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Effect of different cuttings and growth retardant (Cycocel) on higher forage yield and seed yield in berseem (*trifolium alexandrinum* L.)

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SUMMARY

An experiment was conducted during winter season of 2002-2003 and 2003-2004 of C.S. Azad University of Agriculture and technology, Kanpur. Berseem (*trifolium alexandrinum* L.) is winter season crop and is propagated through seed. It has regenerative capacity after its each cutting. It is regenerative characteristics having a negative correlation between green fodder production and seed yield over the variety "Wardan" which was cut five times. All the cuttings were done at 25 days interval except Ist cutting which was at 45 days after date of sowing. Three doses of different concentration of growth retardant *i.e.*, CCC (cycocel) as control S_1 (0 ppm) and S_2 (1000 ppm), S_3 (2000 ppm), and S_4 (3000 ppm), were applied at 10 days intervals in the form of foliar spray after each cutting. The higher doses of cycocel S_4 (3000 ppm) produced maximum green forage yield as compared to control (S_1) during both the years. Highest seed yield was obtained from S_2 doses (1000 ppm) at third cutting stage against the control in both the years.

Key words : Cycocel, Multicut forage, Regenerative, Correlation

Green forage of berseem is plays vital role in animal feed. It is platable, digestible, nutritive and full of minerals, vitamin and protein and useful for the health of animals, especially milch cattles. The berseem fodder on dry weight basis contains 18-21 per cent protein, 1.98 per cent calcium, 0.64 per cent phosphorus which are basic requirement for the milch animals and had got 70-75 per cent digestibility. Berseem has no anti-nutritional and toxic effects, therefore, it is used not only as green forage but in the form of hay, pellets, etc. during off seasons. It is shy in seed bearing, so the seed in sufficient quantity of high quality essentially required for raising this succulent feed for Indian milch and other draft animals. in general, it has been in practice that the crop is left after harvesting maximum possible green fodder which resulted into low seed production (3.5 q/ha). The higher percentage of photosynthates about 60-70 per cent mostly stored in crown root and remaining protein is utilized for developing new branches and leaves. Reserve carbohydrates in the crown root protein are the source of energy for development of new tillers and branches in plants. Therefore, in general, negative correlation was found between green fodder production and seed yield. Since the bereem is multicut forage crop, it is essential to standardize the appropriate cutting after which the maximum possible good quality seed can be produced with or without use of growth promoter or growth retardant which has direct effect on flowering, seed setting, higher number of branching and healthy sink capacity.

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MATERIALS AND METHODS

The experiment was conducted during winter season 2002-2003 and 2003-2004 at C.S. Azad university of Agriculture and technology, Kanpur. The berseem (*trifolium alexandrinum* L.) variety 'Wardan' was selected on the basis of its popularity in form of green fodder. The treatment considered for five cuttings (C_1, C_2, C_3, C_3 and C_5) and four levels of growth retardant as CCC (cycocel) consisted three concentrations like S_1 (0 ppm) as control, S_2 (1000 ppm) S_3 (2000 ppm) and S_4 (3000 ppm). The cutting were made to assess the fodder yield and ultimately for seed production and seed quality. first cutting was done at 45 days after sowing, the subsequent four cuttings were done at 25 days interval. The crop was left for seed production in form of cycocel solution which were applied of 10 days interval at after each cutting. The experiment was conducted in randomized block design with three replications. Each plot consisted of 2x1.5 m^2 having five rows at 30 cm apart. The length of rows was 2.0 m and plant to plant distance was maintained at 8-10 cm. Agronomical practices were followed for raising good crop in both the years. Observations were recorded on forage yield after each cutting and finally the harvested seed was weighted to record the seed yield/plot in gram and converted in quintal

per hectare with multiplying factor.

RESULTS AND DISCUSSION

Analysis of variance for first cutting (Table 1) indicated non-significant differences over cyclocel (CCC) application on forage yield in first cutting (Table 3) at either of its doses during both the years. Analysis of variance for second cutting (Table 1) exhibited non-significant values for all the four doses of cycocel. The results (Table 3) showed that the forage production at second cutting was numerically higher due to the presence of higher number of branches and leaves. Due to cutting operation over first cutting (Table 1). It is also evident that S_2 (1000 ppm) doses of cycocel at third cutting produced numerically higher green forage yield (116.66 q/ha) during the first year. Second year the maximum green forage yield (116.47 q/ha) (Table 3) was obtained with S_3 doses of cycocel. The effect of level of cycocel and cutting on green forage yield at fourth cutting (Table 1) showed non-significant differences were observed at fourth cutting is presented in (Table 3), respectively, which showed that higher green forage yield (222.70 q/ha) at fourth cutting was recorded in C_2S_4 combination followed by C_2S_2 doses (222.53 q/ha) combination. Similar results for forage yield were obtained at (Table 1) fifth cutting but the yield level were lower then that of obtained in fourth cutting (221.30 q/ha) (Table 3).

The data showed that higher green forage yield in fourth cutting was due to the presence of higher number of branches and leaves. Higher dose of cycocel C_2S_4 (3000 ppm) combination followed by C_2S_2 combination. These findings were found in accordance with Bahal *et al*. (1988). Whole experiment depending upon the five consequent cutting which revealed effect of (CCC) cycocel. Some results were better at third cutting followed by fourth cutting. The findings are in accordance with the Sardana and Narwal (1999) and yadav *et al*. (1978).

Analysis of variance for seed yield (Table 2) indicated significant differences in cuttings. Doses of growth retardant cycocel interactions in both the year (Table 2).

The data presented in (Table 4) showed that C_3S_2 dose of (1000 ppm) of cycocel at third cutting produced significant higher seed yield/plot 11.34 and 11.59 q/ha in both the consecutive year, respectively followed by C_1S_2 doses of cyclocel at first cutting seed yield 11.02 and 11.22 q/ha in two consecutive year. As for as the effect of cutting is concerned highest seed yield (11.34 and 11.59 q/ha) was produced at this cutting with C_3S_2 dose (1000 ppm) application of cycocel. These findings are in agreement with those reported by Sardana and Narwal (1999) and

Table 1 : ANOVA for cycocel green forage yield q/ha (I^{st} to V^{th}) cutting

Number of forage cutting	Year	Replication	Cutting (C)	KNO_3 (K)	(Cx k)	Error
	d.f.	2	4	3	12	38
(I^{st} cutting)	MS 2002-03	0.02	0.02	0.00	0.01	0.02
	MS 2003-04	0.02	0.01	0.00	0.01	0.13
	d.f.	2	3	3	9	30
(II^{nd} cutting)	MS 2002-03	0.01	0.00	0.02	0.01	0.51
	MS 2003-04	0.01	0.00	0.01	0.01	0.01
	d.f.	2	2	3	6	22
(III^{Rd} cutting)	MS 2002-03	0.02	0.15	2.57	0.17	0.16
	MS 2003-04	0.04	0.07	0.15	0.14	0.07
	d.f.	2	1	3	3	14
(IV^{th} cutting)	MS 2002-03	1.42	2.86	0.19	0.06	2.84
	MS 2003-04	1.03	2.66	0.22	0.10	2.88
	d.f.	2	-	3	-	6
(V^{th} cutting)	MS 2002-03	6.79	-	2.15	-	3.14
	MS 2003-04	6.60	-	2.08	-	3.04

Table 2 : ANOVA for cycocel seed yield q/ha (1^{st} to v^{th} cutting)

	Year	Replication	Cutting (C)	KNO_3 (K)	(Cx k)	Error
	d.f.	2	4	3	12	38
	MS 2002-03	0.17	2365.26**	85.30**	360.34**	0.94
	MS 2003-04	2.65	12816.73**	782.52**	357.58**	5.59

* and ** indicate significance of values at P=0.05 and 0.01, respectively

Table 3: Effect of cycocel green forage yield q/ha (I to Vth) cutting

Number of forage cutting		S_1		S_2		S_3		S_4	
		2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04
	C_1	18.73	19.13	18.77	19.20	18.90	19.29	18.60	19.00
	C_2	18.70	1913	18.70	18.90	18.47	18.90	18.60	19.00
Ist Cutting	C_3	18.77	19.20	18.83	19.10	18.83	19.26	18.77	19.30
	C_4	18.83	19.03	18.93	19.33	18.83	19.16	18.73	19.00
	C_5	18.83	19.23	18.77	19.07	18.77	19.03	19.70	19.24
2002-03	C	S		C x S	2003-04	C	S		C x S
C.D. (P=0.05)	0.37	0.33		0.77	C.D. (P=0.05)	0.33	0.30		0.63
	C_1	46.43	47.03	46.63	46.93	46.06	46.64	46.73	46.93
IInd Cutting	C_2	46.76	46.70	46.20	43.47	46.46	46.90	46.52	47.03
	C_3	46.76	47.13	46.33	46.64	46.33	46.76	46.46	46.96
	C_4	46.70	46.76	46.46	47.03	46.49	47.06	46.73	47.20
2002-03	C	S		C x S	2003-04	C	S		C x S
C.D. (P=0.05)	0.33	0.33		0.67	C.D. (P=0.05)	0.33	0.33		0.67
	C_1	113.53	112.73	166.66	114.20	116.47	115.74	115.41	114.50
IIIrd Cutting	C_2	115.43	114.63	115.70	114.66	115.31	114.50	115.80	114.56
	C_3	115.73	114.66	116.13	114.76	116.26	114.86	116.47	115.00
2002-03	C	S		C x S	2003-04	C	S		C x S
C.D. (P=0.05)	1.07	1.23		2.13	C.D. (P=0.05)	0.70	0.83		1.43
IVth Cutting	C_1	218.53	219.10	218.83	221.67	219.47	220.00	220.63	220.14
	C_2	221.27	220.03	218.40	222.53	218.26	222.40	222.03	222.70
2002-03	C	S		C x S	2003-04	C	S		C x S
C.D. (P=0.05)	4.63	6.53		9.23	C.D. (P=0.05)	4.63	5.23		9.50
Vth Cutting	C_1	218.89	219.47	220.46	221.23	220.57	221.23	221.17	221.77
2002-03	C	S		C x S	2003-04	C	S		C x S
C.D. (P=0.05)	6.53	5.67		11.30	C.D. (P=0.05)	6.57	5.70		11.40

Table 4 : Effect of Cycocel on unprocessed seed yield q/ha (I to V) cutting

		S_1		S_2		S_3		S_4	
		2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04
	C_1	10.55	10.70	11.02	11.22	5.93	6.14	7.98	8.19
	C_2	9.90	10.13	9.04	9.34	9.53	9.79	9.93	10.18
	C_3	10.00	10.26	11.34	11.59	7.69	7.94	9.77	10.01
	C_4	7.00	7.00	6.54	6.79	6.06	6.23	6.44	6.62
	C_5	1.80	1.80	1.38	1.44	1.88	2.02	1.71	1.86
2002-03	C	S		C x S	2003-04	C	S		C x S
C.D. (P=0.05)	0.0825	0.0737		0.1650	CD	0.2016	0.1803		0.4031

* and ** indicate significance of values at P=0.05 and 0.01, respectively

Yadav *et al*. (1978) Behal (1988).

Conclusion:

On the basis of experimental findings it can be concluded that the foliar spray of S_2 (1000 ppm) dose of cycocel produced maximum green forage yield in fourth cutting as compared to control S_1 (0 ppm) during both the years. In case of seed production grain yield/plot was produced by application of S_2 doses of cycocel at C_3 cutting followed by S_2 doses of cycocel at Ist cuttings.

REFERENCES

Behal (1988). Effect of growth regulators on seed production of berseem. *Seed & Farm*, **14**(11) : 31-32.

Sardana, V. and Narwal, S. S. (1999). Effect of cutting dates for fodder on the seed quality of berseem (*trifolium alexandrinum* L.) sown in different dates. *Indian J. Plant Physiol.*, **4** (2) : 133-136.

Yadav, R.B. R., Patil, B. D. and Sreenath, P. R. (1978). Effect of growth regulators on leaf growth, photosynthetic pigments and seed yield of berseem. *Forage Res.*, **4** : 121-125.

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