

Intercropping Vegetables and Mungbean under Paired Row System of Sugarcane

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ABSTRACT

This study was conducted during the cropping year 2004-2005 at the Bangladesh Sugarcane Research Institute farm to investigate the performance of some high value vegetables as first and mungbean as second intercrop under paired row cane (PRC) planting method. Four high value vegetables viz. broccoli, sweet pea, carrot and bush bean as first and mungbean were grown as second intercrop. The experiment was laid out in Randomized Complete Block design with three replications. Results showed that significant effect of intercropping was found on the tiller, millable cane production and cane yield in paired row cane under intercrops. The yields of first and second intercrops were found satisfactory. Among the treatments, maximum adjusted cane yield (190.78 t ha⁻¹) was recorded from the treatment T4 (PRC + carrot - mungbean) followed by 185.32 t ha⁻¹ in the treatment T2 (PRC + broccoli - mungbean), 176.15 t ha⁻¹ in T5 (PRC + bushbean - mungbean) and 149.78 t ha⁻¹ in T3 (PRC + sweet pea - mungbean). The lowest adjusted cane yield (94.13 t ha⁻¹) was obtained from the control treatment (PRC only). Pol % cane in different treatments combination were found statistically identical. Intercropping combinations 'Cane + carrot - mungbean' and 'Cane + broccoli - mungbean' gave better result for higher total production and economic returns.

Key words: Sugarcane, intercrop, paired row, transplanted cane

INTRODUCTION

Sugarcane is one of the principal cash crop of Bangladesh which needs 12-14 months from planting to harvesting. Our poor farmers can't wait without income for such a long period by sole crop only with sugarcane. The farmers can get income throughout the year by intercropping with improved method of cane planting. Bangladesh Sugarcane Research Institute (BSRI) developed paired row systems of cane planting technique which facilitates growing two intercrops in sequence (Ali *et al.*, 1989 and Khan *et al.*, 1995). About 5-29% cane increased in paired row systems of cane (PRC) over conventional method (Roach, 1977). The research finding was also observed insignificant effect on germination as well as pol % cane in paired row systems. Recently some high value vegetables are becoming popular in sugarcane growing areas of the country which can be grown as intercrop with sugarcane. But the research information in these regards is very scant. Therefore, the present study was taken to find out the suitable high value vegetables as intercrop with paired row sugarcane for higher crop production and economic benefit per unit area and time.

MATERIALS AND METHODS

The study was conducted at BSRI farm during 2004-2005 cropping season. Single budded bed seedlings of cane variety Isd 31 were used in the experiment. The trial was assigned in RCB design with three replications. The unit plot size was 12 m x 8 m. Broccoli, sweet pea, carrot and bushbean as first and mungbean (Bina mung 5) as second intercrops were cultivated in the study. The fertilizers Urea, TSP, MP and Gypsum were used in the cane field @ 325, 250, 180 and 190 kg ha⁻¹ respectively. Fertilizers for intercrops were used as per Fertilizer Recommendation Guide of BARC, 1997. The experiment consisted of the following treatments.

- T1 : Paired row cane (PRC) only (control)
- T2 : T1 + broccoli (3 lines) - mungbean
- T3 : T1 + sweet pea (4 lines) - mungbean
- T4 : T1 + carrot (5 lines) - mungbean
- T5 : T1 + bush bean (4 lines) - mungbean
- T6 : T1 + 0 - mungbean

Seedlings/ seeds of different intercrops were transplanted/sown within the vacant spaces of paired rows of cane after transplantation of sugarcane. Hybrid seeds for broccoli and carrot, BARI sweet pea-1 and BARI Jhar sim-1 for sweet pea and bushbean respectively were cultivated as first intercrops. After harvesting of first intercrop on 10th February, 2004 mungbean of cv.Bina mung-5 was sown as second intercrop in the

following day. The second intercrop was harvested on 28th May, 2005. Data on different intercrops yield were recorded and converted in to adjusted cane yield for economic analysis. For sugarcane, tiller population, millable cane stalks, cane yield were recorded. Partial budget analysis (Horton, 1982) was used to compare the performance of different intercropping over sole cane in respect of net income.

RESULTS AND DISCUSSION

Tiller and millable cane production

The tiller population and millable cane stalks production were significantly influenced by the different treatments of the experiment (Table 1). The highest tiller population of $170.23 \times 10^3 \text{ ha}^{-1}$ was recorded from T3 treatment followed by T4 treatment where the first intercrops were carrot and sweet pea respectively. The same trend was also observed in millable cane stalks like tiller population and which were $139.26 \times 10^3 \text{ ha}^{-1}$ and $132.95 \times 10^3 \text{ ha}^{-1}$ in T3 and T4 respectively. The lowest number of tiller and millable cane stalks were exhibited in the control treatment (T1) where only cane was cultivated without intercropping. The number of tiller increased and millable cane were obtained in the intercrops plot compared to other treatments might be related to contribution of residual effects of fertilizers and higher compatibility of intercrops grown with sugarcane. This results are in agreement with the findings of Khan *et al.* (1995) and Kabir *et al.* (2004).

Intercrop yield

The yield of both first and second intercrops showed in Table 1 was found satisfactory. Significant differences in yields of 2nd intercrop were observed in the experiment and it was found the highest of 0.547 t ha^{-1} in the T6 treatment where first intercrop was not sown and the lowest (0.478 t ha^{-1}) in the T2 treatment where mungbean was grown after broccoli.

Table 1. Tiller, millable cane, cane yield, pol % cane and yield of intercrops, BSRI, 2005

Treatment	Tiller ($\times 10^3 \text{ ha}^{-1}$)	Millable cane ($\times 10^3 \text{ ha}^{-1}$)	Cane yield (t ha^{-1})	Pol(%) cane	Intercrop yield(t ha^{-1})	
					1 st	2nd
T ₁ = Paired row cane only(control)	149.23	120.11	94.13	13.05	-	-
T ₂ = T ₁ + broccoli-mungbean	153.11	123.28	92.46	14.16	10.23	0.428
T ₃ = T ₁ + sweet pea-mungbean	170.23	139.26	103.13	13.66	3.94	0.515
T ₄ = T ₁ + carrot-mungbean	161.00	132.95	99.03	14.32	14.28	0.451
T ₅ = T ₁ + bush bean-mungbean	157.33	131.00	95.90	14.24	8.50	0.455
T ₆ = T ₁ + 0-mungbean	150.83	119.63	93.16	14.36	-	0.547
LSD (5%)	12.63	12.49	5.47	-	-	0.084

Equivalent cane yield of intercrops

Yields of intercrops converted into equivalent cane yields were found significantly different in the treatments tested in the experiment (Fig. 1). The T2 (T₁ + broccoli-mungbean) gave maximum equivalent cane yield (92.86 t ha^{-1}) followed by T4 (T₁ + carrot-mungbean) (91.75 t ha^{-1}). The minimum equivalent cane yield of 17.01 t ha^{-1} was recorded in T6 (T₁ + 0-mungbean). This variation was mainly due to different quantity of yields and market value of the end product of the crops grown as intercrops with sugarcane.

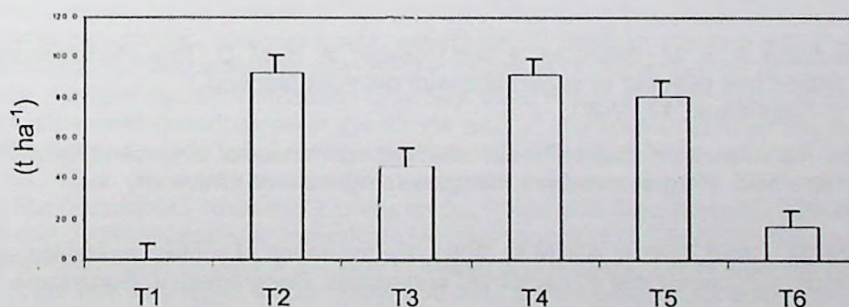


Fig 1 : Equivalent cane yield of intercrops (t ha^{-1}). Vertical bars represent LSD at 0.05 level.

Cane yield and pol % cane

The data related to the yield of cane and pol % cane obtained from different treatments have been presented in the Table 1 showed that maximum cane yield (103.13 t ha^{-1}) was obtained in T_3 (T_1 + sweet pea-mungbean) followed by T_4 (T_1 + carrot- mungbean) (99.03 t ha^{-1}) and the minimum (94.13 t ha^{-1}) in T_1 (PRC only). The different of pol % cane in different treatments were insignificant and it might be due to the same variety used in the experiment. Similar result was also observed by Matin *et al.* (2001) and Kabir *et al.* (2004).

Cost and returns of production

The cost and return of treatments are presented in the Table 2. The highest total adjusted cane yield (190.78 t ha^{-1}) and BCR (3.40) were recorded in T_4 where carrot and mungbean was first and second intercrop respectively. The second highest adjusted cane yield and BCR of 185.32 t ha^{-1} and 3.17 were obtained in the T_2 where broccoli and mungbean was first and second intercrop respectively. The lowest cane yield of 94.13 t ha^{-1} and BCR of 2.01 were observed in the control where only cane was grown in paired row method (T_1). The data in Table 2 clearly showed profit more or less for intercropping compared to the control. This results are in agreement with the findings of Gani *et al.* (2000), Matin *et al.* (2001) and Kabir *et al.* (2004). Intercropping combinations 'Cane + carrot - mungbean' and 'Cane + broccoli - mungbean' in paired row gave better result for higher total production and economic returns.

Table 2. Cost and return of sugarcane cultivation with different intercrops, BSRI, 2005

Treatment	Adjusted cane yield (t ha^{-1})	Total variable cost (Tk ha^{-1})	Gross return (Tk ha^{-1})	Gross margin (Tk ha^{-1})	BCR
T_1 = Paired row cane only (control)	94.13	60124	121051.18	60927.18	2.01
T_2 = T_1 + broccoli -mungbean	185.32	75257	238321.52	163064.52	3.17
T_3 = T_1 + sweet pea -mungbean	149.78	72800	192617.08	119817.08	2.65
T_4 = T_1 + carrot -mungbean	190.78	72254	245343.08	173089.08	3.40
T_5 = T_1 + bush bean -mungbean	176.15	72129	226528.90	154399.90	3.14
T_6 = T_1 + O-mungbean	110.17	64164	141678.62	77514.62	2.20
LSD (5%)	12.56	-	-	-	-

Price of crops (Tk t^{-1}) :

Sugarcane	: 1286.00	Carrot	: 7000.00
Broccoli	: 10000.00	Bushbean	: 10000.00
Sweet pea	: 10000.00	Mungbean	: 40000.00

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