

Studies on nitrogen requirement for sugarcane at sugarcane research institute farm

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ABSTRACT

An experiment was carried out on nitrogen requirement of Sugarcane Research Institute farm. The variety Co. 1158 was tested with 0, 80, 125, 170 and 215 kg N/ha.

N application did not affect germination. Higher level of N increased number of tillers and 170 kg N/ha increased significantly the number of millable canes. Yield of cane increased with increasing N levels but sugar/ha decreased and 170 kg N/ha gave the highest sugar yield.

INTRODUCTION

Sugarcane is an exhaustive crop and like other graminaceous crops responds more to nitrogenous fertilizer. Hiregoudar *et. al.* (1964) stated quoting from Dear 1921 that 30 tons of cane removed approximately 105 lbs of N from the soil. Therefore, additional nitrogen is required for proper growth and development of sugarcane to supplement the losses of N from the soil through leaching, fixation, volatilization and other unknown causes. The requirement of 200-250 lbs N/ac has been found to be optimum for obtaining economic yield of cane (Ranganathan, 1964).

The soil of SRI belongs to Gangetic river flood plain group and normal dose of Nitrogen is 110 lbs/acre, (Ali, 1974). Normal dose of nitrogen throughout Bangladesh is 110 lbs/acre, but experiments at Carew & Co., and JSM show that 200 lbs. nitrogen per acre produced the highest yield. Therefore, the experiment was conducted at SRI farm to determine the proper dose of nitrogen to get higher yield of cane and sugar.

MATERIALS AND METHODS

The experiment was conducted during 1979-80 cropping season at Sugarcane Research Institute farm soil condition. The cane variety Co. 1158 was cultivated for getting response of different level of N such as 0, 80, 125, 170 and 215 kg/ha. The treatments were distributed in a randomized block design with four replications. Three eyed assorted setts were planted in plots measuring 10mx10m with interrow spacing of 1.06m and the gap between plots and blocks being 1.52m & 1.82m respectively.

A blanket dose of 125 kg P_2O_5 and 110 kg K_2O /ha were applied in all plots. Full dose of TSP & one third of MP and Urea were applied in trenches at planting. The rest of MP and Urea were applied in two equal instalments, one at tillering stage and the rest quantities in early June at growth stage. Before plantation, soil samples were collected and analysed for total Nitrogen and other properties like soil texture, pH & organic matter.

Data on germination, tillers, number of millable cane, cane yield, percent recovery of sugar and sugar production were recorded and their interpretations were based on statistical analysis.

RESULTS AND DISCUSSION

Soil of the experimental plots was silty-clay with pH 8.1, Organic matter 1.038% and total nitrogen 0.086%.

Data on germination, tillers, millable cane, % recovery, tons cane per hectare (TCH) and tons sugar per hectare (TSH) are presented in Table-1. Nitrogen application did not affect germination in any treatment. Number of tillers significantly increased at higher levels of N, the highest millable cane being produced at 170 kg N/ha.

Table 1. Effect of different levels of nitrogen fertilizer on germination, tillers, millable cane, TCH, % recovery of cane and TSH.

N-level kg/ha	Germination %	No. of tillers/ha ('000')	Millable cane/ha ('000')	Cane yield (TCH)	Recovery of sugar (%)	Sugar yield (TSH)
N ₀	47	123.43	84.94	67.78	9.90	6.69
N ₈₀	47	155.83**	88.87	87.07*	9.32	7.19
N ₁₂₅	46	154.72**	99.64**	91.51**	8.56**	7.81
N ₁₇₀	46	161.64**	101.12**	99.12**	8.54**	8.84**
N ₂₁₅	46.5	164.65**	97.74**	104.48**	8.00**	8.35*
LSD (5%)	N.S	5.60	2.49	5.78	0.60	0.49
LSD (1%)	N.S	8.43	3.75	8.10	0.91	0.68

* Significant at 5% level.

** Significant at 1% level.

A positive effect was found on total yield (Table 1). Tons cane per hectare (TCH) increased with increasing N level which corresponds to the number of millable cane (Table-1). The application of 215 kg N gave the highest yield of cane (104.48 TCH) but decreased sugar per hectare (TSH). On the contrary 170 kg N gave the highest TSH compared to 215 kg N. Similar result was obtained by the application of 200 lbs N/acre (Islam & Ali, 1979) where 34.62 & 46.11 TCA were produced at JSM and Carew & Co. farms respectively.

An increase in the level of N fertilization caused significant reduction in sucrose content in juice. This probably resulted in plant succulence following application

of high dose of nitrogen and consequently tons sugar per hectare was decreased (Fig. 1). This result agrees with the finding of Dillewijn (1952) who record that

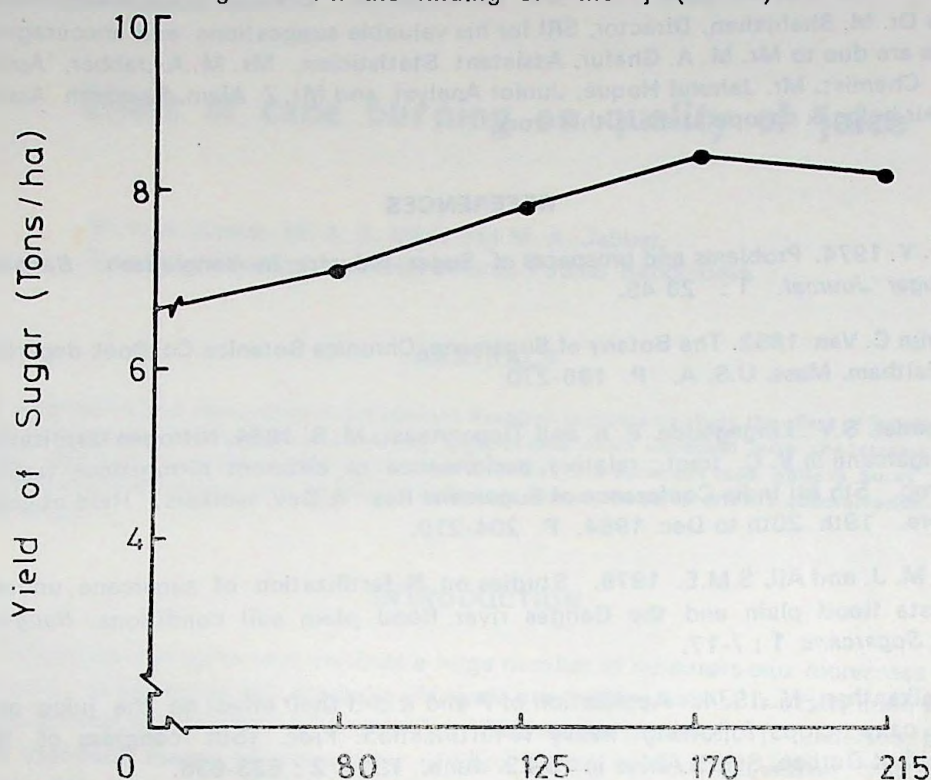


Figure 1. Effect of different levels of nitrogen on yield of sugar.

under Java conditions sugar yield follows the cane response to nitrogen until an optimum cane tonnage is reached, beyond which the sugarcane follows the rendement curve, gradually declining with increasing nitrogen. Similar results were also obtained by several workers (Lakshikantan, 1974 ; Singh, 1975 and Wang, 1976.)

The results of the two experiments conducted at JSM and Carew & Co. Farms (Islam & Ali, 1979) and this experiment conducted revealed that the present recommended dose of N fertilizer was insufficient for getting higher yield and sugar production. In order to bring the yield of sugar and cane at desired level, the rate of nitrogen needs to be increased at certain level.

Considering the yield of cane and sugar at Sugarcane Research Institute Farm following different doses of nitrogen, it is suggested that the optimum dose of nitrogen per hectare may be 170 kg.

ACKNOWLEDGEMENT

The authors are very much indebted to Dr. M. A. Hamid Miah, Principal Cane Entomologist, for helpful criticism and suggestions in the preparation of this paper. We

are also grateful to Mr. A.H.M. Delwar Hossain, Principal Cane Agronomist, for his helpful guidance and suggestions in the investigation. Grateful acknowledgement are due to Dr. M. Shahjahan, Director, SRI for his valuable suggestions and encouragement. Thanks are due to Mr. M. A. Ghafur, Assistant Statistician, Mr. M. A. Jabber, Assistant Sugar Chemist, Mr. Jahurul Hoque, Junior Analyst and Mr. Z. Alam, Research Assistant for their helps & co-operation in this work.

REFERENCES

- Ali, M. Y. 1974. Problems and prospects of Sugar Industry in Bangladesh. *Bangladesh Sugar Journal*. 1 : 26-45.
- Dillewijn C. Van. 1952. The Botany of Sugarcane, Chronica Botanica Co. Book department, Waltham, Mass, U.S. A. P. 196-270.
- Hiregoudar, S.V., Lingegouda, B. K. and Tippannavar, M. B. 1964. Nitrogen fertilization to Sugarcane in V. C. tract; relative performance of different nitrogenous fertilizers. Proc. 5th All India Conference of Sugarcane Res. & Dev. workers. Held at coimbatore. 19th 20th to Dec. 1964. P. 204-210.
- Islam, M. J. and Ali, S.M.E. 1979. Studies on N-fertilization of sugarcane under the Tista flood plain and the Ganges river flood plain soil conditions. *Bangladesh J. Sugarcane* 1 : 7-17.
- Lakshmikanthan, M. 1974. Application of P and K and their effect on the juice quality of cane crops following heavy N-fertilization. Proc. 15th congress of ISSCT held at Durban, South Africa in 13-20 June, 1974, 2 : 633-636.
- Raganathan, V. 1964. Response curve for nitrogen fertilization in sugarcane. Proc. 5th All India conference of sugarcane Res. & Dev. Workers Coimbatore, 1964, P. 158-168.
- Singh S. K. 1975. Nitrogen and sugarcane, *Indian Sugar*. 24(12) : 1023-1026.
- Wang, Chwa-Chan. 1976. The effect of fertilizer application on sucrose content of sugarcane. *Taiwan Sugar*. 23(4) : 167-171.