PERFORMANCE OF SUGARCANE WITH DIFFERENT PLANTING METHODS AND INTERCROPS IN OLD HIMALAYAN PIEDMONT PLAIN SOILS

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ABSTRACT

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A study was conducted at grower's field of Regional Sugarcane Research Station (BSRI), Madarganj, Thakurgaon during 2006-07 to study the performance of four different intercrops viz. Potato (*Solanum tuberosum*), Mungbean (*Vigna radiata*), Chilli (*Capsicum frutescens*) and Garlic (*Allium sativum*) in different planting methods in the farmer's field at Thakurgaon Sugar Mills zone under Old Himalayan Piedmont Plain Soils during the cropping season 2006-07. The results revealed that the highest millable cane stalks (108.3 X 10^3 ha^{-1}) and yield (101.60 t ha^{-1}) was obtained from the T_2 (STP single row + Potato-Mungbean) followed by millable stalks (107.8 X 10^3 ha^{-1}) and cane yield (99.38 t ha^{-1}) from T_4 (STP paired row + Potato-Mungbean). Highest adjusted cane yield of 220.9 t ha^{-1} and 219.1 t ha^{-1} were recorded from T_4 and T_2 respectively. Overall results showed that STP single row + Potato-Mungbean (T_2) and STP paired row + Potato-Mungbean (T_4) combination was found most productive and remunerative package technology for Old Himalayan Piedmont Plain Soils.

Key Words: Sugarcane, planting method, performance of intercrops

INTRODUCTION

Rice being the staple food crops occupies more than two-third of the cultivated land and sugarcane occupies 2% of the cultivated land and is one of the important cash-cum industrial crops particularly for north- western part of the country. Due to many factors including growing of short duration high value vegetables and other crops the sustainability of long duration crop is at threat. This is more accurate in high land where most of short duration crops grow well including sugarcane. To meet the situation, strategies are to be evolved to increase sugarcane yield, income and benefit in totally per unit area. Goni and Paul (2005) reported that intercropping one or more crops with sugarcane cultivation could profitable by earning higher net profit and keep abreast besides crop competition. Yadav and Verma (1984) have reported that intercropping of sugarcane with other crops was found profitable particularly in the sub tropical region of India. Imam *et.al* (1982) reported that sugarcane + Potato + Amaranth was more profitable followed by Sugarcane + Onion than the sole sugarcane crop. Hossain *et.al* (1995) conducted that soybean and some pulses and oil seed crops as intercropped with paired row transplanted sugarcane gave additional economic return and added about 3.5 to 4.5 t ha^{-1} biomass to soil which is useful for soil organic matter.

Ali *et.al* (1989) found that short duration winter crops like potato, garlic, onion, tomato, cabbage, chilli and mustard are grown in vacant space between two rows of sugarcane before canopy development to get an additional crop with minimum investment without affecting of main crop sugarcane and also found that intercropping potato with sugarcane increased cane yield compared of different row adjustment. Singh and Singh (1973) also found increased cane yield by 64.3% from intercropping potato with sugarcane. Kabir (1988) also observed that potato, mustard and gram are most compatible intercrops with sugarcane, which reduce cost of sugarcane cultivation. In view of the above facts, the experiment was undertaken to study the performance of different intercrop in Isd 37 BSRI bred varieties at Old Himalayan Piedmont Plain Soils.

MATERIALS AND METHODS

The experiment was conducted at grower's field in Old Himalayan Piedmont Plain Soils (AEZ 1) during 2006-07 cropping season under Regional Sugarcane Research Station (BSRI), Madarganj, Thakurgaon. The land was medium high and sandy loam soil with pH 4.5-5.5. The experiment was laid out in LSD with three replications. The unit plot size was 12 m X 10 m. The varieties used were Isd 37. The following treatments were included in the study:

T_1= Conventional cane single row (control)

T_2= Space Transplanting (STP) single row + Potato-Mungbean

T_3= Conventional paired row + Potato-Mungbean

T_4= STP in paired row + Potato-Mungbean

T_5= Conventional paired row + Chilli

T_6= Conventional paired row + Garlic

Forty days old 2 budded soil bed settlings of sugarcane were transplanted in main field on 17th November 2006 and were harvested 15 December 2007. The land was prepared as per requirement. Trenches were made by hand spade. The settling was transplanted in the main field at distance of 120 cm from row to row 45 cm from plant to plant. Application of fertilizers for sugarcane was done @ 272, 260, 185, 138 and 15 kg ha^{-1} as urea, MP, TSP, Gypsum and MgO respectively. Full doses of TSP, Gypsum, MgO and 1/3rd MP and 1/3rd urea were applied in trenches during the time of plantation. One-third of urea was applied as side dressing at 21 days after transplanting. The rest of MP and urea were applied two equal splits at early tillering stages and late tillering phase of sugarcane. Necessary intercultural operations like weeding, mulching, irrigation and pest management were done as and when required. For the control of top shoot borer Furadan 5G @ 40kg ha^{-1} was applied as per recommendation.

Tiller, tiller mortality (%), millable cane was recorded. Both the tiller population and millable cane stalks were recorded and calculated at harvest by dividing the weight of cane stalks from yield sample by the number of cane stalks and it was expressed as kg per cane stalk. Brix (%) was determined by hand refractometer. Data on different parameter were analyzed following the standard statistical procedures. The tiller mortality was calculated following the procedure as mentioned below:

$$\text{Tiller Mortality (\%)} = \frac{\text{Number of tillers} - \text{Numbers of millable cane}}{\text{Number of tiller}} \times 100$$

RESULTS AND DISCUSSION

Tiller and Millable cane production

Data on tiller population showed that there was significant difference in tiller population among the treatments. The highest population of 193.8 X 10^3 ha^{-1} was found from T_2 (STP single row + Potato-Mungbean) followed by the T_1 (Conventional single row), T_4 (STP paired row + Potato-Mungbean) and T_5 (Conventional paired row + Chilli) combinations. Lowest tiller of 169.9 X 10^3 ha^{-1} was recorded from the T_3 plot and did not differ with T_6 (Table 1). Incase of millable cane production, the maximum millable cane stalk 108.3 X 10^3 ha^{-1} was recorded from the T_2 plot and the minimum (102.5 X 10^3 ha^{-1}) was from the T_5 plot (Table 1). Nankar (1990) reported the beneficial effects of intercropping potato on tiller and millable cane stalk production.

Cane Yield

Cane production has been influenced significantly among the treatments. Highest yield of cane 101.6 t ha^{-1} was obtained from T_2 (STP single row + Potato-Mungbean) followed by T_1 (96.98 t ha^{-1}), T_3 (95.18 t ha^{-1}) and T_4 (99.98 t ha^{-1}). Matin *et.al* (2001) reported statistically similar cane yield due to different treatments of intercrop combinations. The lowest yield (78.21 t ha^{-1}) was recorded from T_5 plot (Table 1).

Table 1. Tiller, Millable cane, Cane yield, Intercrop yield and adjusted cane yield at growers' field under different intercrops combinations

Treatments	No. of Tillers (X 10^3 ha^{-1})	No. of Millable cane (X 10^3 ha^{-1})	Cane Yield (t ha^{-1})	Intercrop Yield (t ha^{-1})		Brix%	Adjusted cane yield (t ha^{-1})
				I st	2nd		
T_1	185.8 B	106.5 AB	96.98 BC	-	-	20.0	97.4 D
T_2	193.8 A	108.3 A	101.60 A	17.50	0.32	20.5	219.1 A
T_3	169.9 D	103.4 B	95.18 C	14.75	0.35	20.5	205.8 B
T_4	186.0 B	107.8 A	99.38 AB	19.12	0.36	21.5	220.9 A
T_5	181.2 C	102.5 B	78.21 E	7.50	-	20.4	195.8 C
T_6	172.6 D	108.1 A	89.60 D	4.90	-	19.6	207.8 B
LSD at 5%	4.36	4.18	2.64	-	-	NS	8.51

* In a column figures having similar letter do not differ significantly whereas figures with dissimilar letters differ significantly as per DMRT at 5% level of probability

Yield of Intercrops

Yield of 1st and 2nd intercrops along with cane and adjusted yield of cane are presented in Table 1. It is evident from the Table 1 that the first intercrops potato produced 17.50, 14.75 and 19.12 t ha^{-1} respectively. The highest yield of first intercrop as potato was obtained from T_4 (19.12 t ha^{-1}) followed by T_2 (17.50 t ha^{-1}) and the lowest yield of mungbean was obtained from T_2 (0.32 t ha^{-1}). T_5 and T_6 produced 7.50 t ha^{-1} and 4.90 t ha^{-1} yield of chilli and garlic respectively.

Brix and Adjusted Cane Yield

Brix of cane showed non-significant effect due to different treatment combinations. Similar results have also been observed by Hossain *et al* (2003). Adjusted cane yield is an important parameter for determining the total yield potentials of intercropped plot over the sole cane plot (Alam *et al.* 2000). From the Table 1, significantly the highest adjusted cane yield of 220.9 t ha^{-1} was obtained from the T_4 followed by T_2, T_3 and T_6 while the lowest of 97.43 t ha^{-1} was from the T_1 plot. Alam *et al.* (2000) reported that the highest adjusted cane yield of 154.21 t ha^{-1} from paired row cane + Potato-Mungbean combination. Therefore, in the present experiment, Sugarcane + Potato-Mungbean combination under single row system (T_2) was found superior to others intercrop combinations. This is evident from the experimental results that intercropping of potato, chilli, garlic and other suitable crops is superior to only cane cultivation and the practice helps to earn additional income in the said Old Himalayan Flood Plain soils and thus make cane cultivation more remunerative.

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