

# EFFECT OF ROW SPACING ON THE PRODUCTIVITY OF ANJAN GRASS (*CENCHRUS CILIARIS*) WITH CARIBBEAN STYLO UNDER DIFFERENT LEVELS OF PHOSPHORUS

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## ABSTRACT

Studies on three row spacing (50, 75 and 100 cm) on anjan grass (*Cenchrus ciliaris* Linn.) intercropped with Caribbean stylo (*Stylosanthes hamata* (L.) Taub.) under three levels of phosphorus (0, 30 and 60 kg P<sub>2</sub> O<sub>5</sub> /ha) were carried out on sandy clay loam soil to know the suitable spacing of anjan grass for intercropping with legume to get the higher production. Forage production, crude protein yield and metabolisable energy were not affected by row spacing. Application of phosphorus upto 30 kg P<sub>2</sub> O<sub>5</sub> /ha gave significantly higher dry matter and crude protein yield as well as metabolisable energy.

## INTRODUCTION

*Cenchrus ciliaris* (Linn.) and *Stylosanthes hamata* (L.) Taub. commonly known as anjan grass and Caribbean stylo, respectively are drought resistant forage species, well adapted to arid and semi-arid regions of India. It is expected that grass-legume intercropping may result in more nutritious herbage. The maximum forage production under mixture can be obtained by providing optimum space to allow the component species to grow better with least intra-species competition. Keeping the above objectives in view, a field experiment was conducted to find out the suitable row spacing of anjan grass for intercropping with Caribbean stylo and work out the phosphate requirement of such mixtures.

## MATERIAL AND METHODS

The soil of the experimental area was sandy clay loam, pH 7.09, total nitrogen 0.06%, organic carbon 0.46 % and available phosphorus 11.25 kg/ha. The total rainfall recorded during 1982, 1983 and 1984 was 1131 (51 rainy days), 1329 (62 rainy days) and 839 mm (45 rainy days), respectively.

The treatments consisted of 3 row spacings (50, 75 and 100 cm) of anjan grass and each intercropped with Caribbean stylo in inter-row spaces and fertilized with 3

levels of phosphorus (0, 30 and 60 kg  $P_2O_5$ /ha). The experiment was laid out in Randomised Block Design with three replications. One and half month old seedlings of anjan grass 'IGFRI-3108' were transplanted with the onset of monsoon in July 1982 and Caribbean stylo was sown one week after transplanting in inter-row spaces at the rate of 6 kg/ha. Phosphorus was applied in the form of single super phosphate in the furrows and mixed properly at the time of sowing of legume while in other years it was broadcasted and mixed at the onset of monsoon.

Two cuttings taken on 29th October and 16th December during 1982, five cut in 1983 and three cuts in 1984. Plants samples (100 g) were taken at each cutting for dry matter determination and pooled samples of each year were analysed for crude protein content. Dry matter yield obtained with grass and legume were computed after conversion into metabolisable energy (M cal/ha) as proposed by Gohl (1975).

## RESULTS AND DISCUSSION

### Forage production

Row spacings did not significantly influence the dry forage yield obtained either from grass alone or legume alone as well as total of both during all the three years (Table 1). Due to application of phosphorus the total dry matter yield significantly increased in all the three years as well as in pooled data. The forage yield recorded from either grass alone or legume alone did not show significant response of phosphorus in all the years except during 1983 where the legume produced significantly higher yield due to application of phosphorus. Total forage yield increased by 37.4 per cent with application of 30 kg  $P_2O_5$ /ha over control. Interaction of spacing x phosphorus did not show significant effect on forage yield of either grass and legume or total of grass + legume in all the three years.

### Crude protein yield

The crude protein of grass, legume and total of grass + legume due to different spacings did not differ significantly in all the three years (Table 2). Application of phosphorus showed significant variation in crude protein yield of legume during 1983 and 1984 while the total (grass+legume) crude protein yield significantly increased due to application of phosphorus in all the years as well as in the pooled data. The total crude protein yield obtained with application of 30 and 60 kg  $P_2O_5$ /ha was at par in all the three years.

### Metabolisable energy

The metabolisable energy remained uninfluenced due to variation in spacings (Table 3). The metabolisable energy of either grass or legume did not show significant response of phosphorus in all the years as well as in the pooled analysis except

Table 1. Effect of anjan grass row spacing and levels of phosphorus on dry matter yield (q/ha) of anjan grass + Caribbean Stylo intercropping

Treatments	1982			1983			1984			Pooled		
	Anjan grass	Caribbean Stylo	Total	Anjan Grass	Caribbean Stylo	Total	Anjan grass	Caribbean Stylo	Total	Anjan Grass	Caribbean Stylo	Total
Spacing (cm)												
50	17.1	5.8	22.9	67.2	29.7	96.9	50.5	15.5	66.0	44.9	17.0	61.9
75	16.3	5.8	22.1	70.9	28.5	99.4	53.5	10.5	64.0	46.9	14.0	61.8
100	15.8	9.1	24.9	57.0	35.2	92.2	46.1	20.7	66.8	39.6	21.7	61.3
CD 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Phosphorus (P <sub>2</sub> O <sub>5</sub> /ha)												
0	13.0	5.1	18.1	53.7	24.2	77.9	41.6	10.5	52.1	36.1	13.8	49.4
30	18.3	7.7	26.0	73.2	32.8	106.0	54.4	17.4	71.8	48.6	19.3	67.9
60	17.9	8.0	25.9	68.2	36.4	104.6	54.1	18.7	72.9	46.7	21.0	67.7
CD 5%	NS	NS	5.4	NS	7.2	15.0	NS	NS	16.1	NS	NS	12.8

Table 2. Effect of anjan grass row spacing and levels of phosphorus on crude protein yield (q/ha) of anjan grass + Caribbean Stylo intercropping

Treatments	1982			1983			1984			Pooled		
	Anjan grass	Caribbean Stylo	Total	Anjan grass	Caribbean Stylo	Total	Anjan grass	Caribbean Stylo	Total	Anjan grass	Caribbean Stylo	Total
Spacing (cm)												
50	1.4	0.7	2.1	5.2	4.9	10.1	3.4	2.1	5.5	3.3	2.6	5.9
75	1.3	0.7	2.0	5.4	4.4	9.8	3.7	1.5	5.2	3.5	2.2	5.7
100	1.3	1.1	2.4	4.1	5.3	9.4	3.0	2.9	5.9	2.8	3.1	5.9
CD 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Phosphorus (P <sub>2</sub> O <sub>5</sub> /ha)												
0	1.0	0.6	1.6	3.9	3.6	7.5	2.9	1.4	4.3	2.6	1.9	4.9
30	1.5	0.9	2.4	5.6	5.4	11.0	3.7	2.4	6.1	3.6	2.9	6.5
60	1.4	1.0	2.4	5.1	5.6	10.7	3.5	2.6	6.1	3.3	3.1	6.4
CD 5%	NS	NS	0.6	NS	1.2	1.2	NS	0.7	1.5	NS	NS	1.3

Table 3. Effect of anjan grass row spacing and levels of phosphorus on metabolisable energy (M cal/ha) of anjan grass + caribbean stylo intercropping

Treatments	1982			1983			1984			Pooled		
	Anjan grass	Caribbean Stylo	Total	Anjan grass	Caribbean Stylo	Total	Anjan grass	Caribbean Stylo	Total	Anjan grass	Caribbean Stylo	Total
Spacing (cm)												
50	3660	1418	5078	14588	6749	21337	10782	3621	14403	9677	3929	13606
75	3479	1381	4860	15164	6667	21831	11440	2469	13909	10028	3505	13533
100	3378	2118	5596	12201	8168	20369	9815	4814	14629	8464	5068	13532
CD 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Phosphorus ( $P_2O_5$ /ha)												
0	2767	1222	3989	11481	5617	17098	8868	2448	11316	7705	3096	10801
30	3911	1864	5775	15885	7510	23395	11646	4033	15679	10480	4469	14949
60	3839	1930	5769	14588	8457	23045	11522	4424	15946	9983	4937	14920
CD 5%	NS	NS	1390	NS	2053	1831	NS	NS	3552	NS	NS	2905

NS=Non significant

in 1983 where legume showed significant variations due to phosphorus application. However, the total (grass+legume) metabolisable energy significantly increased due to the application of phosphorus in all years. The total metabolisable energy obtained in 1982 and 1983 was maximum with application of 30 kg  $P_2O_5$ /ha while during 1984 it was maximum with 60 kg  $P_2O_5$ /ha. The pooled data revealed that the metabolisable energy increased by 38.4 and 38.1 per cent with application of 30 and 60 kg  $P_2O_5$ /ha, respectively over control.

Interaction of spacing and phosphorus also did not reveal significant variations in metabolisable energy of either grass, legume or total of grass+legume in all the three years as well as in pooled data.

#### REFERENCES

Gohl, B. 1975. Tropical Feeds. Food and Agriculture Organisation, Rome. 661 pp.