

coefficient between solasodine content and berry yield is due to high positive indirect effect of days to fruiting and number of branches and the high correlation coefficient between weight per berry and berry yield is mainly due to high indirect effects of number of branches, plant spread and solasodine yield per plant.

In the present study, the residual effect was of low magnitude (0.0378) suggesting that most of the important contributing attributes to berry yield per plant have been utilised.

Path analysis may or may not give results identical to correlation studies. In case of disparities, reliance must be placed on path analysis. Therefore, more emphasis should be given during selection on days to fruiting, number of flowers per bunch, number of branches, plant height, plant spread and weight per berry. Selection based on these component attributes might be helpful in evolving high yielding varieties of *S.khasianum*.

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## EVALUATION OF THE HEDGE LUCERNE (*Desmanthus Virgatus*) AS FORAGE CROP UNDER DIFFERENT IRRIGATIONS AND IN COMBINATION WITH GUINEA GRASS

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### ABSTRACT

The fodder yield and quality from monocrop of hedge lucerne (*Desmanthus virgatus*) was compared with its intercrop with guinea grass (hamil variety) in 1 : 2 ratio in the year 1987-88 under three irrigation conditions: 1) Weekly irrigation, 2) Fortnightly irrigation, 3) No irrigation (rainfed crop). The annual fresh yields of the monocrop under three conditions were 90.1, 77.76, 30.87 t/ha and for intercrop 249.4, 212.23 and 70.87 t/ha respectively. The cost of production of the green monocrop was Rs.296, 317, 386 and for the intercrop Rs.120, 131 and 195 per tonne respectively. The dry matter content varied from 25.74 to 26.97% for monocrop and 18.45 to 21.11% for the intercrop. Crude protein content on D M basis ranged from 22.63 to 24.20% and 13.12 to 13.80% respectively. With reduction in irrigation source, the returns per/ha reduced considerably. The intercrop was more economical than the single crop though both cropping systems were profitable.

Feeding of leguminous fodder to milch cows can effect reduction in concentrate requirement. The cost of cultivation of conventional legumes such as lucerne is high. Hedge lucerne (*Desmanthus virgatus*) is a leguminous shrub naturally found in tropical and sub-tropical America and South Asia. It is grazed by cattle or periodically harvested for feeding. When used as a

hedge plant, one metre length of hedge yielded 30 kg from a single cut. In the field, it produced 39 t/ha under irrigation and 13 t/ha in rainfed condition (Sundararaj and Nagarajan, 1963). Its intercrop with napier grass yielded 187.1 tonnes grass and 39.8 tonnes legume/ha (Chandrasekharan et al., 1983). Plantation of *Desmanthus* in grain crops was found to increase the grain yield (Desai

Table 1. Annual forage yield

Particulars	Hedge lucerne Monocrop			Guinea + Hedge lucerne Intercrop		
	Weekly irrigated	Fortnightly irrigated	Rainfed	Weekly irrigated	Fortnightly irrigated	Rainfed
Fresh yield (t/ha)	90.10	77.76	30.87	249.40	212.23	70.87
No. of cuts	7	7	4	7	7	4
Dry matter content %	25.74	26.81	26.97	18.45	19.04	21.11
Crude protein content %	24.20	23.02	22.63	13.80	13.29	13.12
Dry matter yield (t/ha)	22.77	20.85	8.33	46.02	40.41	14.96
CD (.05) = 16.31 for Fresh yield		2.8 for DM yield				0.53 for CP content

and Bhoi, 1982). High yields of 125 t/ha from a monocrop and 225 t/ha from intercrop with hybrid napier were reported by Srirangasamy *et al.*, (1984). The present study evaluates the economic returns from the monocrop as well as when grown along with guinea grass under different irrigations.

#### MATERIALS AND METHODS

Plots of size 30 m<sup>2</sup> were allotted as per randomised block design for three irrigation conditions, 1) weekly irrigation, 2) fortnightly irrigation, 3) no irrigation (rainfed crops) and two crops, 1) hedge lucerne monocrop in lines 30 cm apart, and 2) intercrop of guinea grass in 50 X 50 cm spacing and a row of hedge lucerne alternated with every two rows of the grass (Hamil variety). The soil was of red loam type and annual rainfall was 520 mm. The land was prepared by one ploughing, Two harrowings and one levelling using

tractor. Manure was applied at 20 t/ha for irrigated crop and 10 t/ha for rainfed crop. The irrigated monocrop received 40 kg urea, 200 kg super phosphate, 170 kg muriate of potash at sowing and the intercrop received 200 kg urea (divided into four doses), 100 kg super phosphate and 70 kg muriate of potash per hectare. For rainfed crop, the fertilizer dose was at half the rate of irrigated crop. Hedge lucerne in monocrop was sown at 15 kg seeds/ha and in intercrop 6 kg/ha with 20,000 root slips of the grass. Both the crops required gap filling to the extent of 10 per cent in first three months. Irrigated crop required one weeding in the first month and further weeding at alternate harvesting, whereas rainfed crop required one weeding in monsoon season only. Allowing three months upto first cutting from June to August, 1987 as establishment period, the weekly irrigated crop received 28 irrigations and fortnightly

Table 2. Annual cost of production (Rs/ha)

Components	Monocrop			Intercrop		
	Weekly irrigated	Fortnightly irrigated	Rainfed	Weekly irrigated	Fortnightly irrigated	Rainfed
Land preparations	610	610	610	610	610	610
Manuring	2,316	2,316	1,158	2,316	2,316	1,158
Fertilizers	1,224	1,224	612	1,148	1,148	574
Sowing	810	810	810	2,324	2,324	2,324
Irrigation	3,472	1,984	-	3,472	1,984	-
Weeding	2,240	2,240	1,160	2,240	2,240	1,236
Gap filling	81	81	-	232	232	-
Supervision	1,200	1,200	600	1,200	1,200	600 <sup>st</sup>
Harvesting	2,803	2,419	1,080	4,365	3,174	1,322
Land rent (Assumed)	10,000	10,000	5,000	10,000	10,000	5,000
Miscellaneous cost	425	425	225	425	425	225
Interest on working capital (6%)	1,511	1,399	625	1,700	1,572	783
Total	26,692	24,648	11,930	30,032	27,765	13,832

Table 3. Economics of forage farming

Components	Monocrop			Intercrop		
	Weekly irrigated	Fortnightly irrigated	Rainfed	Weekly irrigated	Fortnightly irrigated	Rainfed
Green fodder yield (t/ha)	90.10	77.76	30.87	249.40	212.23	70.87
Total cost of production (Rs/ha)	26,692.00	24,648.00	11,930.00	30,032.00	27,765.00	13,832.00
Fodder cost (Rs/t)	296.00	317.00	386.00	120.00	131.00	195.00
Sale price* (Rs/t)	613.00	617.00	576.00	254.00	253.00	281.00
Margin of profit (Rs/t)	317.00	300.00	190.00	134.00	122.00	86.00
Net returns (Rs/ha/year)	28,562.00	23,328.00	5,865.00	33,420.00	25,892.00	6,095.00

\* Sale price taken as Rs. 100/- for every 1% CP in fodder.

irrigated crop received 16 irrigations in one year till the end of August, 1988. The irrigated crop was harvested 7 times at 40 to 50 days interval. Rainfed crop was harvested 2 times in rainy season, once at the end of winter and once at the end of summer. Green fodder yield, dry matter (D M) and crude protein contents (C P) were recorded.

## RESULTS AND DISCUSSION

Hedge lucerne monocrop produced 90.1 t/ha green forage (Table 1) under weekly irrigation. It did not differ significantly from the fortnightly irrigated crop which yielded 77.76 t/ha per year. Fourteen per cent drop in yield was observed when irrigation frequency was reduced by 50 per cent. The rainfed monocrop yielded 30.97 t/ha out of which 70 per cent yield was obtained from two cuttings in rainy season. The intercrops produced significantly higher yield of 249.4 t/ha containing 30.27 tonnes from the legume under weekly irrigation and 212.23 tonnes containing 23.23 tonnes from the legume under fortnightly irrigation. The D M content of the monocrop ranged from 25.74 to 26.97 per cent and for the intercrop, it ranged from 18.45 to 21.11 per cent. The CP content of the monocrop was 24.2 per cent and for the intercrop, it was 13.8 per cent on D M basis under weekly irrigation. The level of irrigation had no significant effect on the CP content of the crop.

The annual cost of fodder production is indicated in Table 2. With reduction in the frequency of irrigation, the input cost came down consistently with fodder yield. The cost of fodder production per tonne of forage increased with

decrease in the irrigation source (Table 3). Hedge lucerne in monocrop costed Rs.296/t as compared to Rs.120/t of the mixed crop of grass and legume under weekly irrigation. The cost per kg of CP was Rs.4.84 from hedge lucerne as against Rs.4.74 from the mixed crop. The mixed crop was found to be more economical than the monocrop. For irrigated crops, the capital pay back period was less than three years. For rainfed crops, the pay back period exceeded 5 years showing slow rate of returns. It could be recommended to grow hedge lucerne mixed with guinea grass preferably under irrigation for higher profits.

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