds.m^{-1}$)	4.4
Organic matter(Mm /$Lter^{-1}$)	11.2
Phosphorus Ready(Mg / kg^{-1})	14.4
Potassium ready (Mg / kg^{-1})	245.2
Nitrates ready (Mg / kg^{-1})	18.8
Sulfates(Mm /$Lter^{-1}$)	2.8

Berseem seeds were planted in each line at the beginning of the November. All cutting treatments were taken before leaving the crop to produce seeds. As shown in Table 2.

Table 2: Cutting treatment of berseem during 2017 season

First cutting	number of cutting stage
2 March	1 First cutting treatment
2 April	2 Second cutting treatment
28 April	3 Third cutting treatment
24 May	4 Fourth cutting treatment

Add phosphate fertilizer at a rate of 200 kg /ha.P_2O_5 before planting, and then add a fertilizer dose of nitrogen fertilizer at a rate of 20 kg / h in the form of ammonium sulphate. After two weeks of planting to stimulate seedling growth. Weeding was done twice manually along with recommended dose of fertilizers and scheduled irrigation [7].

Four cutting treatments spread over February to May were imposed before leaving the crop for seed production. The crop was harvested for fodder at appropriate stage and after taking last fodder cutting similar results have been reported such as [9, 11].

For the purpose of studying the yield and yield components, 10 plants were randomly taken from the middle lines of each plot to study the following traits No.of stems/plant, Head length , No. of flowers /head ,No. of seeds/ flower, weight of 1000 seeds and Grain yield seeds. Analysis of variance was performed for each character, Mean separation were made by [24] L.S.D test at the 0.05 probability level.

Results and Discussion

The variance of the studied traits was in berseem and significant differences were observed for all studied traits in potassium levels, Stages of cutting and overlap Table3.

Table 3: Variance analysis of the traits studied in berseem

S.O.V.	D.F	No. of stems/plant	Head length (Cm)	No. of flowers/Head	No. of seeds/flower	Weight 1000 seeds (g.)	Grain yield (ton/he.$^{-1}$)
Replicates	2	3.015	3.219	15.981	13.510	2.103	3.201
Potassium K	3	*36.241	*81.22	*214.201	*154.220	*87.310	*143.012
Error(A)	6	2.781	1.341	10.331	11.510	0.310	0.311
Cutting treatment (C)	3	*625.120	*91.510	*272.510	*168.330	*98.41	*175.781
K × C	9	*88.410	*85.210	*123.510	*143.200	*102.110	*188.501
Error (B)	24	1.410	1.241	8.315	9.421	0.309	0.340

Effect of Potassium Levels

The data in Table 4 indicate the effect of potassium levels in the number of stems of the plant. There was a significant effect of the levels on the characteristic and the highest treatment rate was (160 kg /ha^{-1}) with 9.81 stems / plant. While the lowest rate of the number of stems, when the treatment did not add to the fertilizer was 7.45 stems /plant, and the best overlap occurred between the treatment 160 kg /ha^{-1} with the first cutting treatment recorded 12.15 stem /plant. This may be due to the importance of potassium in stimulating growth [15, 17].Indicated that the protein-rich crop has a high potassium requirement, which stimulates the growth of the buds in the crown area.

This is confirmed by [12] the increase in the number of branches in Berseem as a result of the addition of potassium fertilizer. As for the effect of the potassium levels length of the head, Table 5 showed the increase in the length of the head by increasing the levels of potassium and reaching its highest level at 160 kg /ha.$^{-1}$ Which was 2.36 cm but decreased at 240 kg /ha.$^{-1}$ and recorded an average 1.61 cm, while the lowest rate at the treatment did not fertilize amounted to 1.04 cm and the best overlap occurred between the treatment 160 kg / ha.$^{-1}$ with the first cutting treatment amounted to 3.02 cm. This is due to increased levels of potassium, which stimulates plant growth and activates the process of photosynthesis and thus increases the ability of the plant to increase the root stock of carbohydrate.

Some researchers [13] found positive correlation between the root stock of carbohydrates and the ability of the plant to produce the largest head length. Table(6) showed that the effect of potassium levels in the number of flowers in the head , increased levels to 160 kg/ha.$^{-1}$ increase the number of flowers head and gave the level 160 kg /ha.$^{-1}$ highest rate of 121.34 flower/head.

The lowest treatment rate was 73.01 flower / head. The best interaction between the treatments was 160 kg /ha.$^{-1}$ with the first cutting treatment recorded 122.40 flower /head. This is due to the role of potassium in the growth and activation of ovarian and increases their size, which later become fertilized to seeds [14]. Table 7 showed that effect of potassium levels no. of seeds / flower. The increase in fertilizer levels to an increase in no. of seeds /flower. The highest level was 160 kg /he^{-1} highest rate was 38.96 no.seeds / flower, while the lowest treatment rate was 27.37 no. of seeds / flower, and the best overlap was obtained between the treatment 160 kg /he.$^{-1}$ with the third cutting stage recorded 42.22 no. of seed /flower.

This is due to the role of potassium in the activation and growth of ovarian that turn into seeds after fertilization [15]. Table 8 showed that effect of the levels Potassium fertilizer in the weight of 1000 seeds. It was noted that the level of 160 kg /ha.$^{-1}$ recorded the highest weight 2.90 g, while the non-fertilized treatment recorded the lowest rate 2.06 g. The best overlap between the treatments was 160 kg /ha^{-1}.This was due to the role of potassium fertilizers in the stimulation and activation of ovarian and increases their size, which led to large size of seeds after fertilization [18, 19]. As showed in Table 9 Effect of potassium levels in increasing the seed yield, it was noticed that the increase of the main yield components was reflected in the increase of seed yield, given the level of 160 kg /ha.$^{-1}$ highest the seed yield was 2.06 ton/ha^{-1}.

While the non-fertilizer treatment with potassium fertilizer was 0.70 ton /he^{-1}.The best overlap was for the level 160 kg/ha.$^{-1}$ with the first cutting treatment recorded 3.398 ton/ha^{-1}. The superiority of the treatments that have fertilizer high levels of potassium fertilizer in the grain yield is due mainly to the superiority of the treatments of components of the yield and showed that of

the positive role of potassium in the activation and growth of berseem crop [20, 21].

Effect of Cutting Treatments

Table 4 showed the significant effect of the cutting treatment on the yield and its components for all studied traits. Tables 4, 5, 6, 7, 8 and 9 showed the highest mean no. of stem /plant, head length, no. of flowers/ head, no. of seeds /flower, 1000 seed weight and seed yield where it reached 9.99 stems /Plant , 2.47 cm, 97.22 flower head, 37.07 seed / flower, 2.66 g. and 1.74 ton /ha^{-1}, respectively.

We noted that trait number of stems in the plant only increased at the cutting treatment C3, while the of the other traits get an increase in the rate at the cutting treatment C1 and may be due to the inhibition of stimulation in the growth of basal sprouts growing in the crown area and that The cutting in the first treatment increased the growth of the weeding in other cutting.

It may be due to the compatibility of the process of flowering in terms of temperature and the period of light. The reason for the don't of superiority of treatments that have been cut two or three or four times due to the repeated cutting leads to the weakening of the crop and the lack of root stock of carbohydrates, leading to the loss of flowers. It is clear from Table 7, which showed the number of cuttings in the average number of seeds in flower. It is clear that the flower in berseem is composed of a large number of flowers, each containing a overlain and often contains one egg. When vaccine and fertilizing the egg, it turns into a seed, the number of flowers and the efficiency of pollination of the flower are the two factors determining the number of seeds per flower. This result agrees with [13, 17].

This study showed that the highest average number of seeds in the flower was when cutting the crop once and then leaving it to produce the seeds, because the plants that were cut once encountered with appropriate environmental conditions of heat and light, resulting in the production of more flowers with the presence of insect activity accompanied by process flowering due to the process of cross-pollination, which led to increased fertilization.

The results of Table 8 showed that the highest rate weight of 1000 seeds appeared at the cutting treatment C1 and gave a rate 2.66 g, while the lowest rate at the treatment of cutting C4 was 1.87 g, indicating that this trait effected by different growth factors and decreases weight when increasing the number of cutting, because it leads to the weakening of the plant when leaving for produced seed yield. These results agree with [19, 21].

It is clear from Table 9 that there was a significant effect of the cutting treatments in the average seed yield. The one-time treatment gave the highest yield of 1.74 ton /ha^{-1}. While the four-time cutting treatment gave the lowest yield of 0.71 tone /ha^{-1}. This is due to the increase in the components of the other yield in the first cutting treatment to good the environmental conditions of this cutting treatment. The results agree with [22, 24] .We conclude from this that cutting the berseem once before leaving the seeds with good management provides the highest output per unit area. While some farmers are used when cutting the crop several times, leading to weakening and giving a low seed yield.

Table 4: Effect of Cutting Treatment and Potassium Fertilizer Levels in the Number of stems in Plant

Cutting treatment / potassium	C1	C2	C3	C4	Average
0	7.13	6.50	8.88	7.32	7.45
80	9.98	9.95	9.98	7.5	9.35
160	12.15	9.98	11.15	5.94	9.81
240	9.91	8.87	9.93	6.10	8.70
Average	9.79	8.83	9.99	6.71	
L.S.D 5%		A= 2.166	B= 1.542	A×B= 2.193	

Table 5: Effect of Cutting Treatment and Potassium Fertilizer Levels in the Head length (cm)

Cutting treatment / potassium	C1	C2	C3	C4	Average
0	2.40	0.151	1.50	0.09	1.04
80	2.16	1.31	1.35	1.18	1.50
160	3.02	2.57	2.51	1.34	2.36
240	2.31	1.20	2.51	0.45	1.61
Average	2.47	1.31	1.96	0.76	
L.S.D 5%		A=1.504	B=1.447	A×B=2.057	

Table 6: Effect of Cutting Treatment and Potassium Fertilizer Levels in number of flowers/ head

Cutting treatment / potassium	C1	C2	C3	C4	Average
0	75.95	74.41	71.71	69.98	73.01
80	109.29	104.21	103.30	98.91	103.92
160	122.40	121.21	120.15	121.58	121.34
240	81.25	80.21	78.40	75.34	78.80
Average	97.22	95.01	93.39	91.45	
L.S.D 5%		A=4.175	B=3.745	A×B=5.325	

Table 7: Effect of Cutting Treatment and Potassium Fertilizer Levels in number of seeds/ flowers

Cutting treatment / potassium	C1	C2	C3	C4	Average
0	31.37	28.28	27.59	22.25	27.37
80	35.36	32.51	30.35	25.77	30.99
160	40.33	38.88	42.22	34.44	38.96
240	41.21	36.36	40.01	25.87	35.86
Average	37.07	34.00	35.04	27.08	
L.S.D 5%		A=4.407	B=3.987	A×B=5.669	

Table 8: Effect of Cutting Treatment and Potassium Fertilizer Levels in weight of 1000 seeds (g)

Cutting treatment / potassium	C1	C2	C3	C4	Average
0	2.55	2.31	2.21	1.20	2.06
80	2.54	2.32	2.23	2.20	2.32
160	3.24	2.54	2.87	2.98	2.90
240	2.31	2.40	2.15	1.13	1.99
Average	2.66	2.39	2.36	1.87	
L.S.D 5%		A=0.723	B=0.722	A×B=1.026	

Table 9: Effect of Cutting Treatment and Potassium Fertilizer Levels in grain yield (ton/ha.$^{-1)}$

Cutting treatment / potassium	C1	C2	C3	C4	Average
0	0.908	0.729	0.657	0.509	0.70
80	1.482	1.170	1.037	0.842	1.13
160	3.398	1.794	2.190	0.872	2.06
240	1.162	1.051	1.010	0.610	0.96
Average	1.74	1.19	1.22	0.71	
L.S.D 5%		A=0.724	B=0.757	A×B=1.076	

Conclusions

Conclude from this study that the effect of cutting frequency and potassium levels, where results indicated real important there was a significant effect of the levels potassium on the characteristic.

This study showed that the highest average number of seeds in the flower was when cutting the crop once and then leaving it to produce the seeds, because the plants that were cut once encountered with appropriate environmental conditions of heat and light.

References

1. Abd El Gawad K I (2007) Effect of cutting management on forage, protein and seed yields of berseem clover, Synthetic 79 var. Zagazig Journal of Agricultural Research.
2. Abdel- Rahim HM, EM Sshalaby, KA Abdel- Rahim, AY Allam (1984) Seed yield and some yield components of berseem as affected by moisture stress phosphorus fertilizer and number of cutting Assuit, J. of Agric. Sci., 15(2)87-94.
3. Abdel-Gawad KI (1993) Fresh, dry, protein, seed yield and nutritive value of seven varieties of multi-cut type of Berseem clover. Zagazig. J. Agric. Res., Zagazig Univ., 20(1A): 55-66.
4. Abdel-Gawad K I (1993) Effect of cutting management on forage, protein and seed yields of berseem clover (Synthetic97 var. Zagazig. J. Agric. Res., Zagazig Univ., 20(1A): 67-75.
5. Amato G, Giambalvo D, Ruisi P (2013) Cut and post-cut herbage management affects berseem clover seed yield. Agronomy Journal, 105(4): 1222-1230.
6. Badr A, El-Shazly HH, Watson LE (2008) Origin and ancestry of Egyptian clover (Trifolium alexandrinum L.) as revealed by AFLP markers. Genetic resources and crop evolution, 55(1): 21-31.
7. Bakheit BR, Ali MA, Helmy AA (2012) The influence of temperature, genotype and genotype x temperature interaction on seed yield of berseem clover (Trifolium alexandrinum L.). Asian J. Crop Sci., 4: 63-71.
8. De Santis G, Iannucci A, Dantone D, Chiaravalle E (2004) Changes during growth in the nutritive value of components of berseem clover (Trifolium alexandrinum L.) under different cutting treatments in a Mediterranean region. Grass and Forage Science, 59(4): 378-388.
9. Dost M, B Misris, M El-Nahrawy, S Khan, S Serkan (2014) Egyptian Colver (Trifolium alexandrinum L.) King of Forage Crops. Regional Office for the Near East and North Africa, Food and Agriculture Organization of the United Nation, Caira.
10. Farnaz D, MR Chaichi (2018) Effects of drought stress and field treatments on seed germination and early growth traits parental clover seeds. International Journal of Development Research, 08 (05): 20191-20200.
11. Gewefil HGM, AM Rammih (1990) Seed production of six Egyptian clover cultivars as influenced by cutting system and potassium fertilization zagazing J. Agr. Res., 17(3): 589-598.
12. Hassan MT Badr, MM Habib (1968) Effect of cutting treatment on the forage yield, botanical composition and seed yield of berseem varieties (Miskawi and Wafeer). Alex. J. Agric. Res. 16(1): 63-76.
13. Lannucci A (2001) Effect of harvest on growth dynamics forage and seed yield in Berseem clover. European Journal of Agronamy, 14: 303-314.
14. lazaridou M, SD Koutroubas (2004) Drought effect on water use efficiency of Berseem clover at various growth stages .In Facher T et al (New direction2004) new directions for a diverse planet; proccedings for 4th International Science Congrcss. Brisbane. Australia.
15. Masoud S, A Hamta (2008) Cytogenetic analysis of somaclonal variation in regenerated plants of Berseem clover (Trifolium alexandrium L.). Caryologia, 61(4): 392-396.
16. McVay KA, Radcliffe DE, Hargrove WL (1989) Winter legume effects on soil properties and nitrogen fertilizer requirements. Soil Science Society of America Journal, 53(6): 1856-1862.
17. Mezni M, Haffani S, Khamassi N, Albouchi A (2013) Effects of the defoliation height on the growth, mineral uptake and soluble carbohydrate contents in berseem clover (Trifolium alexandrinum L.) var. Khadhraoui. IOSR J. Agric. Vet. Sci., 5: 78-91.
18. Pecetti L, R Usai, M Romani, P Fraschini, M Salis (2012) Evaluation of berseem clover (Tifolium alexandrinum L.)Germplasm in Sardinia, Italy. Italian. J. Agron., 7 (28): 202-205.
19. Radwan M S, MA Hussein, A A Abdl-Hafeez, R. El- Zanaty (1983) The influencing of cutting date on forage and

seed yield of berseem clover . pidc. Ist Conf. Agrom, Egypt Crop. Sci., 143-151.

20. Salama HSA (2015) Interactive effect of forage mixing rates organic fertilizers on the yield and nutritive value of berseem clover (Trifolium alexandrinum L.) and annual ryegrass (Lolium multiforum Lam).Agric. Sci., 6:415-425.
21. Shaaban E, SA, L Kh Mohamed, MS El-Haroun, FI El-Saedy (1984) Effect of sowing wing date, seeding rate and nitrogenous fertilization on growth and yield of Egyptian clover (Trifolium alexandrinum). Annals of Agric. Sci. Moshtohor, 21: 59-64.
22. Thalooth AT, S Gaber, ME Haroon (2015) Yield and Quality Response of Ryegrass. Egyptian clover and Their Mixtures to Different Sources of Fertilizers. American Adv. J. Agric Sci., 1: 8-17.31(3): 1393-1405.
23. Virender S, SS Narwal (2004) Effect of time of sowing and last cut of fodder on phenology of Egyptian clover (Trifolium alexandrinum). Indian Journal of Agronomy, 45 (4): 808-815.
24. Williams L, Abdi H (2010) Fisher's least significant difference test. Encyclopedia of research design, 492-495.

