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Most suitable intercrops for sugarcane

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Abstract : A field experiment was conducted in the clayey loam soils of the Sugarcane Research Station, Cuddalore during 1999 - 2001 with a view to find out suitable intercrops for sugarcane. This trial was conducted both in early and mid late varieties. Intercropping with sunnhemp (CO1) or blackgram (TMV-1) recorded the highest cane (113.3 and 104.3 t ha^{-1}) and sugar yield (13.81 and 12.81 t ha^{-1}) and also generated the highest net income (Rs.32,731 and Rs.32,544 ha^{-1}).

Key words: Sugarcane, intercrops, cane yield and sugar yield.

Introduction

The inter space between sugarcane rows remains vacant till the completion of tillering phase. For optimum utilization of inter row space, raising of short duration and quick growing crops has been suggested. Intercropping conferred yield advantages ranging from 15 - 60% over sole cropping (Palaniappan, 1985). Several workers reported that intercrops such as bengalgram (Ethirajan *et al.*, 1981), garlic (Verma *et al.*, 1981), potato (Virendra Singh *et al.*, 1986) and radish (Jayabal and Chokalingam, 1990) significantly increased cane and sugar yields. Sunnhemp is a good green manure crop which grows and decomposes quickly in soil and enriches the soil fertility (Nasir Ahmed, 1999). The present study was undertaken to find out the effect of growing various pulse, oil seed and green manure crops in sugarcane.

Material and Methods

Field experiments were conducted at Sugarcane Research Station, Cuddalore during 1999-2000 and 2000-2001. The experiment was laid out in split plot design replicated thrice. The soil type was clayey loam having a pH of 7.2 and low in available N (231 kg ha^{-1}) and medium in available P_2O_5 (16.4 kg ha^{-1}) and K O_2 (212 kg ha^{-1}). The treatments consisted of varieties in main plot *viz.*, early variety (CoSi 95071) and mid late variety (CO 86249) and various intercrops *viz.*, blackgram (TMV 1), greengram (CO 2), cowpea (CO 2), soybean (CO 2), groundnut (VRI 3), sunnhemp (CO 1) and sugarcane sole crop in the sub plots. All the intercrops were sown in December - January and February for early and mid late varieties, respectively. The sunnhemp was harvested at flowering stage and incorporated between rows. Weed count was recorded at 45 DAP. The two years experimental data were compiled and pooled analysis was carried out.

Results and Discussion

Growth and yield attributes

In both the varieties, the germination percentage was not significantly affected due to various intercrops. The interaction effect on germination was nonsignificant. Irrespective of varieties, significantly higher tiller (237,000/

Table 1. Effect of intercropping in sugarcane (mean of two years data)

Treatments	Germination (%)	Tiller count ('000/ha)	Millable cane population ('000/ha)	Cane yield (t ha^{-1})	Commercial cane sugar (%)	Sugar yield (t ha^{-1})	Weed count at 45 DAP (No. / m^2)	Intercrop yield (kg ha^{-1})	Net income (Rs. ha^{-1})	Benefit cost ratio
Varieties										
CoSi 95071	53.1	214.1	119.9	99.7	12.46	12.38	131	-	24,662	1.49
Co 86249	53.8	218.6	113.2	92.3	11.67	10.48	128	-	20,710	1.38
SEd	4.2	10.4	6.7	5.4	0.12	0.14	10.7	-	-	-
CD (P=0.05)	NS	NS	NS	NS	0.52	0.61	NS	-	-	-
Intercrops										
Sugarcane sole	60.4	237.0	127.8	105.7	12.05	12.68	200	-	27,872	1.57
Blackgram	56.6	230.0	125.8	104.3	12.39	12.81	131	374	32,544	1.64
Soyabean	56.2	222.4	119.0	96.9	12.07	11.68	137	368	23,699	1.47
Greeengram	55.7	213.3	114.7	94.7	12.30	11.61	130	258	22,157	1.44
Groundnut	55.4	213.8	116.5	95.7	12.14	11.62	129	484	25,274	1.49
Sunnhemp	57.5	220.8	125.1	113.3	12.25	13.81	125	8675	32,731	1.66
Cowpea	55.4	197.5	112.3	91.1	11.96	10.87	111	262	19,598	1.39
SEd	6.3	13.1	6.8	5.4	0.58	0.65	8.9	-	-	-
CD (P=0.05)	NS	27.5	14.2	11.4	NS	1.37	18.6	-	-	-

ha^{-1}) and millable cane population (127,800 ha^{-1}) were recorded in sugarcane sole crop and it was on par with sugarcane + all other intercrops except cowpea which produced the lowest tiller (197,500 ha^{-1}) and millable cane population (112,300 ha^{-1}). The reduction in tiller production and millable cane population due to various intercrops especially cowpea might be due to the competition for nutrients, moisture and light with their profuse green foliage shading the sugarcane crop. Among the various intercrops studied, cowpea had more detrimental effect on sugarcane. Jayabal and Chokalingam (1990) also observed similar effect of cowpea on sugarcane.

Weed population

Weed count recorded at 45 days after planting showed that intercropping in plant sugarcane had a significant effect on weed infestation. The interaction effect due to varieties and intercrops was not significant on weed population. The lowest weed population of 111 Nos./m^2 was recorded in sugarcane intercropped with cowpea and it was on par with other intercrops grown in. The highest weed count of 200 Nos./m^2 was recorded in sugarcane sole crop. De (1974) reported that in late maturing crops planted in wider rows, planting early maturing

crop helped to cover the vacant inter row spaces rapidly and kept weeds under check.

Intercrop yield

The sunnhemp at flowering stage was harvested and incorporated *in situ.* In one hectare, 8,675 kg of green matter was obtained which could add about 26.0 kg of nitrogen (@ 0.3% N in fresh green matter) to the soil.

Cane and sugar yield and quality

Growing intercrops in both early and midlate varieties, the commercial cane sugar content (CCS) was not significantly affected. Jayabal and Chokalingam (1990) also reported that the quality of juice was not significantly affected due to vegetable intercropping. Growing intercrops had a significant influence on cane and sugar yields. However, these parameters were not significantly affected due to interaction of varieties and intercrops. Among the various intercrops, the highest cane yield (113.3 t ha^{-1}) and sugar yield (13.81 t ha^{-1}) were registered in sugarcane + sunnhemp treatment and it was on par with sugarcane + blackgram and sugarcane sole crop. The cane and sugar yield of sugarcane sole crop was on par with sugarcane + all other intercrops except cowpea, which produced the lowest cane (91.1 t ha^{-1}) and sugar yields (10.87 t ha^{-1}). The cane and sugar yields in sugarcane + sunnhemp treatment were increased by 7.2% and 8.9% respectively over the sugarcane sole crop. The cane yield increase in sunnhemp intercropping in sugarcane might be due to more available nutrients in soils which might have increased the individual cane weight resulting more cane yield. Nasir Ahmed (1999) reported enhanced cane yield from incorporation of sunnhemp intercropped in sugarcane.

Economics

Among the various intercropping systems, sugarcane + sunnhemp gave the highest net income of Rs.32,731 ha^{-1} and it was closely followed by sugarcane + blackgram (Rs.32,544 ha^{-1}). It was only Rs.27,872 ha^{-1} in sugarcane sole crop. Growing sunnhemp and blackgram as intercrops in sugarcane gave additional net income of Rs. 4,859 and Rs.4,672 ha^{-1} respectively. The highest BCR (Benefit cost ratio) of 1.66 was obtained in sugarcane + sunnhemp system followed by sugarcane + blackgram (1.64). The BCR of sugarcane + soybean, sugarcane + cowpea, sugarcane + groundnut, sugarcane + green gram were lesser than that of sugarcane sole crop. The highest net income realized in sunnhemp intercropping in sugarcane can be attributed to more cane yield while more net income in black gram grown in sugarcane crop was because of the additional income realized due to the higher market price of the blackgram grains.

Conclusion

The result of two years field experiments indicated that for both early and midlate sugarcane varieties, sunnhemp or black gram is the most suited intercrop for clayey loam soils. By growing these crops as intercrops increased cane sugar yield and an additional net return of Rs.4,859 and Rs. 4,672 ha^{-1} respectively could be generated.

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