

Growth and Yield of Sugarcane as affected by Planting Geometry and Intercropping

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ABSTRACT

A field experiment entitled "Studies on Planting Geometry and Intercropping in Sugarcane" conducted for two consecutive years during 2002-03 and 2003-04 at Regional Agricultural Research station, Anakapalle revealed that the cane yield was highest under paired row planting (M_2), which was comparable with normal row planting (M_1). The lowest cane yield was produced with wide row planting (M_3). Sole crop of sugarcane (C_6) produced the highest cane yield, which was on par with coriander (C_2) or greengram (C_3) intercropped with sugarcane. Intercropping of maize (C_1) resulted in the lowest cane yield. Sucrose content of cane at harvest, CCS and juice purity were not significantly influenced by either with planting geometry or intercropping. The highest sugar yield was realized with paired row planting (M_2). The highest cane equivalent yield of the cropping system was noticed with paired row planting (M_2), which was comparable with normal planting (M_1). Wide row planting (M_3) resulted in the lowest cane equivalent yield. Intercropping of coriander followed by ginger (C_5) resulted in the highest cane equivalent yield, whereas, it was found the lowest with intercropping of coriander (C_2).

Key words: Intercropping, Planting geometry, Sugarcane.

Sugarcane is one of the most important commercial crops of India. Globally, India ranks second in area (20.4%) and production (18.6%) among sugarcane growing countries of the world (Yadav *et al.*, 2005). In Andhra Pradesh, it is grown over an area of 2.17 lakh hectares with annual production of 176.99 lakh tonnes and productivity of 81.5 tonnes ha⁻¹ (Naidu, 2003). The cost of cultivation in India is higher compared to several other sugarcane growing countries, placing the cane growers and sugar industry of India at a great disadvantage in the international arena, in the backdrop of liberalized regime of the World Trade Organization. The cost of cultivation, therefore, needs to be reduced and returns to be increased by adopting improved agro techniques.

Identification of suitable intercrops in sugarcane and appropriate planting geometry to accommodate the profitable intercrops has not been either investigated or standardized in the sugarcane growing regions of North coastal zone of Andhra Pradesh. In light of the above, the present study was conducted.

MATERIAL AND METHODS

A field experiment entitled "Studies on Planting Geometry and Intercropping in Sugarcane" was conducted for two consecutive years during 2002-

03 and 2003-04 on sandy loam soils of Regional Agricultural Research Station, Anakapalle, North coastal zone of Andhra Pradesh to find out the suitable planting geometry of sugarcane to raise profitable intercrops to enhance the productivity and the profitability of the sugarcane based intercropping systems. The experiment was laid out in a split plot design, replicated thrice. The treatments comprised of three planting geometries M_1 : Normal planting of sugarcane with 80 cm between rows, M_2 : Paired row planting of 40/120 cm and M_3 : Wide row planting of 160 cm, by placing two budded setts horizontally) assigned to main plots and five intercrops C_1 : maize, C_2 : coriander for leafy vegetable, C_3 : greengram, C_4 : soybean, C_5 : coriander for leafy vegetable followed by ginger and Sole crop of sugarcane (C_6) allotted to sub plots. The intercrops were raised by adjusting inter and intra row spacing of respective crops to accommodate 100 per cent recommended plant population.

RESULTS AND DISCUSSION

During both years of study, sole crop of sugarcane (C_6) resulted in the highest number of millable canes (NMC) ha⁻¹, which was comparable with intercropping of coriander (C_2) or greengram (C_3), during both the years of study and also with intercropping of soybean (C_4), during the second year

Table 1. Effect of Planting geometry and intercrops on growth and yield of sugarcane.

Treatment	NMC (ha ⁻¹)		LMC (cm)		Cane yield (t ha ⁻¹)		Sugar yield (t ha ⁻¹)		Sugarcane Equivalent yield of Cropping system (t ha ⁻¹)	
	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04
M ₁	86273	88525	302.7	313.9	88.6	88.8	11.00	11.39	108.8	107.5
M ₂	87230	89052	303.4	313.8	89.4	90.5	11.10	11.66	110.2	112.1
M ₃	79569	77812	291.7	296.4	75.6	78.4	9.29	9.80	95.9	98.6
SEm±	446.8	804.9	3.5	4.5	0.69	1.04	0.08	0.15	0.76	1.64
CD (p=0.05)	1755	3160	NS	NS	2.7	4.1	0.31	0.57	3.0	6.4
C ₁	74300	76426	281.6	287.5	70.3	71.8	8.79	9.11	94.0	95.5
C ₂	87230	87327	302.3	317.3	90.2	91.4	11.13	11.60	90.2	91.4
C ₃	86208	86534	302.8	312.8	86.8	87.9	10.79	11.44	103.2	104.7
C ₄	85773	86348	300.6	311.3	85.0	86.3	10.54	11.21	101.3	101.9
C ₅	85418	85392	298.3	298.7	83.6	85.5	10.49	10.98	150.4	151.2
C ₆	87362	88751	310.0	320.5	90.9	91.7	11.04	11.39	90.9	91.7
SEm±	520.4	840.8	3.5	6.1	0.83	1.47	0.21	0.28	0.90	1.90
CD (p=0.05)	1505	2717	10.2	17.6	2.4	4.3	0.60	0.80	2.6	5.5

of study. The lowest number of millable canes was recorded with intercropping of maize with sugarcane (C₁) during both the years of study (Table 1).

Planting geometry did not influence the length of millable cane (LMC) during both the years of study. Length of millable cane was the highest with sole crop of sugarcane (C₆), which was comparable with intercropping of coriander (C₂) or greengram (C₃) or soybean (C₄), during both the years of study. Intercropping of maize with sugarcane (C₁) resulted in the lowest length of millable cane, during both the years of study (Table 1). The results are in conformity with those of Kanwar and Srivastava(2000).

Cane yield was the highest under paired row planting (M₂), during both the years of study, which was comparable with normal row planting (M₁). Wide row planting (M₃) resulted in the lowest cane yield, during both the years of study. Sole crop of sugarcane (C₆) produced the highest cane yield, which was on par with intercropping of coriander (C₂), during both the years of study and also with intercropping of greengram with sugarcane (C₃) during the second year of study. Intercropping of maize with sugarcane (C₁) resulted in the lowest cane yield as maize has competed with sugarcane for nutrients, space as well as light, which affected the height, girth and weight of cane adversely, during both the years of study (Table 1). Cane yield with intercropping of maize was 29.3 per cent lesser compared to that of sole crop of sugarcane (mean of two years). The findings are in accordance with those of Roodagi et al. (2001) and Mahadevaswamy and James Martin (2002).

The highest sugar yield was recorded under paired row planting (M_2), during both the years of study, which was comparable with normal row planting (M_1). During both the years, wide row planting (M_3) resulted in the lowest sugar yield. Intercropping of coriander with sugarcane (C_2) resulted in the highest sugar yield, which was comparable with all other intercropping systems, except with maize intercropped with sugarcane (C_1) during both the years of study and also with intercropping of coriander followed by ginger (C_5), during the first year of study (Table 1). Sugar yield per unit area is the product of cane yield and CCS. In the present study, CCS did not differ significantly due to intercropping with various crops, while the cane yield differed significantly and hence, obviously the sugar yield followed the trend of cane yield.

The highest cane equivalent yield of the cropping system was recorded with paired row planting (M_2), which was comparable with normal row planting (M_1), during both the years of study. Wide row planting (M_3) has resulted in the lowest cane equivalent yield during both the years of study (Table 1).

Among the intercropping systems, intercropping of coriander followed by ginger (C_5) resulted in the highest cane equivalent yield of the cropping system, which was significantly higher than that with all other intercropping systems, during both the years of study. Though the coriander crop has failed, the cane equivalent yield was highest under this system, higher market price of ginger resulted in highest cane equivalent yield of the above cropping system. The lowest cane equivalent yield was realized with intercropping of coriander with sugarcane (C_2), which was comparable with sole crop of sugarcane (C_6) during both the years of study and also with intercropping of maize, during the second year of investigation (Table 1). Similar results were found by KishanSingh et.al.(1988), Billore et.al.(2000) and Nevase et.al.(2003).

CONCLUSIONS

Paired row system of planting of sugarcane (M_2) was found to be the best planting geometry, owing to its higher cane and sugar yield.

Growing of either ginger or greengram as inter crops in paired rows of sugarcane can be suggested for north coastal zone of Andhra Pradesh.

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