

Effect of Fertilizer and Intercultural Practices on the Performance of Sugarcane

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ABSTRACT

The effect of fertilizer and management practices independently or in combination with the yield and yield contributing characters of sugarcane were studied at SRTI under rainfed condition.

Fertilizer coupled with management practices produced significantly higher yield of both cane and sugar. The rate of yield increase with this combination was 87% over control, 5% over only fertilization and 29% over only management.

INTRODUCTION

It is well accepted that management and fertilization are milestones in any crop production. But the contribution of these factors singly or in combination in increasing yield and quality of sugarcane in Bangladesh was not quantified. Application of fertilizer, without cultural practices, does not show proper response. Different cultural practices along with fertilization aids to improve cane yield and maintain normal physical, chemical and biological conditions of soil. Khan and Mohapatra (1959) reported that sugarcane yield was increased with the effect of cultural-cum-manural treatments. Hence, fertilizer and intercultural practices have important contribution in increasing sugarcane yield independently or jointly. Pahlwan *et. al.* (1982) obtained good yield with better intercultural practices.

A trial including these key-factors was set-up to find out the effect of fertilizer and intercultural practices to assess the contribution of these factors individually and together on the yield contributing characters of sugarcane.

MATERIALS AND METHODS

The experiment was conducted at the Sugarcane Research and Training Institute in 1981-82. The experiment was laid out in split-plot design, treatments being replicated four times. The treatments were :—

T_0 —Control (only sugarcane plantation and harvesting without fertilizers, cultural practices, etc.).

T_1 —Fertilization (application of recommended doses of fertilizer only).

T_2 —Management (weeding, mulching and earthing-up as and when required),

T_3 —Fertilization+management i. e. (T_1+T_2).

Initial soils were collected from the field and determined for different soil parameters which are given below.

Texture—clay loam

pH —8.0

Organic carbon (%)—1.32

Total N (%)—0.07

Available P (ppm)—12.

Three budded equal number of assorted setts were planted following and to and method in 10mx7m plot. Fertilizers were applied at the normal rate and practices i. e. 125 kg N, 125 kg P_2O_5 and 110 kg K_2O per hectare. Isd.2/54 variety of cane was planted in December, 1981 and harvested in January, 1983. Initial and post soil samples were collected for determination of texture, pH, organic carbon, nitrogen and available phosphorus. Soil texture was determined by soil hydrometer method, pH by glass electrode with soil water ratio 1:2.5, total N by macro Kjeldahl method. Organic carbon by wet oxidation method, available P by 0.5 M $NaHCO_3$ method described by Black (1965). Data on % germination, tillers/ha, millable cane/ha, yield of cane, were recorded, recovery (%) of sugar were determined and total sugar production per unit area were calculated.

RESULTS AND DISCUSSION

Mean data on % germination, number of tillers/ha, number of millable cane/ha, yield of cane (TCH), recovery (%) of sugar and yield of sugar (TSH) were presented in Table 1. The table shows that the germination percent of eyebud were not affected by any treatment but highest germination (%) was obtained with fertilization+management treatment. Number of tillers/ha were remain identical in all treatments. Among the treatments maximum number of tillers were produced under the same treatments as in germination. The data on the production of millable cane/ha revealed that fertilization+management maintained its superiority over other treatments including the individual effect of fertilizer and management. On the other hand fertilizer alone also produced significantly higher number of millable cane over control.

Table 1. Effect of fertilizer and intercultural practices on the yield parameters of sugarcane.

Treatments	% Germination	Tillers/ha ('000')	Millable cane/ha ('000')	Yield of cane (Tons/ha)	% Recovery	Yield of sugar (Tons/ha)
T ₀ —Control	16.55a*	66a	53.46a	43.30a	11.39a	4.93a
T ₁ —Fertilization	19.16a	79a	68.71bc	77.07c	11.72ab	9.03c
T ₂ —Management	16.94a	78a	61.07ab	57.05b	12.16b	6.91b
T ₃ —Fertilization+Management	19.64a	87a	74.42c	81.02c	12.21b	9.88c

* Figures with similar letter do not differ significantly at 5% level as per DNMR test.

The joint treatment produced significantly higher yield. But the results were significant over control and management treatment only. Figure 1 shows the trend of yield increase under different set of treatments indicating that the maximum yield of cane only be obtained by the combined effect of fertilizer+management.

Considering the individual effect of each factor, it is evident from the Table 2 that only fertilization of cane may induce 78% higher yield over control and 32% management. Whereas, fertilization+management induced yield increase upto 87% over control, 5% over only fertilization and 29% over only management practices. Fertilizer+management increased 175% yield of cane over control, 13% over fertilization and 20% over management (Anonymous 1981). Single effect of fertilizer produced higher yield than management alone. This indicates that fertilizer application is essential for obtaining better yield of cane.

Table 2. Percent contribution of fertilizer and management on the yield of cane.

Treatments	Yield of cane tons/ha	% increase over control	% increase over different treatment of T ₃
T ₀ —Control	43.30 a	—	87
T ₁ —Fertilization	77.07 c	78	5
T ₂ —Management	57.05 b	32	29
T ₃ —Fertilization+Management	81.02 c	87	—

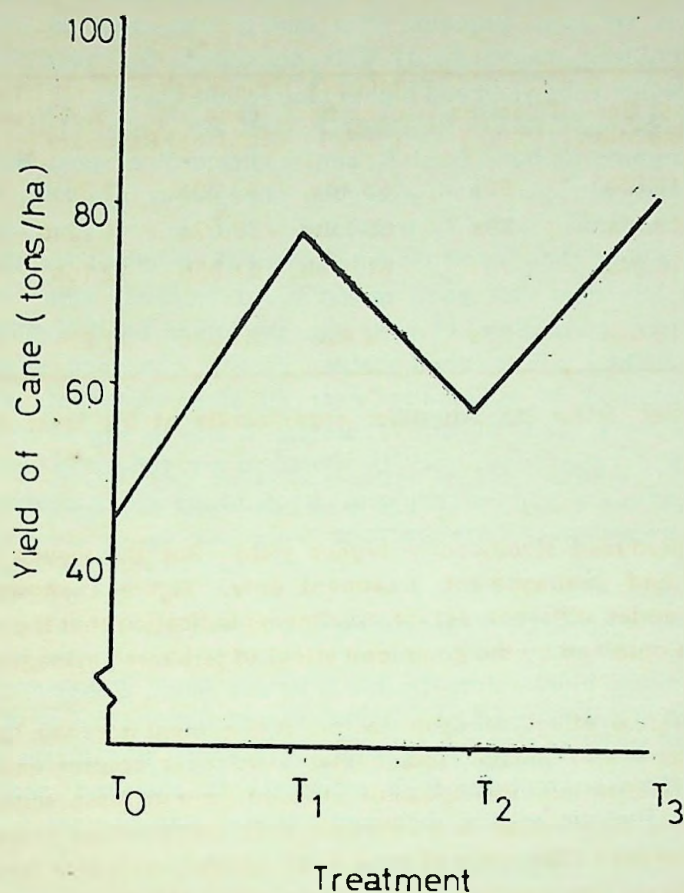


Fig. 1. Independent or joint effect of fertilizer and management on the yield of cane.

Table 3. Nutrient status of soil after harvest of sugarcane.

Treatments	pH	Organic carbon (%)	Total N (%)	Available P (ppm)
T ₀ -Control	8.2	0.81	0.050	6
T ₁ -Fertilization	8.2	0.81	0.051	6
T ₂ -Management	8.2	0.80	0.048	4
T ₃ -Fertilization+Management	8.2	0.83	0.059	7

Data presented in Table 1 revealed that the different treatments had a beneficial effect on recoverable sucrose. Superior juice quality was obtained with the combined treatment of fertilizer+management. This treatment produced higher sugar yield resulting from higher cane yield and higher recoverable sucrose.

Table 3 shows pH, organic carbon, total N and available P of post harvest soil. Organic carbon, total nitrogen and available phosphorus are fairly high with T_3 treatments and minimum with T_2 treatment. But in control plot all nutrient parameters were higher than management treatment, it might be due to lower cane yield. Result indicates that good management practices alone deteriorated physical and chemical conditions of soil. On the other hand fertilizer+management application enriched soil nutrient status. Finally, combined effect of fertilizer+management maintained its superiority over all other treatment, which also gave highest yield of cane and sugar. Therefore, it may be suggested that the better yield of cane and cane sugar may be obtained by following proper management and fertilization. An understanding of effects of the above treatments on sugarcane might lead to new ideas in farm practices.

ACKNOWLEDGEMENT

The authors are very much indebted to Dr. M. A. Hamid Miah, Principal Cane Entomologist, for correction of the manuscript. We are also thankful to Mr. M. A. A. Sarkar, Principal Sugar Chemist, Mr. M. A. Ghafur, Assistance Statistician and Mr. M. A. Kashem, Scientific Assistant for their assistance in chemical analysis of cane samples, statistical analysis of the data and cultural management to the crop under the experiment.

REFERENCES

- Anonymous, 1981. Annual Report. Sugarcane Research and Training Institute, Ishurdi, Pabna, Bangladesh p. 31.
- Black, C. A. 1965. Methods of soil analysis. Part 2. American Society of Agronomy, Inc. Madison, Wisconsin, U. S. A.
- Khan, A. R. and Mohapatra N. A. 1959. Effect of cultural-cum-manural cum-irrigation treatments on the yield of sugarcane. The 3rd All India Conf. Sug. Res. & Dev. Workers, Pusa (Bihar), October, 1957. Part. II. pp. 164-170.
- Pahlwan, A. A., Khan, N. H. and Islam, M. A. 1982. Effect of cultural practices and irrigation on the yield of corn. *Bangladesh Journal of Agriculture*, 6(4) & 7(1); 21-25.