

Comparative Study on Forage and Nutrient Yields of Lucerne Varieties Sown With and Without *Sarson* or Fenugreek

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ABSTRACT

To compare forage and nutrients yield of two improved varieties of lucerne ('Sirsa-9' and 'Anand-2'), an experiment was conducted with six treatments in a randomised block design with four replications for a period of 600 days. The green yield was higher with 'Anand-2' + *sarson* (226729 kg/ha) followed by 'Sirsa-9' + *sarson* treatment. The highest dry matter, crude protein, crude fibre, N.F.E. and calcium yields were observed under 'Anand-2' when grown alone. The result of the present study indicated that 'Anand-2' variety of lucerne was found to be superior to 'Sirsa-9' from green, dry matter and nutrients yield point of view. Moreover, higher green yield was obtained when lucerne crop was grown with *sarson* than when grown with fenugreek. The chemical composition revealed that crude protein content was significantly higher for all 'Sirsa-9' treatments compared to 'Anand-2' treatments, while reverse trend was observed for crude fibre, silica, calcium and carotene contents.

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INTRODUCTION

As a forage crop lucerne has gained world-wide popularity. At many places it is known as "queen of forages". It satisfies all the requirements of an ideal forage plant from the view point of its agronomic characters of economic, nutritive and commercial values (Patel, 1971). Economical livestock production depends on the amount and quality of forage production per unit area per unit time. 'Sirsa-9' and 'Anand-2' are high yielding varieties of lucerne adopted by farmers in Kheda district as an irrigated fodder crop. The present study was, therefore, undertaken to compare forage and nutrient yield of these two high yielding varieties when sown with and without the mixture of fenugreek and *Sarson*.

MATERIALS AND METHODS

There were six treatments in a randomised block design with four replications viz. 'Sirsa-9' alone (T_1), 'Sirsa-9' + Fenugreek (T_2), 'Sirsa-9' + *Sarson* (T_3), 'Anand-2' alone (T_4), 'Anand-2' + Fenugreek (T_5) and 'Anand-2' + *Sarson* (T_6). The experiment commenced in October, 1975 and continued for a period of 600 days. Fertilizers were applied @ 20:160:40 kg/ha NPK from DAP; super phosphate and muriate of potash, respectively, before sowing. The seed rates followed were 20 kg for lucerne, 1 kg for *Sarson* and 5 kg for fenugreek per hectare. The net plot size was 3 x 2 m² and sowing was done with a row spacing of 25 cm. Initial cut was taken at 60 days after sowing and follow-

ed by subsequent cuts at 50 per cent flowering. Top dressing was carried out after one year of sowing @ 20 : 40 : 40 kg/ha N P K in the form of DAP and muriate of potash. Subsequent operations like weeding and irrigation were kept uniform for all treatments. In all 16 cuttings were obtained during a period of 600 days.

The samples of green fodder were collected at every cutting and were analysed for their dry matter and proximate nutrients as per AOAC (1970) methods. Oxalate was estimated by the method suggested by Talpatra *et al.* (1948) while carotene by the method of Acharya and Malpoorwala (1952). From the cuttingwise chemical composition and dry matter yield, nutrient yields per hectare were calculated. Data were statistically analysed by analysis of variance following Snedecor and Cochran (1968).

RESULTS AND DISCUSSION

Green and dry matter yield : The data on total green, dry matter and nutri-

ent yields given in Table 1 indicated that the green forage yield was significantly higher with T-6 ('Anand-2' + 'Sarson') i.e. 226.7 t/ha, and T-3 ('Sirsa-9' + 'Sarson') i.e. 200.4 t/ha as compared to other treatments. Thus, growing of lucerne varieties 'Anand-2' and 'Sirsa-9' with 'Sarson' gave 16.5% and 20.5% higher green forage yield respectively than lucerne grown with fenugreek. Highest dry matter yield was observed under T-4 ('Anand-2' variety of lucerne alone) followed by T-6 and T-5 treatments, as compared to treatments of 'Sirsa-9' variety of lucerne.

Nutrient yield : The data on nutrients yield revealed that higher crude protein yield was also observed under T-4 i.e. 'Anand-2' alone (8385 kg/ha) followed by T-6 (8122 kg/ha) and T-5 (7987 kg/ha) treatments. Similar trends were also observed for ether extract, crude fibre, N.F.E. and calcium yields. Top ranking performance of 'Anand-2' variety of lucerne was also reported in Anonymous (1974-75).

TABLE 1

Total green, dry matter and nutrient yields (kg/ha) under (600 day period) different treatments.

	Treatments					
	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Yield						
Green matter	173583	166334	200417	198249	194541	226729
Dry matter	41765	40375	39571	47603	45176	46157
Nutrients						
Crude protein	7724.23	7501.26	7426.32	8385.10	7987.40	8122.69
Ether Extract	1302.43	1241.42	1263.55	1479.22	1407.05	1464.27
Crude fibre	12675.88	12099.33	12059.78	14889.25	14195.32	14412.57
N.F.E.	15974.57	15604.48	14748.54	17890.15	16980.56	17040.94
Ash	3987.44	3920.44	4074.48	4944.39	4679.12	5115.69
Silica	332.63	344.86	299.71	430.42	407.52	449.77
P	146.34	141.01	148.61	162.40	157.69	168.13
Ca	716.09	683.69	674.50	885.57	842.28	870.09
Oxalate	129.68	118.67	100.00	129.01	116.54	113.86
Carotene	3.07	3.18	3.16	3.52	3.37	3.35

TABLE 1 (contd.)

Constituents Sources	Green yield			Statistical analysis					
	S. Em.	C.D.	C.V.%	Dry matter yield			Crude protein		
Treatments	7985	24034	8.26	S. Em.	C.D.	C.V.%	S. Em.	C.D.	C.V.%
'Sirsa-9' vs. 'Anand-2'	4610	12973		1846	5563	8.50	310	N.S.	7.90
T1 vs (T2 + T3)	6914	N.S.		1066	3209				
T2 vs T3	7985	24034		1599	N.S.		179	539	
T4 vs (T5 + T6)	6917	N.S.		1846	N.S.		269	N.S.	
T5 vs T6	7985	24034		1599	N.S.		310	N.S.	
				1846	N.S.		269	N.S.	
							310	N.S.	
Ether Extract			10.28	Crude fibre			N.F.E.		
Treatments	70	N.S.		S. Em.	C.D.	C.V.%	S. Em.	C.D.	C.V.%
'Sirsa-9' vs. 'Anand-2'	40	122		3291	N.S.	15.55	745	N.S.	9.11
T1 vs (T2 + T3)	61	N.S.		1900	N.S.		430	1214	
T2 vs T3	70	N.S.		2851	N.S.		646	N.S.	
T4 vs (T5 + T6)	61	N.S.		3291	N.S.		745	N.S.	
T5 vs T6	70	N.S.		2851	N.S.		646	N.S.	
				3291	N.S.		745	N.S.	
Ash			7.16	Silica			P		
Treatments	159	605		S. Em.	C.D.	C.V.%	S. Em.	C.D.	C.V.%
'Sirsa-9' vs. 'Anand-2'	92	277		19	57	9.98	30	N.S.	38.43
T1 vs (T2 + T3)	138	N.S.		11	33		17	N.S.	
T2 vs T3	159	N.S.		16	N.S.		26	N.S.	
T4 vs (T5 + T6)	138	N.S.		19	N.S.		30	N.S.	
T5 vs T6	159	N.S.		16	N.S.		26	N.S.	
				19	N.S.		30	N.S.	
Ca			33.99	Oxalate			Carotene		
Treatments	130	N.S.		S. Em.	C.D.	C.V.%	S. Em.	C.D.	C.V.%
'Sirsa-9' vs. 'Anand-2'	75	N.S.		5.37	16.18	9.10	0.21	N.S.	12.97
T1 vs (T2 + T3)	113	N.S.		3.10	N.S.		0.12	N.S.	
T2 vs T3	130	N.S.		4.65	14.00		0.18	N.S.	
T4 vs (T5 + T6)	113	N.S.		5.37	16.16		0.21	N.S.	
T5 vs T6	130	N.S.		4.65	N.S.		0.18	N.S.	
				5.37	N.S.		0.21	N.S.	

N.S. = Non-significant.

Chemical composition : The average chemical composition of fodder for each treatment (Table 2) revealed that crude protein content was significantly higher for all 'Sirsa-9' treatments (18.93-19.12) as compared to those of 'Anand

-2' treatments. Similar results were also reported by Anonymous (1974-75) for 'Sirsa-9' and 'Anand-2' varieties. Calcium and carotene contents were found to be significantly higher under all 'Anand-2' treatments than those of

TABLE 2
Average chemical composition of lucerne varieties under different treatments
(% on dry matter basis).

Constituents	Treatments							Sarson	
	T ₁	T ₂	T ₃	Sarson	T ₄	T ₅	T ₆		
Crude protein	18.95	18.93	19.12	16.37	17.82	17.91	17.78	16.49	
Ether extract	3.38	3.36	3.37	2.66	3.33	3.31	3.34	2.59	
Crude fibre	30.08	29.66	29.45	30.02	31.08	30.97	30.73	28.04	
N.F.E.	38.16	38.50	37.97	33.81	37.67	37.65	37.45	33.85	
Ash	9.43	9.55	10.09	17.14	10.10	10.16	10.70	19.03	
Silica	0.79	0.79	1.10	1.02	0.85	0.87	1.19	1.22	
P	0.36	0.36	0.36	0.54	0.35	0.35	0.35	0.52	
Ca	1.70	1.71	1.71	1.78	1.83	1.84	1.84	2.04	
Oxalate	0.27	0.25	0.24	0.33	0.25	0.24	0.24	0.31	
Carotene (mcg/g)	63.28	66.69	57.59	214.13	64.93	69.06	58.07	201.84	

Statistical analysis									
Constituents	Crude protein			Ether extract			Crude fibre		
Sources	S. Em.	C.D.	C.V.%	S. Em.	C.D.	C.V.%	S. Em.	C.D.	C.V.%
Treatments	0.17	0.52	1.86	0.03	N.S.	1.89	0.31	0.93	2.03
'Sirsa-9' vs 'Anand-2'	0.12	0.36		0.02	N.S.		0.18	0.54	
T1 vs (T2+T3)	0.17	N.S.		0.03	N.S.		0.27	N.S.	
T2 vs T3	0.21	N.S.		0.03	N.S.		0.31	N.S.	
T4 vs (T5+T6)	0.17	N.S.		0.03	N.S.		0.27	N.S.	
T5 vs T6	0.21	N.S.		0.03	N.S.		0.31	N.S.	
		N.F.E.			Ash			Silica	
Treatments	0.28	N.S.	1.52	0.10	0.30	2.00	0.07	0.20	14.43
'Sirsa-9' vs 'Anand-2'	0.17	0.51		0.05	0.17		0.04	N.S.	
T1 vs (T2+T3)	0.24	N.S.		0.09	0.25		0.06	N.S.	
T2 vs T3	0.28	N.S.		0.10	0.30		0.07	0.20	
T4 vs (T5+T6)	0.24	N.S.		0.09	0.25		0.06	N.S.	
T5 vs T6	0.28	N.S.		0.10	0.30		0.07	0.20	
		P			Ca			Oxalate	
Treatments	0.004	N.S.	2.02	2.02	0.06	6.92	0.009	N.S.	7.64
'Sirsa-9' vs 'Anand-2'	0.002	0.006		0.10	0.03		0.005	N.S.	
T1 vs (T2+T3)	0.003	N.S.		0.02	N.S.		0.007	N.S.	
T2 vs T3	0.004	N.S.		0.02	N.S.		0.009	0.26	
T4 vs (T5+T6)	0.003	N.S.		0.02	N.S.		0.007	N.S.	
T5 vs T6	0.004	N.S.		0.02	N.S.		0.009	N.S.	
		Carotene							
Treatments	2.42	7.29	7.64						
'Sirsa-9' vs 'Anand-2'	0.40	N.S.							
T1 vs (T2+T3)	2.09	N.S.							
T2 vs T3	2.42	7.28							
T4 vs (T5+T6)	2.03	N.S.							
T5 vs T6	2.42	7.28							

N.S. = Non-significant.

'Sirsa-9', treatments. On the whole the present study indicated superiority of 'Anand-2' variety of lucerne over 'Sirsa-9' from its green, dry matter and nutrient yields point of view. There was no significant effect of mixed sowing on nutrient yield of lucerne when grown as a perennial crop. However, growing of lucerne with *Sarson* yielded higher green forage than growing it with fenu-greek.

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