

Performance of Sugarcane with Double Intercrops in Tista Meander Floodplain Soils

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ABSTRACT

A study was conducted with five different intercrops viz. Lentil (*Lens culinaris* L.), Onion (*Allium cepa* L.), Potato (*Solanum tuberosum* L.), Mustard (*Brassica campestris* L.) and Coriander (*Coriandrum sativum*) in paired row cane in the farmers field at Joypurhat sugar mills zone under Tista Meander Floodplain Soils during the cropping season 2005-2006. The results revealed that the highest millable cane stalks ($157.86 \times 10^3 \text{ ha}^{-1}$) and yield (117.71 t ha^{-1}) was obtained from the treatment T_4 (PRC + Potato - Mungbean) followed by millable stalks ($146.39 \times 10^3 \text{ ha}^{-1}$) and cane yield (114.44 t ha^{-1}) from T_6 (PRC + Coriander-Mungbean) at Aima Rasulpur location. On the other hand T_4 combinations showed the highest millable cane stalks ($93.82 \times 10^3 \text{ ha}^{-1}$) and cane yield (117.29 t ha^{-1}) followed by millable cane stalks ($88.89 \times 10^3 \text{ ha}^{-1}$) and cane yield (116.60 t ha^{-1}) obtained from T_3 (PRC + Onion-Mungbean) combination at Dargapara location. Highest adjusted cane yield of 257.29 t ha^{-1} and 271.82 t ha^{-1} were recorded from T_4 plot at Aima Rasulpur and Dargapara respectively. Overall results showed that PRC + Potato-Mungbean (T_4) combination was found the most productive and remunerative package technology for Tista Meander Floodplain Soils.

Key words: Sugarcane and Intercrops.

INTRODUCTION

Intercropping with sugarcane is a popular practice in sugar mills zone in Bangladesh and is one of the ways for increasing productivity and economic return per unit area of land. This is probably the way for making sugarcane cultivation sustainable at small and marginal level of farming in mills zone of Bangladesh.

Now a days intercropping has become the most important practice for sustainable sugarcane production to the marginal farmers. Only 15 to 20 percent areas are intercropped in Bangladesh while in Mauritius, about 70-77 percent canes are intercropped mainly with potato and tomato (Imam *et. al.*, 1990 and Anon. 1986). But the yield of intercrop and sugarcane under traditional practices are not satisfactory and remains almost static position for the last two to three decades. This situation led the farmers to grow crops other than sugarcane. Because of single row planting system hardly there is any scope to increase or improve cane yield as well as intercrop yield further. To overcome this problem, Paired row system of cane planting has been developed which allows additional space to accommodate more rows of intercrops without any adverse effect on cane yield. In this method, there is also a scope to grow another crop as second intercrop after harvesting first one. Growing double intercrop under paired row system increased the productivity by 31.20 percent compared to the single intercrop under single row system (Alam, 1999). A limited research has been done on the performance of paired row planting of sugarcane, no detail study has been made to examine the impact of paired row sugarcane compared to the single row sugarcane with double crops in the farmers field conditions of the said areas. Therefore, the present study was under taken to observe the productivity and impact of paired row sugarcane with double intercrops.

MATERIALS AND METHODS

The experiment was conducted at Joypurhat sugar mills area in farmers field under Tista Meander Floodplain soils during the cropping season 2005-2006. Five different intercrops namely Lentil (*Lens culinaris* L.), Onion (*Allium cepa* L.), Potato (*Solanum tuberosum* L.), Mustard (*Brassica campestris* L.) and Coriander (*Coriandrum sativum*) were grown as first intercrop followed by a second intercrop mungbean (*Vigna radiata* L.) with sugarcane (Isd 36). The experiment was laid out in a Randomized Complete Block (RCB) design with three replication at two locations. The plot size was 8m X 8m. The following treatments were included in the study:

- T₁ = Paired row cane (PRC) only
- T₂ = PRC + Lentil - Mungbean
- T₃ = PRC + Onion - Mungbean
- T₄ = PRC + Potato - Mungbean
- T₅ = PRC + Mustard - Mungbean
- T₆ = PRC + Coriander - Mungbean
- T₇ = PRC + 0 - Mungbean

Plantation was done with two-budded soil bed settling in the end of November 2005 with 45 cm interplant spacing in paired row of 60 cm spacing. Spacing between two-paired rows was 120 cm. Necessary intercultural operations were done as and when required. Collection of data on yield and various yield contributing characteristics for cane and intercrop were done. The yield of first and second intercrops was recorded at harvest. The adjusted cane yield for the intercropped plot was calculated by adding the cane yield. The average values of all parameters were analysed statistically.

RESULTS AND DISCUSSION

Tiller

It is observed from the Table 1 that the tiller production was influenced by different intercrop combinations under paired row system of planting at Aima Rasulpure location; but no significant difference was observed in tiller production among the treatments at Dargapara (Table 2). Highest tiller population of $207.22 \times 10^3 \text{ ha}^{-1}$ was produced from the T₄ (PRC + Potato - Mungbean) combination followed by the T₂ (PRC + Lentil - Mungbean), T₃ (PRC + Onion - Mungbean) and T₅ (PRC + Mustard - Mungbean) combinations and showed at per statistically but differed over T₁ (PRC), T₆ (PRC + Coriander - Mungbean) and T₇ (PRC + 0 - Mungbean) combinations. Lowest tiller of $175.14 \times 10^3 \text{ ha}^{-1}$ was recorded from the T₇ plot and did not differ with T₁ and T₆ plot (Table 1).

Millable cane

No significant difference was observed in millable cane production at both locations (Table 1 and 2). The maximum millable cane $157.80 \times 10^3 \text{ ha}^{-1}$ was recorded from the T₄ plot and the minimum ($145.70 \times 10^3 \text{ ha}^{-1}$) was from the T₅ plot at Aima Rasulpur (Table 1). In case of Dargapara, the maximum millable cane was found ($93.82 \times 10^3 \text{ ha}^{-1}$) from T₄ plot while minimum ($80.69 \times 10^3 \text{ ha}^{-1}$) from T₅ plot (Table 2). Intercropping mustard reduced millable cane production by 11.4 to 14.6% while intercropping potato and lentil increased it by 3.7% and 2.9% respectively (Alam *et al.* 2000). Adverse effects of intercropping mustard on tiller and millable cane production have also been observed by many workers (Kanwar, 1975; Rath and Tripathi, 1975 and Imam *et al.*, 1982). Rath and Singh (1979) and Nakar (1990) reported the beneficial effects of intercropping potato and lentil on tiller and millable cane stalk production.

Yield of cane

No significant difference was observed in cane yield among the treatments at both locations (Table 1 and 2). At Aima Rasulpur the highest yield (117.71 t ha^{-1}) was found from the T_4 (PRC + Potato - Mungbean) combination plot followed by 114.44 t ha^{-1} from T_6 (PRC + Coriander - Mungbean) combination plot. The lowest yield (105.83 t ha^{-1}) was recorded from T_1 (PRC) plot (Table 1). In case of Dargapara, T_4 (PRC + Potato - Mungbean) combination plot showed the highest yield of 117.29 t ha^{-1} followed by 116.60 t ha^{-1} from T_3 (PRC + Onion - Mungbean) combination plot. Lowest yield (105.21 t ha^{-1}) was found from T_1 (PRC) plot (Table 2).

Table 1: Tillers, Millable cane, Cane yield, Intercrop yield and adjusted cane yield at Aima Rasulpur, Joypurhat location.

Treatments	No. of Tillers (10^3 ha^{-1})	No. of millable cane (10^3 ha^{-1})	Yield (t ha^{-1})	Intercrop Yield (t ha^{-1})		Adjusted Cane Yield (t ha^{-1})
				1 st	2 nd	
T_1 = Paired Row Cane (PRC) only	179.24b	148.89	105.83	-	-	105.85 ^e
T_2 = PRC + Lentil -Mungbean	194.24ab	156.80	110.14	0.45	0.48	149.29cd
T_3 = PRC + Onion -Mungbean	207.00a	157.36	110.76	6.25	0.57	197.15b
T_4 = PRC + Potato - Mungbean	207.22a	157.84	117.71	17.36	0.58	257.29a
T_5 = PRC + Mustard -Mungbean	204.72a	145.70	100.28	1.04	0.59	169.52c
T_6 = PRC + Coriander - Mungbean	182.57b	146.39	114.44	0.69	0.47	157.69
T_7 = PRC + O - Mungbean	175.14b	148.89	108.18	-	0.57	136.51d
LSD at 5%	21.98	NS	NS	-	-	21.87

* 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.

Adjusted cane yield

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 257.29 t ha^{-1} was obtained from the T_4 (PRC + Potato - Mungbean) combination plot followed by 197.15 t ha^{-1} from the T_3 (PRC + Onion - Mungbean) plot while the lowest of 105.85 t ha^{-1} was from the T_1 (PRC) plot. At Dargapara location, significant difference in adjusted cane yield was observed among the treatments; treatments T_4 showed the highest adjusted cane yield of 271.82 t ha^{-1} which differed significantly from all other treatments. The lowest adjusted yield of 105.20 t ha^{-1} was recorded in T_1 (PRC) plot (Table 2). Alam *et.al* (2000) reported that the highest adjusted cane yield of 154.21 t ha^{-1} from paired row cane + Potato - Mungbean combination. Maximum increase of adjusted yield over control was 158% obtained from the T_4 plot; the minimum 35% was from the T_6 treatment at Dargapara while 143% increase of adjusted yield obtained from the T_4 plot and the minimum 28% was from the T_6 treatment at Aima Rasulpur. Therefore, in the present experiment, Sugarcane + Potato-Mungbean combination under paired row system (T_4) was found superior to others intercrop combinations. This is evident from the experimental results that intercropping of potato, onion and other suitable crops is superior to only cane cultivation and the practice helps to earn additional income in the said Tista Meander Flood Plain Soils and thus make cane cultivation more remunerative.

Table 2: Tillers, Millable cane, Cane yield, Intercrop yield and Adjusted cane yield at Dargapara, Panchbibi location

Treatments	No. of Tillers (10 ³ ha ⁻¹)	No. of millable cane (10 ³ ha ⁻¹)	Yield (t ha ⁻¹)	Intercrop Yield (t ha ⁻¹)		Adjusted Cane Yield (t ha ⁻¹)
				1 st	2 nd	
T ₁ = Paired Row Cane (PRC) only	113.75	88.06	105.21	-	-	105.20 d
T ₂ = PRC + Lentil - Mungbean	130.97	81.64	116.18	0.31	0.49	149.25c
T ₃ = PRC + Onion - Mungbean	134.59	88.89	116.60	5.49	0.57	196.05b
T ₄ = PRC + Potato - Mungbean	126.88	93.82	117.29	16.67	0.56	271.82a
T ₅ = PRC + Mustard -Mungbean	119.59	80.69	110.77	0.61	0.58	152.61c
T ₆ = PRC + Coriander-Mungbean	124.17	84.86	110.00	0.60	0.46	153.77c
T ₇ = PRC + 0 - Mungbean	132.09	91.88	113.61	-	0.55	142.75c
LSD at 5%	NS	NS	NS	-	-	11.83

* 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.

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