EFFECT OF INTERCROPPING OF SIRATRO LEGUME (*MACROPITILIUM ATROPURPIREUM*) ON THE HERBAGE YIELD AND QUALITY OF *CENCHRUS CILIARIS*

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Abstract

Herbage yield and quality of *Cenchrus ciliaris* by intercropping with *Macropitilium atropurpureum* was studied with six different treatments of grass legume mixture during 1982. The green and dry matter yield was found significantly higher in monoculture pure grass as compared to the other treatments throughout the growing period. Legume in pure form as well as in mixture significantly increased the total soil nitrogen in soil. The increase in crude protein contents was associated with the increase of legume in the grass legume mixture. Similarly increase of crude fibre was found with higher proportions of grass.

Introduction

To improve the quality and quantity of growing grass legume mixture is essential as the productivity of the rangelands of the country can be increased manifold by devising suitable combinations of grasses and legumes for various ecological zones. The combinations so developed can be easily accommodated in our cropping systems. It has been established that tropical legumes in a grass legume mixture fix suitable amount of nitrogen under favourable conditions (Anonymus, 1979). Therefore, a study was conducted to find out a suitable combination of grass (*Cenchrus ciliaris*) and legume (*Macropitilium atropurpureum*) for quality herbage yield.

Materials and Methods

The crop (grass – legume) was sown in 20 cms apart rows in a Randomized Complete Block Design experiment with four replications during the last week of June 1982. The following five treatments were applied:–

T_1 : Grass alone
T_2 : Legume along
T_3 : 35 percent grass and 65 percent legume
T_4 : 65 percent grass and 35 percent legume
T_5 : 50 percent grass and 50 percent legume

The plot size was 10 m x 2 m and the seed rate used for grass and legume was 14 kgs and 16 kgs/hectare respectively. The observations regarding plant height, green and dry weight,

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nitrogen content, crude protein and crude fibre were recorded.

Total nitrogen was determined by Kjeldahl method. Two gms of soil was digested with 10 ml concentrated sulphuric acid together with digestion mixture (Selenium and sodium sulphate) for three hours followed by distillation. After the titration nitrogen contents were determined by the equalence technique (Jackson, 1960). Crude protein and crude fibre contents were recorded by using the standard technique (A.O. A.C. 1970). Data was analysed satistically and means were compared by Duncan's Multiple Range test at five percent probability level.

Results and Discussions

Perusal of table 1 indicates, that the overall effect of age on the height of grass and legume was highly significant, whereas that of treatments and their interactions with days was non-significant. There was a continuous increase in the grass height with an increase in age.

TABLE – I

PLANT HEIGHT (CMS) AS AFFECTED BY GROSS-LEGUME MIXTURE AT FOUR INTERVALS OF TIME

PLANT HEIGHT (CMS)

Treatments	30 Days		60 Days		90 Days		120 Days		Mean	
	Legume	Grass	Legume	Grass	Legume	Grass	Legume	Grass	Legume	Grass
T_1 Pure grass	–	7.00	–	17.0	–	68.00	–	96.00	–	47.0 NS
T_2 Pure legume	4.00	–	8.50	–	42.50	–	82.00	–	34.25 NS	–
T_3 35% grass + 65% legume	5.00	7.50	8.75	16.75	46.50	66.00	80.75	93.00	35.25 NS	45.81 NS
T_4 65% grass + 35% legume	4.00	8.50	9.50	17.00	40.50	65.25	78.75	94.75	33.19 NS	46.38 NS
T_5 50% grass + 50% legume	3.75	6.25	8.75	17.75	48.25	66.50	82.50	97.75	35.81	46.56
MEAN	4.19 d	7.31 d	9.19 c	16.63 c	44.44 b	66.44 h	81.00 a	85.38 a		

* Any two means not sharing a letter differ significantly at 5% level of probability.

The maximum plant height of 95.38 cms was recorded at 120 days age. Similar response of the treatments was observed on plant height in case of legume. The plant height on an

average ranged from 33.19 to 35.81 cms. Plants harvested 120 days after planting showed greater height than harvested at intervals of 90, 60 and 30 days. The results are in conformity with those of Gill (1979) and Yasin (1981) as they also reported non-significant effect of various treatments of grass-legume on plant height.

The integrated effect of different treatments, harvesting days and their interaction was significant. It was also found that there was a significant decrease in dry matter production in grass-legume combinations over pure grass (table–II). The plot seeded with pure grass produced the highest dry matter of 542.07 gms/m^2 over the plots seeded with grass-legume combinations. Amongst the grass-legume combinations, 65 percent grass sown with 35 percent legume resulted in the significantly higher value than rest of the combinations. However, the pure legume yielded the lowest dry matter of 227.94 gms/m^2. This shows that grass being the tall and vigorously growing yields comparatively more dry matter per hectare in all the grass-legume combinations.

TABLE – II

DRY MATTER PRODUCTION AS AFFECTED BY GRASS-LEGUME MIXTURE AT FOUR INTERVALS OF TIME (GMS/M^2)

Treatments		Production in Gms/m^2*				
		At 30 Days Dry Matter	At 60 Days Dry Matter	At 90 Days Dry Matter	At 120 Days Dry Matter	Mean Dry Matter
T_1	Pure grass	178.5	361.25	749.5	879.00	542.07 a
T_2	Pure legume	72.0	157.5	291.75	390.50	227.94 e
T_3	35% grass + 65% legume	98.75	237.5	446.25	563.75	336.57 d
T_4	65% grass + 35% legume	137.75	291.25	586.25	695.5	427.75 b
T_5	50% grass + 50% legume	122.75	256.25	525.75	645.75	387.63 c
		121.95 d	260.75 c	519.90 b	634.90 a	

* Any two means not sharing a letter differ significantly at 5% level of probability.

The various cutting intervals, on the other hand, showed a consistent increase in the dry matter yield. The crop harvested 120 days after planting produced the maximum dry matter of 634.90 kg per hectare over 90, 60 and 30 days intervals because of the more green matter yield. The pure grass appeared to be more productive and efficient than all the grass-legume combinations. The low yield in grass-legume combinations was attributed to mutual shading and competition for moisture, nutrients and light. Similar findings have been reported by Wolf (1972) who reported that growth was usually reduced as a result of above ground competition with the taller growing grasses for light, moisture and nutrients. These results are in conformity with Jones (1975), Tudrsi and Whiteman (1977) and Vandenbergh and Elberse (1970).

The nitrogen content of the plot seeded with pure legume was significantly higher than the plot seeded with pure grass but it did not differ significantly from plots seeded with 50 percent grass + 50 percent legume and 35 percent grass + 65 percent legume and vice versa. The results further indicated that combination with higher proportions of legume tend to fix more nitrogen than the pure grass.

TABLE – III

NITROGEN STATUS, CRUDE PROTEIN AND CRUDE FIBER CONTENTS AS AFFECTED BY GROSS – LEGUME MIXTURE

Treatments		Total Soil Nitrogen Before sowing Kg/Hectare	Total Soil Nitrogen After sowing Kg/Hectare	± Addition	Percentage of	
					Crude Proteins	Crude Fibre
T_1	Pure grass	998	983 d	– 15	9.11 d	41.89 a
T_2	Pure legume	997	1037 a	+ 40	14.04 a	34.79 d
T_3	35% grass + 65% legume	995	1027 ab	+ 32	12.07 b	35.51 d
T_4	65% grass + 35% legume	996	1015 bc	+ 19	10.01 c	39.51 d
T_5	50% grass + 50% legume	997	1020 ab	+ 23	11.78 b	37.74 c

* Any two means not sharing letter differ significantly at 5% level of probability

The combined effect of treatments on the crude protein and fiber contents was highly significant (table – III). Among the various treatments tested the pure legume gave a maximum of 14.4 percent crude protein which was significantly higher than the other treatments. The next value of 12.07 was given by 35 percent grass and 65 percent legume, but it was on the same level of significance as 50 percent grass and 50 percent legume.

Maximum crude fiber was in case of pure grass (41.89 percent) followed by 39.27 percent in case of 65 percent grass and 35 percent legume and was significantly greater than the remaining treatments. The least crude fiber (34.79%) was given by pure legume, but it did not differ significantly from that of 35 percent grass and 65 percent legume. It is evident from the results that the increased proportions of grass have a corresponding increasing effect on the crude fiber. These results are in agreement with those of Yepes, (1975), Pezo et al. (1978).

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