

Compatibility of Sugarcane Varieties with Khira (*Cucumis sativa*) as Intercrop

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ABSTRACT

The experiment was conducted at farmers' field in Jaipurhat sugar mills zone under Tista Meander Floodplain soils (AEZ-3), during the cropping year 2005-06 to study the compatibility of sugarcane varieties with khira as intercrop. In the study six sugarcane variety viz; Isd 16, Isd 26, Isd 32, Isd 34, Isd 35 and Isd 36 were planted in wide row spacing and khira was grown as intercrop in the vacant spaces (140 cm) between paired rows (60 cm) sugarcane. It was laid out in a randomized complete block design having unit plot size of 48 m² with three replications. Results indicated that all growth parameters, brix percent and yield responded significantly to different treatment combinations. Highest cane yield of 148.0 t ha⁻¹ was obtained from T₅ (Isd 35 in WRS + Khira) followed by 142.4 t ha⁻¹ in T₁ (Isd 16 in WRS + Khira). Highest net profit of Tk. 169561 ha⁻¹ and BCR of 3.78 and the second highest net profit of Tk. 163261 ha⁻¹ and BCR of 3.68 were also changed from T₅ and T₁ treatment, respectively.

Key words: Compatibility, sugarcane varieties, khira (*Cucumis sativa*), intercrop.

INTRODUCTION

Sugarcane (*Saccharum officinarum* L) is one of the important cash cum industrial crop of Bangladesh. Sugarcane being a long duration and widely spaced crop does not cover the vacant space between the rows up to 3-4 months and as such there is an ample scope to grow one or two additional short duration intercrops. Due to complementary effect of different crops when grown together, making better use of resources ultimately helps in enhancing the productivity of sugarcane. Intercropping in sugarcane with pulses, oilseeds and vegetable is quite a common practice and an economical approach to get high agricultural production from same piece of land. As sugarcane is a long duration crop grown in considerable wide row spacing, so, intercropping with sugarcane is very economic (Kabir, 1988; Ali *et al.*, 1989). It is reported that 50 to 80 percent of the rain fed crops are planted as intercrops with sugarcane in many developing countries (Norman, 1974 and Jodha, 1977). Only 15 to 20 percent sugarcane area is intercropped in Bangladesh whereas in Mauritius about 70-77 percent areas are intercropped mainly with potato and tomato (Imam, 1990 and Anon; 1986). Successful intercropping of various crops with sugarcane has been reported by many researchers (Rathi *et al.*, 1974, Behli and Narwal; 1977, Verma *et al.* 1981, Imam *et al.*, 1990). Usually one line of winter vegetables is intercropped in between two single rows of sugarcane and this system of conventional intercropping could not give satisfactory intercrop yield in most of the cases. To overcome this problem recently "paired row system" of sugarcane plantation has been developed at BSRI to facilitate higher intercrop

population and raising two intercrops in sequence. The most significant yield increase (15-29%) over conventional spacing has been reported from planting two rows of cane at 40-50 cm apart leaving 150 cm between two such paired rows for growing intercrops (Roach, 1977). It has been reported that tiller, millable cane, cane stalk, cane yield and adjusted cane yield were significantly higher in paired row cane with potato-mungbean or onion-mungbean as sequential double intercrops with sugarcane than any other treatments with single row cane (Anon; 1991). Furthermore, Ali *et al.* (1989) reported that there was no significant adverse effect of row arrangement on germination of cane and recoverable sucrose percent. Growing double intercrop under paired row system increase the productivity by 31.20 per cent compared to the single intercrop under single row system (Alam, 1999). Khira (*Cucumis saliva*) is a popular nutritious fruit crop in Bangladesh and it is use as salad as well as for direct eating. The crop competes with sugarcane with for land as both the crop is grown in highland.. In Jaipurhat region farmers cultivated khira as a single crop in winter season. Generally khira is not intercropped with sugarcane. Bangladesh Sugarcane Research Institute (BSRI) has recommended several intercrop combination after intensive studies at research station and at farmers field. But much less effort has been given to implement the recommendations of BSRI or even to select the most suitable intercrop combination (s) to be practiced by the farmers' in a particular agro-climatic and edaphic conditions. Hence, an attempt has been taken to study the compatibility of BSRI bred sugarcane varieties with khira as intercrop cultivated in wider row spacing at Jaipurhat region (AEZ 3).

MATERIALS AND METHOD

The experiment was conducted at farmers' field in Jaipurhat sugarmills zone, during the cropping year 2005-06. The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications. The plot size was 8 m x 8 m. After final land preparation in the vacant space of two paired row 60 cm x 60 cm pit was prepared for showing khira seed and the spacing between two pits were 1.5 meter. Khira seed was shown in November, 21. The 45 days old soil bed settlings of different sugarcane varieties was transplanted on December 9, 2004. Interplant spacing for sugarcane settlings was 45 cm for paired rows of 60 cm spacing while spacing between two wider rows was 140 cm. Six sugarcane varieties viz., Isd 16, Isd 26, Isd 32, Isd 34, Isd 35 and Isd 36 was used as test crop. Following treatments were included this experiment.

Table 1. Treatment details.

Treatments	Treatment detail
T ₁	Isd 16 in WRS* + Khira
T ₂	Isd 26 in WRS + Khira
T ₃	Isd 32 in WRS + Khira
T ₄	Isd 34 in WRS + Khira
T ₅	Isd 35 in WRS + Khira
T ₆	Isd 36 in WRS + Khira

*WRS-Wider row spacing

Recommended dose of fertilizers were applied for sugarcane and two thirds of recommended dose of fertilizer for the intercrop Khira was used. Intercultural operations were done as and when required for sugarcane as well as for intercrop. Data on intercrop yield were recorded and converted into adjusted cane yield for economic analysis. For sugarcane, tiller population, millable canes, cane yield and brix per cent were recorded and analyzed statistically at 5 % level of probability using LSD test. For economic analysis, all variable costs related to intercropping were also included. Total returns were calculated on the basis of yield and local market price of products.

RESULTS AND DISCUSSIONS

Growth parameters and yield of sugarcane:

Data on tiller, millable canes, yield and brix percent are presented in Table 2. Tiller production has been influenced significantly by growing khira as intercrop under paired row system of planting. The highest tiller population of $217.1 \times 10^3 \text{ ha}^{-1}$ was produced from the T_4 treatment where Khira was grown as intercrop with sugarcane variety Isd 34. Treatment T_2 (Isd 26 in WRS + Khira) gave the second highest number of tiller ($170.7 \times 10^3 \text{ ha}^{-1}$) which was produced statistically similar number of tiller ($166.1 \times 10^3 \text{ ha}^{-1}$) with T_3 (Isd 32 in WRS + Khira). Treatment T_3 also produced statistically similar number tillers of $166.1 \times 10^3 \text{ ha}^{-1}$ and $166.1 \times 10^3 \text{ ha}^{-1}$ with the treatments T_1 (Isd 16 in WRS + Khira) and T_6 (Isd 36 in WRS + Khira), respectively. The lowest number of tiller ($138.8 \times 10^3 \text{ ha}^{-1}$) was obtained from the treatment T_5 (Isd 35 in WRS + Khira) which were statistically identical with T_6 and T_1 . Sugarcane variety Isd 34, Isd 26 and Isd 32 performed better in producing tiller with khira as intercrop. It may be due to high potentiality for tiller production of those varieties. Which partially at par with Kashem *et al.* 2005 and Barma *et al.* 2005.

Highest number of millable canes ($134.0 \times 10^3 \text{ ha}^{-1}$) was also obtained from T_4 treatments. The second highest millable cane was found from T_6 treatment ($116.5 \times 10^3 \text{ ha}^{-1}$) which were statistically identical with the treatments T_3 ($112.9 \times 10^3 \text{ ha}^{-1}$), T_5 ($112.8 \times 10^3 \text{ ha}^{-1}$) and T_1 ($112.9 \times 10^3 \text{ ha}^{-1}$) respectively, regarding millable cane production. The lowest number of millable cane was obtained from the treatment T_2 ($106.9 \times 10^3 \text{ ha}^{-1}$) and it also showed statistically similar number of millable canes with T_1 , T_5 and T_3 , respectively. The sugarcane varieties Isd 34, Isd 36, Isd 32 and Isd 35 performed better in producing millable cane with khira intercropping. Which also may be due to better potentiality for millable cane production of those varieties. Which also partially corroborates with Barma *et al.* 2005.

Highest cane yield of 148.0 t ha^{-1} was obtained from T_5 (Isd 35 in WRS + Khira) followed by 142.4 t ha^{-1} in T_1 (Isd 16 in WRS + Khira). Treatment T_2 (136.9 t ha^{-1}), T_6 (134.5 t ha^{-1}) and T_3 (133.0 t ha^{-1}) were statistically similar with the treatment T_1 (142.4 t ha^{-1}) regarding cane yield. The lowest yield was obtained from the treatment T_4 (110.0 t ha^{-1}). Sugarcane variety Isd 35, Isd 16, Isd 26, Isd 36 and Isd 32 performed better regarding cane yield. It may be due to their yield potential and better compatibility with khira as intercrop.

Brix percent of cane showed significant effect due to different treatment combination. Highest percent of brix was obtained from the treatment T_1 (17.45%) followed by T_2 (17.11%) and T_5 (16.92%), respectively. Treatment T_6 (15.92%) was statistically similar in percent of brix with T_5 . Treatment T_3 (15.22%) and T_4 (14.89%) were found statistically

identical and also at par with T_6 regarding brix percent. Higher brix of Isd 16, Isd 26 and Isd 35 may be also due to better compatibility of sugarcane varieties with khira.

Yield of intercrop:

Yield of khira as intercrop along with cane and adjusted yield of cane are presented in Table 3. It is revealed from the table that the highest yield of khira was obtained from T_3 treatment (12.9 t ha^{-1}) and the second highest yield (12.8 t ha^{-1}) were found both from the treatments T_1 and T_5 , respectively.

Adjusted cane yield:

Adjusted cane yield is an important parameter for determining the total yield potentials of the intercropped plot (Cane + intercrop). From the table 4 it was observed that in case of adjusted cane yield the highest was obtained from T_5 (204.8 t ha^{-1}) and the second highest was from T_1 (199.3 t ha^{-1}). The lowest adjusted cane yield was found from T_4 (164.7 t ha^{-1}).

Economics of khira intercropping with sugarcane:

It is revealed from the table 4 that the highest net profit of Tk. 169561 ha^{-1} and BCR of 3.78 was found from T_5 treatment and the lowest net profit of Tk. 124311 ha^{-1} and BCR of 3.04 was obtained from T_4 treatment. The second highest net profit (Tk.163261) and BCR (3.68) was found from the treatment T_1 . Treatment T_2 , T_6 and T_3 were occupied the 3rd (Tk.155574 and 3.55), 4th (Tk.153374 and 3.52) and 5th (Tk.153186 and 3.51) position, respectively regarding net profit and BCR. So considering economic aspects treatment T_5 and T_1 performed better.

From the above discussion it may be concluded that considering yield parameters, adjusted cane yield and economic benefit cultivation of khira as intercrop with sugarcane variety Isd 35 and Isd 16 was the most compatible intercrop combination in Jaipurhat region. Hence, sugarcane variety Isd 35 and Isd 16 may be suggested for intercropping khira in Jaipurhat region to get interim benefit from the sugarcane plot.

Table 2. Performance of intercrop combinations on the growth and yield of sugarcane

Treatment	Tiller ($\times 10^3 \text{ ha}^{-1}$)	Millable cane ($\times 10^3 \text{ ha}^{-1}$)	Yield of cane (t ha^{-1})	Brix (%)
T ₁ - Isd 16 in WRS + Khira	140.1 cd	110.4 bc	142.4 ab	17.45 a
T ₂ - Isd 26 in WRS + Khira	170.7 b	106.9 c	136.9 b	17.11 a
T ₃ - Isd 32 in WRS + Khira	166.1 bc	112.9 bc	133.0 b	15.22 c
T ₄ - Isd 34 in WRS + Khira	217.1 a	134.0 a	110.0 c	14.89 c
T ₅ - Isd 35 in WRS + Khira	138.8 d	112.8 bc	148.0 a	16.92 ab
T ₆ - Isd 36 in WRS + Khira	139.2 cd	116.5 b	134.5 b	15.69 bc
LSD (P=0.05)	27.02	7.46	10.36	1.39

Figures with same letter (s) do not differ significantly at 5% level as per DNMR test.

Table 3. Performance of khira as intercrop with wide spaced sugarcane

Treatment	Yield of cane (t ha^{-1})	Yield of khira (t ha^{-1})	Adjusted Cane Yield (t ha^{-1})
T ₁ - Isd 16 in WRS + Khira	142.4	12.8	199.3
T ₂ - Isd 26 in WRS + Khira	136.9	12.5	192.5
T ₃ - Isd 32 in WRS + Khira	133.0	12.9	190.3
T ₄ - Isd 34 in WRS + Khira	110.0	12.3	164.7
T ₅ - Isd 35 in WRS + Khira	148.0	12.8	204.8
T ₆ - Isd 36 in WRS + Khira	134.5	12.6	190.5

Price of crops: Sugarcane-Tk. 1125 t^{-1} , Khira-Tk.5000 t^{-1}

Table 4. Economics of khira intercropping with wider spaced sugarcane

Treatment	Yield of cane (t ha^{-1})	Yield of khira (t ha^{-1})	Cost of Cultivation (Tk. ha^{-1})	Gross Return (Tk. ha^{-1})	Net profit (Tk. ha^{-1})	BCR
T ₁ - Isd 16 in WRS + Khira	142.4	12.8	60939	224200	163261	3.68
T ₂ - Isd 26 in WRS + Khira	136.9	12.5	60939	216513	155574	3.55
T ₃ - Isd 32 in WRS + Khira	133.0	12.9	60939	214125	153186	3.51
T ₄ - Isd 34 in WRS + Khira	110.0	12.3	60939	185250	124311	3.04
T ₅ - Isd 35 in WRS + Khira	148.0	12.8	60939	230500	169561	3.78
T ₆ - Isd 36 in WRS + Khira	134.5	12.6	60939	214313	153374	3.52

Market price of cane @ Tk. 1125.0 M ton^{-1} , Khira @ Tk. 5000.0 M ton^{-1} , Seed cost (Tk. Kg^{-1}): Sugarcane- 1.13, Khira-500. Fertilizer cost (Tk. Kg^{-1}): Urea-6.0, TSP-13.0, MOP-10.0, Zypsum- 4.0, Zinc Sulphate-60.0. Pesticide cost (Tk. Kg^{-1}): Bavistin-1250.0, Regent

3GR-95.0, Furadan 5G-85.0, Dithane M 45- 500.0, Labour cost: Tk. 55.0 person day⁻¹, Plough cost: Tk. 60.0 pair⁻¹ of bullock, Interest on operating capital: 12 % (Interest on operating capital were considered for six month).

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