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Determining appropriate number of forage cutting for high graded quality seed and fodder productivity of berseem (*Trifolium alexandrinum* L.) under different concentration of KNO_3

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SUMMARY

An experiment was conducted during winter season of 2002-2003 and 2003-2004 at C.S. Azad University of Agriculture and Technology, Kanpur. Berseem is a multicut forage crop due to its regenerative characteristics having a negative correlation between green fodder production and seed yield over the variety "Wardan" which was cut five times. The first cutting was done at 45 days while subsequent cuttings were done at 25 days interval. Three levels of growth promoter KNO_3 ($K_1$0, $K_2$2.0 and $K_3$2.5 kg/ha) were applied as foliar sprays at the time of flowering initiation stage. The higher level of KNO_3 @ 2.5 kg/ha produced maximum green forage yield as compared to control during both the years at fourth cutting. during IInd year, highest seed yield was obtained from dose of KNO_3 at second cutting stage against the control in both the experimental years.

Key words : Multicut forage, KNO_3, Regenerative, Correlation

Green fodder of berseem is palatable and useful for the health of animals, especially milch animals. The berseem fodder on dry weight basis contains 18-21 per cent protein, 1.98% calcium, 0.64% phosphorus which are the basic requirement for the milch animals and has got 70.75% digestibility. berseem is shy in seed bearing. Whereas, seed in sufficient quantity of high quality is essentially required for raising forage grass. In general, it has been in practice that the crop is left after harvesting of maximum possible green fodder, which resulted into low seed production (3-5 q/ha). Since the berseem is multicut forage crop, it is essential to standardize the appropriate cutting after which the maximum possible good quality seed can be also produced with or without use of growth promoter or retardant which have direct effect on flowering, seed setting and healthy sink capacity.

MATERIALS AND METHODS

The experiment was coducted during *Rabi* season of 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 treatments consisted of five cuttings (C_1, C_2, C_3, C_4 and C_5) and three levels of growth promoter (KNO_3). first cutting was done at 45 days, while subsequent cuttings were done after 25 days interval and after final cutting, the crop was left for seed production. the three doses of KNO_3 such as K_1 (0 kg/ha control), K_2 (2.0 kg/ha) and K_3 (2.5 kg/ha) in the form of solution were applied as foliar sprays at initiation of flowers after each cutting. The experiment was conducted in randomized block design with three replications. Each plot consisted of 2x1.5m^2 having five rows 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 unprocessed seed yield. Unprocessed seed yield received directly after threshing the processing plant. The processing of these smaller seed of berseem passed through round mess size 2.4 mm and slotted mess size 1.25 mm ultimately, clean seed of uniform size was procured as quality seed and was weighted to record the processed 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 of KNO_3 application on forage yield (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 three doses of KNO_3. The results (Table 3) showed that the forage production at second cutting was numerically higher due

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Table 1 : ANOVA for KNO_3 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	2	8	28
(I^{st} cutting)	MS 2002-03	0.020	0.023	0.027	0.007	0.020
	MS 2003-04	0.020	0.007	0.003	0.010	0.133
	d.f.	2	3	2	6	22
(II^{nd} cutting)	MS 2002-03	0.010	0.003	0.003	0.007	0.013
	MS 2003-04	0.007	0.003	0.007	0.003	0.013
	d.f.	2	2	2	4	16
(III^{Rd} cutting)	MS 2002-03	0.023	0.153	0.073	0.043	0.160
	MS 2003-04	0.037	0.072	0.007	0.013	0.067
	d.f.	2	1	2	2	10
(IV^{th} cutting)	MS 2002-03	1.420	2.857	0.083	0.053	2.843
	MS 2003-04	1.027	2.663	0.080	0.068	2.877
	d.f.	2	-	2	-	4
(V^{th} cutting)	MS 2002-03	6.790	-	0.643	-	3.137
	MS 2003-04	6.600	-	0.697	-	3.037

Table 2 : ANOVA for KNO_3 processed seed q/ha (1^{st} to v^{th} cutting)

	Year	Replication	Cutting (C)	KNO_3 (K)	(Cx k)	Error
	d.f.	2	4	2	8	28
	MS 2002	3.157	4880.98**	480.30**	24.04**	0.440
	MS 2003	2.062	4978.08**	327.70**	13.24**	0.307

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

Table 3 : Effect of KNO3 green forage yield q/ha (I to V^{th}) cutting

Number of forage cutting		K_1		K_2		K_3	
		2002-03	2003-04	2002-03	2003-04	2002-03	2003-04
	C_1	18.83	19.26	18.59	19.00	18.86	19.20
	C_2	18.60	18.92	18.83	19.17	18.44	18.83
I^{st} Cutting	C_3	18.73	19.03	18.97	19.36	19.00	19.26
	C_4	18.95	18.20	18.67	19.06	18.92	19.14
	C_5	18.95	19.23	19.17	18.95	18.92	19.24
2002-03	C	K	C x K	2003-04	C	K	C x K
C.D. (P=0.05)	0.367	0.300	0.667	CD	0.333	0.233	0.567
	C_1	46.36	46.96	46.26	46.76	46.76	46.90
II^{nd} Cutting	C_2	46.46	46.73	46.39	46.93	46.61	49.90
	C_3	46.70	49.79	46.26	46.82	46.43	47.00
	C_4	46.70	47.12	46.42	46.79	46.70	47.09
2002-03	C	K	C x K	2003-04	C	K	C x K
C.D. (P=0.05)	0.33	0.30	0.57	CD	0.33	0.30	0.57
	C_1	114.93	114.10	116.10	114.16	115.26	114.56
III^{rd} Cutting	C_2	115.70	114.63	115.56	114.60	115.24	114.30
	C_3	116.17	114.76	116.36	114.93	115.93	114.93
2002-03	C	K	C x K	2003-04	C	K	C x K
C.D. (P=0.05)	1.067	1.061	1.883	CD	0.700	0.700	12.333
IV^{th} Cutting	C_1	218.60	219.53	219.63	220.70	219.87	220.43
	C_2	221.63	222.37	221.66	222.37	221.80	222.60
2002-03	C	K	C x K	2003-04	C	K	C x K
C.D. (P=0.05)	4.63	5.67	2.00	CD	4.63	5.70	8.07
V^{th} Cutting	C_1	218.89	219.47	220.50	221.03	220.40	221.23
2002-03	C	K	C x K	2003-04	C	K	C x K
C.D. (P=0.05)	10.00	8.67	12.29	CD	9.83	8.53	17.03

Table 4 : Effect of KNO_3 doses processed seed q/ha (I^{st} to V^{th}) Cutting

		K_1		K_2		K_3	
		2002-03	2003-04	2002-03	2003-04	2002-03	2003-04
	C_1	4.79	5.00	5.17	5.33	5.53	5.69
	C_2	6.19	6.38	6.53	6.72	7.17	7.37
	C_3	5.75	6.01	6.49	6.70	7.21	7.42
	C_4	3.32	4.30	6.40	6.54	4.89	5.04
	C_5	1.20	1.32	1.44	1.57	1.63	1.74
2002-03	C	K	C x K	2003-04	C	K	C x K
C.D. (P=0.05)	0.056	0.050	0.098	C.D. (P=0.05)	0.047	0.367	0.082

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

to the presence of higher number of branches and leaves over first cutting. It is also evident that K_3 dose of KNO_3 produced numerically higher green forage yield over K_2 dose. Non-significant differences were observed between different doses of KNO_3 at third cutting (Table 1). However, the forage yield was numerically higher over second cutting (Table 3). Similarly at fourth cutting (Table 1) non-significant differences were observed between the three levels of KNO_3 but the forage yields were highest at fourth cutting in both the years (Table 3). Similar results for forage yield were also obtained at fifth cutting (Table 1) but the yield level were lower than that of obtained in fourth cutting (Table 3).

The data showed that higher seed yield in second cutting was due to the presence of higher number of branches and leaves. Higher dose of KNO_3 (K_3) produced numerically higher green forage yield over K_1 and K_2 levels. Fourth cutting (C_4) produced higher forage yield over control and other treatments during both the years. These findings are in accordance with the findings of Zamanian (2005) and Sardana and Narwal (1999).

Analysis of variance for seed yield indicated significant differences in cuttings, doses of growth promoter and interactions over both the years (Table 2).

Analysis of variance (Table 4) displayed that the maximum significant processed seed yield was produced by K_3 dose and III[rd] cutting the shown (table 4). Use of K_3 dose of KNO_3 at (C_3) cutting (7.21 and 7.42 q/ha) followed by K_3 dose of KNO_3 at C_2 cutting (7.17 and 7.37 q/ha) recorded during both the years. These findings are in agreement with those reported by Rawat and Hazara (1992).

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