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PRODUCTIVITY OF INTERCROPPING SYSTEM IN SUGARCANE WITH SUGARBEET AND WHEAT

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ABSTRACT

Results of two years field experiments conducted to explore the possibilities of remunerative autumn planting of cane by intercropping and by changing the method of planting showed that autumn planting sugarcane intercropped with sugarbeet or wheat significantly increased the cane production and gives Rs.19427- and Rs. 9681- additional income, respectivley, when compared with standard practice of spring planting giving monetary return of Rs 10646 per ha. Further it was observed that paired planting of sugarcane at 45 cm and using the 135 cm inter-paired space for growing intercrops was superior to uniform raw spacing.

INTRODUCTION

The advantage of autumn planting of sugarcane particularly in respect of increased cane yield and improvement in the early juice quality, is well known but this practice is being rarely adopted by farmers, due to loosing of one additional preceeding Kharif crop alongwith Rabi crop.Therefore, it would be necessary to think of exploring the possibilities of remunerative autumn planting of cane by intercropping.

The intercropping in sugarcane have been emphasised by several scientists like Mukerji(1976). Behl and Narwal(1977) and Reddy (1980). It has also been emphasised that intercropping under the paired row system of planting led to higher yield (Andrews, 1972). Among the several Rabi crops, sugarbeet and wheat are the best suited and most profitable for sugarcane intercropping as judged from earlier trials at this station (Mukerji, 1983). Hence studies on productivity of intercropping system of sugarcane with sugarbeet and wheat at two methods of nitrogen application were carried out.

MATERIALS AND METHOD

An experiment was conducted at Agricultural Research Station, Sriganganagar having semi-arid climate with extremes of cold winter, hot dry windy summer and humid warm monsoon with annual rainfall of 250 mm. The soil was loamy sand having pH 8.2, organic carbon 0.2% available P_2O_5 and K_2O were 23 and 320 kg/ha, respectivley. The treatment consisted of four cropping pattern (C_1 = sole sugarcane autumn, C_2 = sole sugarcane spring, C_3 = sugarcane autumn + wheat as intercrop and C_4 = sugarcane autumn + sugarbeet as intercrop), two planting system (P_1 = planting in uniform rows of 90 cm and P_2 = planting in paired rows of 45/135 cm) and two method of nitrogen application (M_1 = 1/4th nitrogen at planting + 1/2 at early may (after removal of intercrop) + 1/2 at end June in sugarcane and M_2 = No planting, 1/2 nitrogen at early May (after removal of intercrop) + 1/2 at end June in sugarcane).

In intercropping treatments, 3 rows of wheat and two rows of sugarbeet was taken in interspace of uniform row system, while 5 rows of wheat and three rows of sugarbeet was taken interspaced in paired row system. The variety of sugarcane Co 1253, wheat Raj 821 and sugarbeet Ramonskaya were used. The base crop received 150 kg N and 60 kg P_2O_5/ha, the nitrogen as per treatment and full phosphorus was placed in furrows at sowing. The intercrops wheat and sugarbeet were received 120 kg N and 40 Kg P_2O_2/ha, half of nitrogen and full phosphorus at sowing while half nitrogen as top dressed near

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Table 1. Effect of cropping pattern, planting system and methods of nitrogen appplication on yield.

Treatment	Yield (t/ha)		Mean
	First Year	Second Year	
Treatment :			
A. Cropping pattern :			
C_1 = Sugarcane (Autumn) Solid	91.80	93.57	93.19
C_2 = Sugarcane (Spring) Solid	52.66	51.56	52.11
C_3 = Sugarcane (Autumn) + Wheat as intercrop	63.82 (4.10)	66.32 (3.22)	65.07 (3.66)
C_4 = Sugarcane (Autumn) + Sugarbeet	57.98 (51.14)	59.31 (48.81)	58.65 (49.98)
SEm ±	2.55	1.95	2.25
CD 5%	7.36	5.65	6.49
B. Planting system :			
P_1 = Uniform planting at 90 cm	62.59	61.80	62.35
P_2 = Paired planting at 45/135 cm	70.74	73.59	72.17
SEm ±	1.80	1.38	1.59
CD at 5%	5.22	3.99	4.59
C. Method of nitrogen application :			
$M_1 = \frac{1}{2}$ N at planting + $\frac{1}{4}$ at early May $\frac{1}{4}$ at end of June	66.72	68.76	67.74
$M_2 = \frac{1}{4}$ at early May + $\frac{1}{2}$ at end June	66.91	66.62	66.77
SEm ±	1.80	1.38	1.59
CD at 5%	NS	NS	NS

Figures in parenthesis are yield of intercrop.

intercrops at first irrigation. Planting of cane was done in October for Autumn and early March for spring planting cane. Planting of sugarbeet was done one day after cane planting while wheat was sown in end of November during both the years.

RESULTS AND DISCUSSION

There was significant varition in cane yield due to the cropping pattern and planting system (Table 1).

Pure autumn planting of cane produced significantly higher cane yield as compared to autumn planted cane intercropped with wheat or sugarbeet and spring planted pure cane. Similarly autumn planted sugarcane intercropped with wheat or sugarbeet gave significantly higher yield over the spring planted pure cane.

The average increased in cane yield was 24.87 and 12.55% due to autumn planted cane intercropping with wheat and sugarbeet respectively, over spring planted pure cane. In addition to this average wheat grain and sugarbeet root yield of 3.66 and 49.98. t/ha, respectively was also recorded. Similar findings were also reported by Mukerji 1983. The increase in cane yield of autumn planted cane might be associated due to increased in millable cane per ha (Table 2).

Among the planting systems, paired row planting system 45/135 cm gave higher yield and prove significantly superior as compared to uniform row system (90cm). The superiority of paired row system was more marked in intercropping system particularly with wheat.

Table 2. Gross monetary return (Rs/ha), millable cane/ha, juice quality (Sucrose and purity %) in January and ratton cane yield as influenced by cropping pattern, planting system and method of nitrogen application in sugarcane

	Gross monetary return (Rs/ha)*		Millable cane per ha (000)	Juice quality		Ratoon cane yield (t/ha)
				Sucrose%	Purity%	
C_1 P_1 M_1	18150		124518	15.18	89.18	47.03
C_1 P_1 M_2	19409	19096 (C_1)	126163	14.62	86.05	43.43
C_1 P_2 M_1	19940		123756	14.02	82.23	46.73
C_1 P_2 M_2	18887		120156	14.98	86.37	43.52
C_2 P_1 M_1	10239		93941	14.95	84.44	47.67
C_2 P_1 M_2	10168	10646 (C_2)	92778	14.47	84.67	46.62
C_2 P_2 M_1	11722		90282	15.12	85.77	47.92
C_2 P_2 M_2	10456		93454	14.69	83.14	42.41
C_3 P_1 M_1	18407		99867	15.11	84.93	45.41
C_3 P_1 M_2	18189	20327 (C_3)	97003	15.30	85.48	46.47
C_3 P_2 M_1	22316		118042	15.28	85.58	50.70
C_3 P_2 M_2	22398		119449	14.34	79.55	44.88
C_4 P_1 M_1	32019		95855	14.21	83.38	44.22
C_4 P_1 M_2	29588	30073 (C_4)	97454	14.11	79.87	44.22
C_4 P_2 M_1	30553		98200	14.68	82.60	45.06
C_4 P_2 M_2	28133		99232	15.22	84.65	44.12

* The cost of cultivation for sugarcane was Rs. 5820/ha in general.

There was no significant differences in cane yield due to methods of nitrogen application.

Further, it was observed that there was no much difference in cane juice quality, and cane yield of ratoon crop due to any of the treatment (Table - 2).

As regards of gross monetary return, average return of Rs.30073/- ha was recorded with autumn planted sugarcane intercropped with sugarbeet, followed by autumn planted cane intercropped with wheat and autumn planted sole sugarcane Rs.20,327/- and Rs.19,096/- ha, respectively. Highest return of Rs.32019/ ha was obtained with autumn cane intercropped with sugarbeet at uniform rows of 90 cm planting and 1/4th nitrogen at planting + 1/2 at early May and 1/4 nitrogen at end of June in sugarcane.

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