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Research Article

EFFECT OF PLANTING GEOMETRY AND INTERCROPS ON GROWTH AND YIELD OF SUGARCANE

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Abstract: The cane yield was the highest under paired row planting (M_2), which was comparable with normal row planting (M_1). Wide row planting (M_3) produced the lowest cane yield. 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. 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).

Keywords: Planting Geometry, Intercropping, Sugarcane

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Introduction

Sugarcane is one of the important commercial crops of our country and is being cultivated in an area of around 4.60 million ha. Sugarcane is grown in almost all the states with annual cane production of 289.6 million tonnes and productivity of 62.80 t ha^{-1} [6]. In Andhra Pradesh, it is grown over an area of 0.99 lakh hectares with annual production of 79.48 lakh tonnes and productivity of 80.3 tonnes ha^{-1}. The cost of cultivation in India is higher compared to several other sugarcane growing countries. The cost of cultivation, therefore, needs to be reduced and returns to be increased by adopting befitting 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.

Materials and Methods

An 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 system. The experimental design was split plot with three replications. 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: green gram, 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 percent 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 green gram (C_3), during both the years of study and also with intercropping of soybean (C_4), during the second year of study. The lowest number of millable canes was recorded with intercropping of maize with sugarcane (C_1) 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 (C_6), which was comparable with intercropping of coriander (C_2) or green gram (C_3) or soybean, during both the years of study. Intercropping of maize with sugarcane (C_1) resulted in the lowest length of millable cane, during both the years of study [Table-1] [1]. Cane yield was the highest under paired row planting (M_2), during both the years of study, which was comparable with normal row planting (M_1). Wide row planting (M_3) resulted in the lowest cane yield, during both the years of study [8]. Sole crop of sugarcane (C_6) produced the highest cane yield, which was on par with intercropping of coriander (C_2), during both the years of study and also with intercropping of green gram with sugarcane (C_3) during the second year of study. Intercropping of maize with sugarcane (C_1) resulted in the lowest cane yield, during both the years of study [Table-1] [4, 7]. 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]. 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) resulted in lowest cane equivalent yield during both the years.

Table-1 *Study 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

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. 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] [1-5].

Conclusion

- Paired row system of planting of sugarcane (M_2) was found the best planting geometry, owing to its higher cane and sugar yield.
- Growing of either ginger or green gram as inter crops in paired rows of sugarcane can be suggested.

Application of research: Sugarcane is a long duration crop and it takes around 10 to 12 months for maturity. During formative phase *i.e.*, first four months period crop growth is slow and the space available in between the rows can be utilized by the farmers to grow short duration crop to enhance the net profit.

Research Category: Planting geometry, intercropping

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Study area / Sample Collection: Regional Agricultural Research Station, Anakapalle, 531 001

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Conflict of Interest: None declared

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.
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