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Effect of Sowing Time, Phosphorus Level and Seed Rate on Seed Production of Lucerne

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ABSTRACT

The results of a field experiment conducted at Forage Research Project, Anand revealed that early ving dates (1st and 15th November) gave higher seed yield than delayed sowings. Economics of sowing tes indicated that higher net incremental cost benefit ratio (ICBR) was obtained from 15th November wing. Phosphorus had no significant effect on seed and forage yields of lucerne. Significantly higher seed ld was obtained with the use of 5 kg seed/ha than 10 kg seed/ha. So also net ICBR was high when cerne was sown at the rate of 5 kg seed/ha. The interaction of 40 kg P_2O_5/ha × 5 kg seed/ha gave gnificantly higher seed yield than other interactions barring no application of phosphorus with 5 or 7.5 seed/ha, application of 40 kg P_2O_5/ha × 7.5 kg seed/ha and 80 kg P_2O_5/ha × 5 kg seed/ha. Its onomics indicated that high net ICBR was obtained when the lucerne crop was sown at the rate of 5 kg ed/ha without application of phosphorus.

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INTRODUCTION

Lucerne is one of the most important forage rop in Gujarat during winter season particularly or the milkshed area where the livestock roduction is involved. The fertilizer and seed are he costly inputs for seed production of lucerne, herefore, their proper utilization is the matter of onsideration. Sowing date is non-cash input, owever, appropriate time of sowing substantially ncreases the forage yield. As the informations egarding sowing date, seed rate and phosphorus equirement for lucerne seed production in the state are scarce, the present investigation was carried out.

MATERIALS AND METHODS

Field trial was carried out on lucerne var. Anand-2 for three consecutive *rabi* seasons of 1982-83, 1983-84 and 1984-85 at Gujarat Agricultural University, Anand. The soil of the experimental site was sandy loam, neutral in reaction and low in available nitrogen (207 kg/ha) but high in phosphorus (59 kg P_2O_5/ha). The treatments were comprised of four sowing dates (1st, 15th and 30th November and 15th December - D_1, D_2, D_3 and D_4, respectively) as main plot, three phosphorus levels (0, 40 and 80 kg P_2O_5/ha - P_0, P_1 and P_2, respectively) as sub-plot and three seed rates (5.0, 7.5 and 10.0 kg seed/ha - R_1, R_2 and R_3, respectively) as sub-sub plot treatments in split-split plot design with three replications.

A basal dose of 25 kg N/ha in the form of urea and phosphorus as per treatment in the form of single super-phosphate was given before sowing. The crops was sown at 20 cm apart in rows as per the treatments of sowing dates and seed rates. First cut of green forage was taken after 55 days of sowing and subsequent cuts were harvested after 25 to 30 days interval. The last cut of green forage was taken during 8th March to 16th March (except 28th February in 1984) and thereafter the crop was left for seed production. The seed crop was harvested between 16th to 23rd May during all the three years. Two irrigations were applied after last cut of

green forage. Other cultivation practices were followed as recommended.

The weather data (Fig. 1) indicated that temperature was declined from October to January and had increased thereafter till June. The off seasonal rainfall (273.6 mm) was more during 1982-83, whereas during 1983-84 and 1984-85, it was 19.1 and 2.8 mm, respectively.

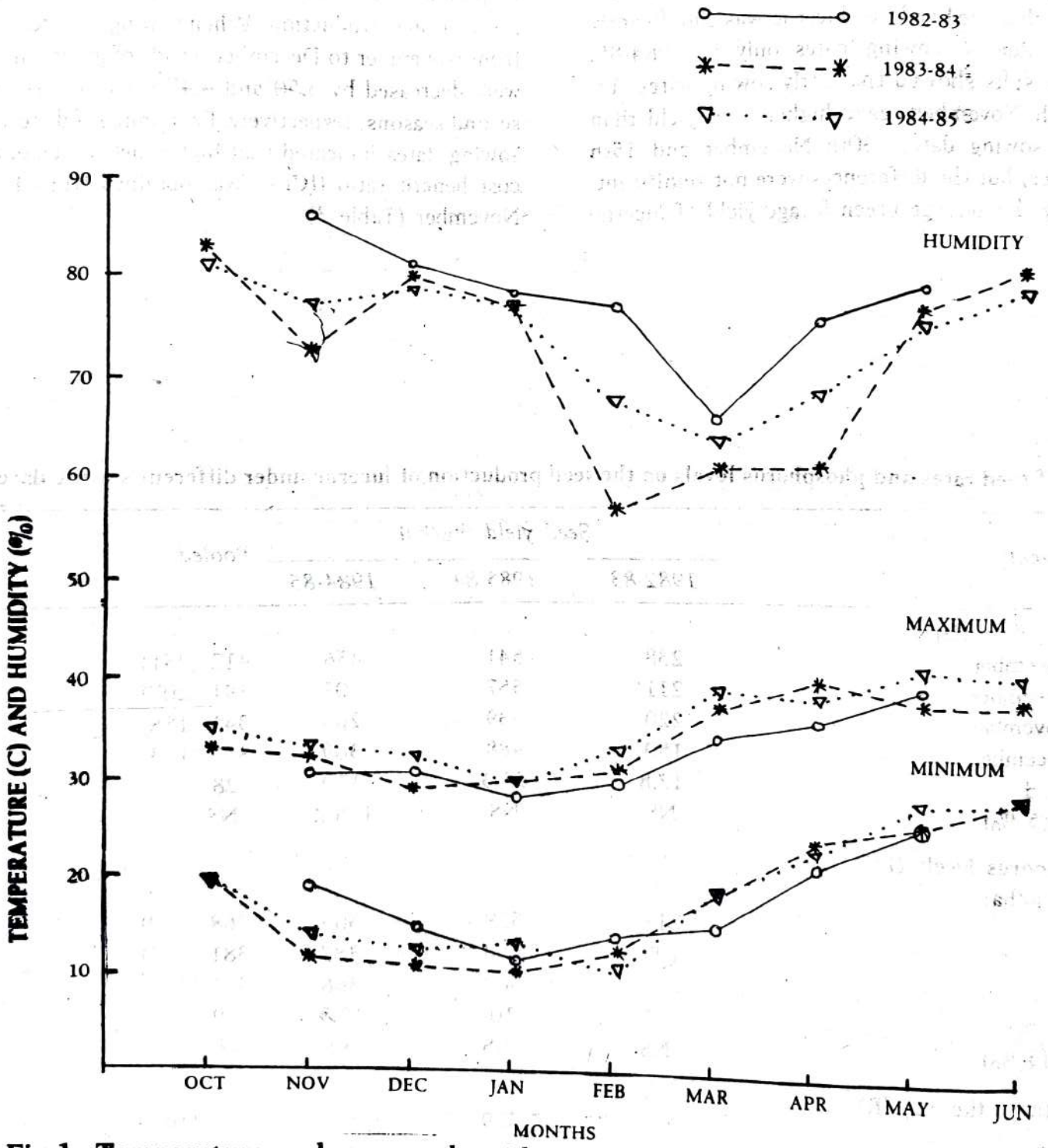

Fig.1. Temperature and average humidity data during growth period of lucerne

RESULTS AND DISCUSSION

ffect of sowing date

The effect of sowing dates on seed and green orage yields are presented in Table 1. The data ndicate that seed yield of lucerne was significantly ffected due to sowing dates only in 1984-85. ooled results showed that early sowing dates (1st nd 15th November) gave higher seed yield than elayed sowing dates (30th November and 15th ecember) but the differences were not significant. imilarly the average green forage yield of lucerne reduced drastically by successive delay in sowing. The lower temperature (Fig. 1) during the month of January might have affected adversely the growth of late sown crop. On the basis of field studies, Wynn-William (1976) indicated that spring sown crop (September, October or November) gave the highest green forage production. When sowing was delayed from November to December, yields of green forage were decreased by 3.50 and 4.47 t/ha in first and second seasons, respectively. Economics of different sowing dates indicated that higher net incremental cost benefit ratio (ICBR) was obtained from 15th November (Table 3).

ABLE 1

ffect of seed rates and phosphorus levels on the seed production of lucerne under different sowing dates.

Treatment	*Seed yield (kg/ha)*			*Pooled*
	1982-83	*1983-84*	*1984-85*	
Sowing date (D)				
1 November	238	541	456	412 (251)
15 November	211	557	407	391 (207)
30 November	220	539	263	341 (188)
15 December	150	488	369	337 (123)
S. Em. ±	17.8	23.3	37.1	28
C. D. (5 %)	NS	NS	128.2	NS
Phosphorus levels (P) (P_2O_5kg/ha)				
0	211	529	365	368 (190)
40	199	556	387	381 (193)
80	208	508	368	361 (195)
S. Em. ±	3.5	10	13.5	9
C. D. (5 %)	NS	NS	NS	NS
Seed rates (kg/ha) (R)				
5.0	224	569	384	392 (181)
7.5	210	552	371	378 (194)
10.0	184	473	366	341 (203)
S. Em. ±	6.0	10.0	11.1	13
C. D. (5 %)	15.5	28.4	NS	NS

Figures in parentheses indicate average green forage yield (q/ha).

TABLE 2

Interaction table of phosphorus level (P) and seed rate (R) for seed yield of lucerne for the year 1984-85 and on pooled basis.

R/P	*Seed yield (kg/ha)*					
	1984-85			*Pooled*		
	P_0	P_1	P_2	P_0	P_1	P_2
R_1	372	379	403	379	404	394
R_2	391	398	322	395	388	350
R_3	334	384	380	331	351	340
S. Em. ±		19			9	
C. D. (5 %)		55			25	

Interaction table of sowing date (D) and seed rate (R) for seed yield of lucerne for the year 1982-83.

D/R	*Seed yield (kg/ha)*			*Mean*
	R_1	R_2	R_3	
D_1	248	234	233	238
D_2	227	208	197	211
D_3	248	245	168	220
D_4	172	155	137	150
Mean	224	210	184	
S. Em. ±		10.0		
C. D. (5 %)		31.0		

Effect of phosphorus

The data indicated that the phosphorus levels had no significant effect on seed yield of lucerne in three years as well as when data were pooled (Table 1). Green forage yield was also not altered by phosphorus supplementation. One of the reasons for obtaining no response of phosphorus might be due to availability of high phosphorus in the soil. Experimental results of three years at Anand revealed that foliar application of phosphorus at the rate of 2% or 4% along with its soil application (40 to 120 kg P_2O_5/ha) did not show any significant effect on seed yield of lucerne (Anonymous, 1977-78, 1978-79, and 1979-80). The experimental soil have high availability of phosphorus ranges from 62 to 83 kg P_2O_5/ha. McCaslin and Gledhill (1982) also did not observe any effect of phosphorus on seed yield of lucerne.

Economics of different levels of phosphorus indicated that total return received more from the application of 40 kg P_2O_5/ha but it showed low net ICBR while the treatment of 80 kg P_2O_5/ha showed negative net ICBR (Table 3).

TABLE 3

Economics of lucerne seed as influenced by dates of sowing, seed rates and phosphorus levels.

Treatments	*Pooled seed yield (kg/ha)*	*Total return (Rs/ha)*	*Additional return over control (Rs/ha)*	*Additional cost (Rs/ha)*	*Gross ICBR*	*Net ICBR*
Sowing dates						
1st Nov. D_1	412	14,496	4285	1350	1:3.17	1:2.17
15th Nov. D_2	391	13,133	2922	780	1:3.75	1:2.75
30th Nov. D_3	341	11,603	1392	570	1:2.44	1:1.44
15th Dec. D_4	337	10,211	—	—	—	—
Phosphorus						
0 kg/ha	368	12,264	—	—	—	—
40 kg/ha	381	12,623	359	220	1:1.63	1:0.63
80 kg/ha	361	12,203	-61	440	-1:0.14	-1:1.14
Seed rate						
5.0 kg/ha	392	12,636	733	115	1:0.37	1:5.37
7.5	378	12,574	671	173	1:3.88	1:2.88
10.0 kg/ha	341	11,903	—	—	—	—
Interaction (P × R)						
P_0R_1	379	13,717	804	115	1:6.99	1:5.99
P_0R_2	395	14,085	1172	173	1:6.78	1:5.78
P_0R_3	331	12,913	—	—	—	—
P_1R_1	404	14,292	1379	235	1:5.87	1:4.87
P_1R_2	388	13,924	1011	393	1:2.57	1:1.57
P_1R_3	351	13,073	160	450	1:0.36	-1:0.64
P_2R_1	394	14,062	1149	555	1:2.07	1:1.07
P_2R_2	350	13,050	137	613	1:0.22	-1:0.78
P_2R_3	340	12,820	—	670	—	—

Selling price of lucerne seed = Rs.23/kg
Selling price of green forage yield = Rs.20/q
Cost of phosphorus = Rs.5.5/kg
Harvesting cost = Rs.360/cut/ha
Irrigation cost = Rs.210/Irri./ha

Effect of Seed Rate

Lucerne seed rate of 5 kg seed/ha gave significantly higher seed yield of lucerne over 10 kg seed/ha but at par with 7.5 kg seed/ha during the year 1982-83 and 1983-84. Similar trend was also observed in the year 1984-85 as well as on pooled basis but the differences were not significant. Sevecka (1979) reported that the highest seed yield of lucerne was obtained with the lowest seed rate of 5 kg seed/ha. Similarly, Craiu *et al.* (1984), also found that 6 kg/ha seed rate was the optimum for obtaining the highest yield. So also, Maslinkov *et al.* (1982) did not notice any significant increase in seed yield with increase in seed rate.

Economics of different seed rates indicated that high net ICBR was obtained when the seed rate of lucerne used was at the rate of 5 kg seed/ha (Table 3).

The interaction of R × P was significant for seed yield of lucerne during the year 1984-85 and on pooled basis. The interactions of R_1P_2 (403 kg/ha) and R_1P_1 (404 kg/ha) gave significantly higher seed yield during 1984-85 and on pooled basis respectively than R_2P_2 and R_3P_0. The interactions of R_3P_1 and R_3P_2 were also significantly lower in seed yield than R_1P_1 on pooled basis (Table 2). Economics of the said interactions indicated that high net ICBR was obtained when the lucerne crop was sown at the rate of 5 kg seed/ha in the absence of phosphatic fertilizer (Table 3).

These results indicated that the lucerne variety Anand-2 should be sown in line (20 cm) during 2nd week of November (15th November) by keeping the seed rate of 5 kg seed/ha for obtaining high seed yield of lucerne and also net realization. Applicati of phosphorus did not require under Anand s conditions where availability of phosphorus is hig

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