

Impact of Different Technologies on Sugarcane and Sugar Yield

M.Ali, S.A. Imam, M. M. Uddin, A.H.M.D. Hossain and M. Shaheen

Sugarcane Research & Training Institute,
Ishurdi, Pabna, Bangladesh.

ABSTRACT

An experiment was carried out at Sugarcane Research & Training Institute (SRTI) farm to find out contribution of different recommended technologies alone or in combination for higher yield of cane and sugar. In all, 11 recommended sugarcane production technologies including farmers practice were tested. The highest yield of cane (103.7 TCH) was obtained where all the 11 recommended technologies were applied compared to 38.2 TCH obtained from farmers practice. Commercial Fertilizer, optimum planting time, irrigation, organic manure and gap filling in succession were found to have more contribution among the recommended technologies tested.

INTRODUCTION

Sugarcane is an exhaustive long duration crop requiring 12-15 months to mature. Like other field crops, it requires proper care and management for obtaining higher yield. Verma and Yadav (1985) reported that the highest yield of cane and sugar were from the November planted cane in comparison to cane planted in December, January or February (Hoey and Hossain, 1981). In Autumn planting, 0.75 m-1.0m row spacing has been found economic and produces higher yields (Anon, 1986). Interrow spacing of 0.90 m to 1.0 m resulted in higher plant population and yield (Matherne, 1974). In case of optimum land preparation and method of trenching plough tillage and spade trenching produced the highest yield of cane (Anon, 1980). Sugarcane being long duration and tall plant it requires huge amount of fertilizer. The highest yield was obtained due to the application of balanced fertilizer on sugarcane (Boramanikar and Norole, 1983). They reported that plant cane increased yield upto 20% due to the application of 4.94 t/ha of bio-compost. Filter cake applied at the rate of 12.5 t/ha gave higher total cane and sugar yield (Patil *et al.* 1983). Yield of cane may be reduced by 14% and sucrose by 2% due to borer infestation (Anon, 1979-80).

Graciano and Ramatho (1983) reported that 83.1% cane yield may be reduced due to no weeding and proper weeding upto 120 d of planting increased cane yield. Cane yield was the greatest as a result of proper hand weeding (Graciano and Ramatho 1983). Optimum soil moisture is an important factor for uniform germination. Optimum levels of irrigation results higher yield of cane and sugar (Gosnell and Lonsdale, 1977). Lodging reduces cane and sugar yield. Pawar (1983) reported that yield of cane was greater with earthing up than without it. Contribution of individual production technology on yield of cane has been worked out by different scientists but its combined effect and percent contribution has not been worked out as yet. Therefore, this experiment was undertaken to evaluate the effect of different crop production technologies singly or in combination for higher yield of cane and sugar.

MATERIALS AND METHODS

An experiment was conducted during 1985-86 and 1986-87 cropping season at Sugarcane Research & Training Institute (SRTI) farm with the following treatments.

Farmers practices involve-use of non-recommended commercial seedcane, planting in January after harvesting Aman paddy, 60 cm row spacing, use of one third of recommended rate of fertilizers, one weeding only around March and one spading in May, no earthing up, no disease and pest control, no use of compost, no irrigation and harvesting by Hasua.

T_1 = Farmers practices (Control),

T_2 = T_1 + Planting cane in optimum time (1st fortnight of Nov.),

T_3 = T_2 + Optimum row spacing (1.0 m),

T_4 = T_3 + Spade trench (25 cm $\times$ 30cm),

T_5 = T_4 + Recommended rates fertilizers (125 kg N, 125 kg P_2O_5 and 110 kg K_2O /ha),

T_6 = T_5 + Gap filling by polybag raised seedlings (Absence of plant within 30-60 cm along the row was considered as gap),

T_7 = T_6 + Organic manuring (Compost 13 t/ha during land preparation),

T_8 = T_7 + Pest control (Mechanically as and when necessary),

T_9 = T_8 + Weed control (Manually as and when necessary),

T_{10} = T_9 + Earthing up (June, by spade, 15 cm from ground level),

T_{11} = T_{10} + Spade harvest at ground level,

T_{12} = T_{11} + Irrigation (Thrice, at planting, at 120 d and at 150 d of planting).

The treatments were distributed in a randomized block and replicated four times. Three eyed selected setts were treated with Aretan-6 (@ 1:400) and planted following end to end method on 15th November in plots measuring 12 m $\times$ 8m with interrow spacing of 1.0 m. Compost was used as organic manure and were applied during land preparation. The full dose of TSP, half of Urea and MP were applied at planting in trench. The rest half of Urea and MP were applied at 120d of planting as top dress. All operations were done as per treatments assigned. The crop was harvested on 15th December 1987 at the age of 13 months.

Data on germination, number of tillers, number of millable cane, height of cane, girth, internode per stalk, yield of cane, recovery of sugar at harvest, and sugar production per unit area were recorded, and their interpretations made based on statistical analysis.

RESULTS AND DISCUSSION

The yield and yield contributing factors of cane are shown in the Table 1. Yield of cane as increased with the application of recommended technologies are shown in the Figure 1.

The results revealed that there was no significant effect of different recommended technologies on germination of sugarcane, but significantly superior to farmers practices. The highest tillers were produced in treatment T_{11} (123470/ha) followed by T_9 (115830/ha). No significant difference in plant height was recorded among

recommended technologies but all treatments were found superior to control. The highest number of internodes (26.3) was found in treatment T_{12} where all 11 recommended technologies were applied followed by T_7 (25.8) and T_{11} (25.6).

Table 1. Impact of some recommended cultural practices single and in combination on the yield and yield contributing factors of sugarcane.

Treatments	Germination (%)	Tiller/ha ('000')	Millable cane/ha ('000')	Average height (m)	Average inter-node/stalk	Girth (cm)	Yield of cane (t/ha)	Recovery (%)	Sugar (TSH)	increase over control (%)	Contribution individual techn (%)
T_1 -Farmers practice (Control)	16.2 b	103.5 bcd	64.7 bcd	2.3 b	20.1 cd	1.95 bc	38.2 f	10.4 ab	4.0	—	—
T_2 - T_1 +Optimum time of planting	52.4 a	117. ab	62.6 cd	2.5 b	22.0 cd	2.21 ab	46.0 ef	11.6 a	5.3	20.4	20.4
T_3 - T_2 +Row spacing	30.2 a	92.3 d	64.4 bcd	2.5 b	22.0 d	2.23 ab	52.0 de	10.9 ab	5.7	36.0	12.9
T_4 - T_3 +Spade trench	34.3 a	88.2 d	57.2 d	2.5 b	22.8 bcd	2.20 ab	54.8 de	11.5 a	6.3	43.3	5.3
T_5 - T_4 +Fertilizer	33.8 a	99.2 bcd	71.1 abc	3.0 a	24.8 ab	2.36 ab	81.5 d	11.1 ab	9.0	113.4	48.9
T_6 - T_5 +Gap filling	32.7 a	101.1 bcd	69.4 abc	3.0 a	23.8 b	2.38 ab	83.8 d	10.4 ab	8.7	118.7	22.5
T_7 - T_6 +Organic manure	52.7 a	101.2 bcd	71.1 abc	3.0 a	25.8 a	2.38 ab	86.8 c	10.6 ab	9.2	127.3	3.9
T_8 - T_7 +Pest control	52.1 a	96.5 cd	67.8 abc	2.8 a	25.5 a	2.29 ab	88.7 bc	11.0 ab	9.7	132.3	2.2
T_9 - T_8 +Weed control	33.0 a	115.8 ab	69.9 abc	2.9 a	25.5 a	2.28 ab	90.4 bc	11.0 ab	9.9	136.7	1.9
T_{10} - T_9 +Earthing up	32.8 a	113.1 abc	68.5 abc	3.6 a	25.6 a	2.31 ab	91.0 bc	11.1 ab	10.1	138.2	0.7
T_{11} - T_{10} +Spade harvest	28.8 a	123.5 a	72.6 ab	3.0 a	25.6 a	2.27 ab	93.0 b	11.2 ab	10.3	143.5	2.2
T_{12} - T_{11} +Irrigation	32.0 a	112.6 abc	76.1 a	3.0 a	26.3 a	2.44 b	103.7 a	10.2 ab	10.6	171.5	11.5

In a column, the values followed by different letters are significantly different at 5% level of sugarcane.

The girth of cane was found higher in the treatment T_{12} (2.44 cm) followed by T_7 (2.38 cm), T_3 (2.36 cm), T_{10} (2.31 cm) and T_9 (2.29 cm). Significantly the highest millable cane (76,060/ha) was produced where all 11 recommended technologies were applied followed by T_{11} (72,580/ha). The highest recovery % was found in treatment T_2 (11.6%) followed by T_4 (11.5%). This may be due to use of less quantity of fertilizer and irrigation. The treatment where all 11 recommended technologies were applied produced the highest yield (103.7 t/ha) followed by T_{11} (93.0 t/ha); and T_{10} (91.0 t/ha). In the T_{12} treatment 10.6 t/ha sugar was produced which was the highest followed by T_{11} (10.3 t/ha) and T_{10} (10.1 t/h).

In this study it was observed that all technologies had contributed to yield in varying proportions ranging from 0.6 to 48.9%. The highest contribution (48.9%) to the yield was derived from the application of recommended rates of fertilizers followed by optimum planting time (20.4%) and optimum row spacing (12.9%). It has been further seen that application of 11 recommended production technologies have increased the cane yield by 171.5% over control.

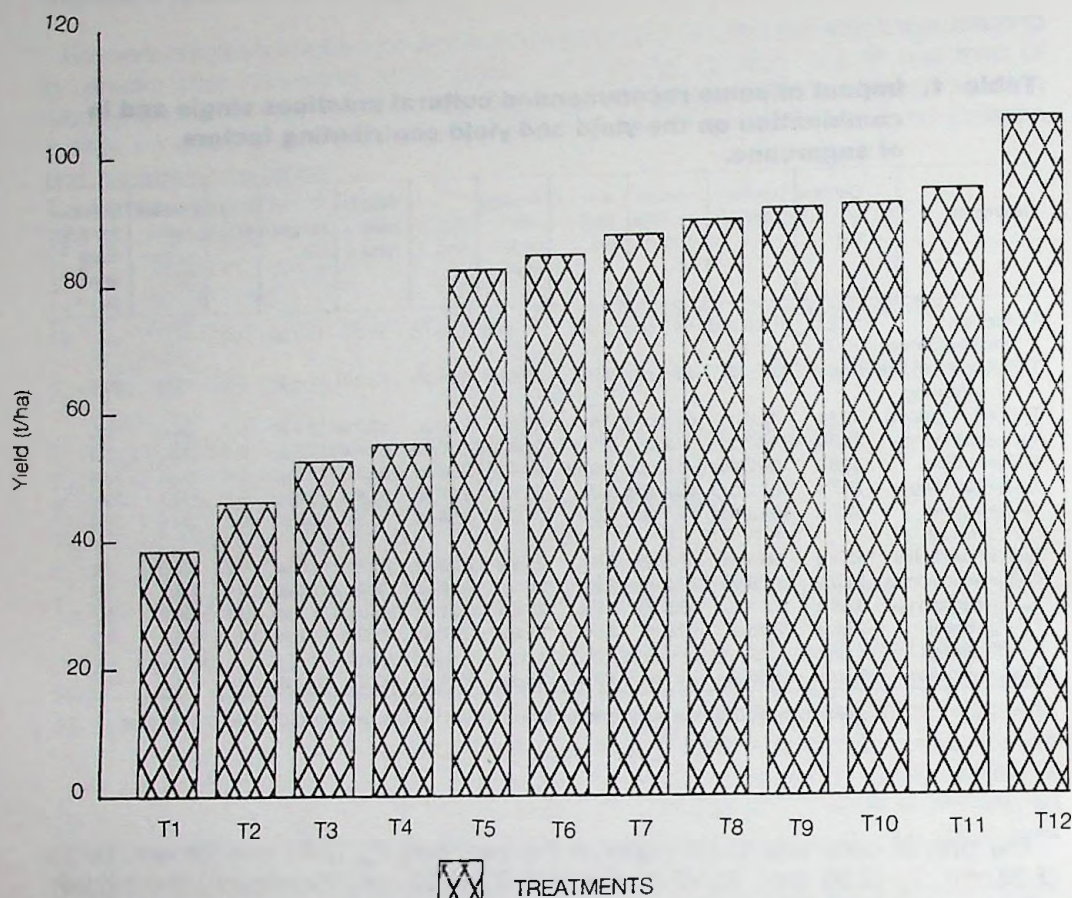


Figure 1. Yield of Sugarcane as influenced by different recommended technologies.

Among the 11 technologies tested, application of recommended doses of fertilizer was found as the number one yield contributing factor followed by planting cane in optimum time, planting in optimum space, irrigation, application of organic manures and gap filling. Recommended cane production technologies should be adopted for higher yield with special emphasis on application of recommended rates of fertilizer, planting cane in optimum time, allowing proper space, adequate irrigation and trench planting.

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