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Effect of Nitrogen Fertilizer on Irrigated and Rainfed Spaced Transplanted Sugarcane

M.H. Rahman, M. Khondaker, S.K. Pal, F. Alam, M.A. Majid, M.W. Zaman and M.Y. Ali
Sugarcane Research & Training Institute,
Ishurdi, Pabna. Bangladesh

ABSTRACT

A field experiment was conducted to determine the nitrogen requirement of irrigated and rainfed spaced transplanted sugarcane. Different doses of N fertilizer were added to each of irrigated and rainfed plot. Equal number of seedlings was transplanted in all plots. The response of tiller, millable cane, yield of cane and sugar to applied N were recorded. Yield increases due to nitrogen fertilizer with or without irrigation were significant over control and 160 kg N ha^{-1} produce maximum yield in both the cases. Highest number of tiller was obtained at 150 d of transplanting and 30 to 40 percentage tiller produced, no of millable cane with or without irrigaticon. Sugar recovery was not affected by nitrogen fertilizer.

INTRODUCTION

Nitrogen is the main growth regulating nutrient of sugarcane. It affects both cane yield and sugar production. Thus a sound fertilization of nitrogenous fertilizer is very essential for cane growth and development. In 1980 Indian Council of Agricultural Research (ICAR) reported that 70 tonne cane removes 85-100 kg N ha^{-1} from Soil. Therefore additional nitrogen is required for proper growth and development, and to supplement the losses of N from the soil through leaching, fixation, volatilization and other causes. Singh and Singh (1972) stated that the rate of nitrogen application varies from place to place on the basis of soil fertility, productivity, agro-climatic condition and other factors.

In Bangladesh the recommended dose nitrogen fertilizer for sugarcane is 125 kg N ha^{-1} (Ali, 1974). But Rahman and Khalequzzaman (1981) obtained highest yield of cane with 200 kg N ha^{-1} at Jaipurhat sugar mills and in India the highest yield was obtained with 250 kg N ha^{-1} (Boramanikar and Borole, 1983). Spaced transplanting of sugarcane is a new planting technique of sugarcane. In this method uniform stand cane be maintained. Thus the production of millable cane and yield of cane and sugar is higher than the conventional planting method. Considering the above situations studies were undertaken with various doses of nitrogen to find out optimum dose of N for irrigated and non-irrigated spaced transplanted sugarcane.

MATERIALS AND METHODS

A field experiments were carried out at Sugarcane Reseach and Training Institute (SRTI) farm, Ishurdi in the cropping season 1987-88. The treatments were 0,80,120, 160 and 200kg N ha^{-1} from urea, which were arranged with irrigated and rainfed condition and were replicated four times in RCB design. Soils of SRTI farm are Ganges River Flood Plain and calcareous in type. The major properties of these soils are presented in the Table 1.

Recommended dose of phosphorus (120 kg $P_2O_5 ha^{-1}$), potash (110 kg K_2O ha^{-1}), sulphur (30 kg s ha^{-1}) and Zinc (8 kg Zn ha^{-1}) fertilizer were applied in the form TSP,

MP, Gypsum and Zinc-oxide respectively. Half of K and full of P, S and Zn fertilizer were applied in pit, at the time of transplantation. After 15 d half dose of N fertilizer was applied. The rest half of N and K were top-dressed at 120 d of transplantation. One month old polybag settlings of LJC variety were transplanted in November. Intercultural operations, pest and disease control measures were done in time. In case of irrigated sugarcane three irrigations were given at 60 and 120 d of transplanting.

Data on tiller number, millable cane, yield of cane and sugar were recorded at harvest. Soil samples were also collected before set up experiments.

Soil texture was determined by hydrometer method, organic carbon by wet oxidation method, pH by a glass electrode pH meter and total nitrogen by kjeldahl method. Available P was determined by using 0.5 M $NaHCO_3$ extraction in spectrophotometer. Exchangeable K was determined by 1M NH_4OAC extraction in flame photometer and available S was determined by turbidimetric spectrophotometer method (Black, 1965).

RESULTS AND DISCUSSION

Data on tiller production are shown in the Table 2. It is evident from the result that N fertilizer had some effects on tiller production. The maximum number of tiller production was obtained at 150 d under both irrigated and rainfed condition. After 150 d of transplantation tiller number was decreased. Similar results were obtained by Thomas *et al.* (1985). They obtained maximum vegetative growth during fifth month of growth stage. Application of nitrogen fertilizer produced higher tiller over control. It is also seen from the result that tillering to harvesting stage 30-40% tiller fail to produce any millable cane. Maximum number of tiller was obtained with the treatment of 160 kg N ha^{-1} under both rainfed and irrigated condition, as shown in Table 2.

Table 1. Major pre-planting Soil properties of experimental plots.

Texture	pH	Organic carbon (%)	Total N (%)	Available P (ppm)	Exchangeable K (me%)	Available S (ppm)
Sandy loam	7.5	0.58	0.053	18.5	0.16	8.5

Addition of nitrogen fertilizer and irrigation both shown positive response on millable cane production. It is observed from the result that higher number of millable cane were obtained in irrigated than rainfed condition which has been shown in Table 3. Maximum number of millable cane were obtained with 160 kg N ha^{-1} both under irrigated and rainfed condition. Application of 80,120,160 and 200 kg N ha^{-1} increased cane yield about 7.0, 5.4, 28.4 and 23.2% at rainfed condition, whereas under irrigated

condition the increasing trend to cane yield were about 10.7, 28.6, 35.6 and 25.8% respectively.

Table 2. Number of tiller production in different stage.

Treatment kg ha^{-1}	Irrigated			Rainfed		
	No. of tiller ha^{-1} in '000'			No. of tiller ha^{-1} in '000'		
	at 120 d	at 150 d	at 180 d	at 120 d	at 150 d	at 180 d
No	100.6 ab*	135.0 ab	112.9 bc	79.6 ab	92.6 ab	90.6 ab
N_{80}	105.8 ab	140.3 ab	112.7 b	103.8 a	104.7 a	98.5 ab
N_{120}	120.7a	155.7 ab	127.8 ab	101.4 a	103.8 ab	94.4 ab
N_{160}	128.4 a	162.3 a	139.0 a	106.2 a	130.0 a	108.5 ab
N_{200}	119.5 a	151.9 a	135.2 a	100.4 a	101.2 a	100.2 a

*Figures accompained by the same letters are not significantly different at 5% level of probability.

Table 3. Effect of nitrogen fertilizer in different growth parmeters of spaced transplanting sugarcane.

Condition	Treatments (kg ha^{-1})	No. of millable cane ha^{-1} (000)	Yield of cane (TCH)	Recovery (%)	Yield of Sugar (TSH)
Rainfed	No	79.5 b*	74.7 b	11.0 a	8.2
	N_{80}	90.2 b	79.9 b	10.7 a	8.6
	N_{120}	98.0 a	78.7 b	10.8 a	8.5
	N_{160}	100.6 ab	95.9 a	10.9. a	10.5
	N_{200}	106.4 ab	92.0 a	10.3 a	9.5
Irrigated	No	105.7 d	79.1 cd	11.0 a	8.7
	N_{80}	108.2 cd	87.6 bc	11.1 a	9.7
	N_{120}	120.6 a	101.8 a	11.3 a	11.5
	N_{160}	123.7 abc	107.3 a	11.0 a	11.8
	N_{200}	118.2 ab	99.5 ab	10.7 a	10.6

* Figures accompanied by the same letter are not significantly different at 5% level of probability.

Highest yield of cane were obtained with the treatment of 160 kg N ha^{-1} under both conditions and it was significant over control. Similar result was also obtained by Rahman and Khalequzzaman (1981). It is observed from the result that nitrogen fertilizer had no significant effect on sucrose content of sugarcane. However, highest yield of sugar was obtained with the treatment of 160 kg ha^{-1}. It was due to higher yield of cane.

It may be concluded from the result that at least 2-3 irrigations and 160 kg N ha^{-1} could be recommended for maximum yield of sugarcane.

REFERENCES

Ali, M.Y. 1974. Problems and Prospect of sugar Industry in Bangladesh. *Sugar Journal,* **1 :** 26-45.

Black, C.A. 1965. Methods of Soil analysis (Pt-2). Agronomy series No. 9 Am. Sc. Agronomy. Madison, Wisconsin, P. 914-1378.

Boramanikar, P.K. and Borole, R.D. 1983. Effect of timely application of balanced fertilizer on sugarcane yield. *Maharastra Sugar,* **8 :** 51-52.

ICAR, 1980. Hand Book of Agriculture. Indian Council of Agricultural Research, New Delhi. P. 203-246.

Islam, M.J. and Ali, S.M.E. 1979. A study on the effect of application of NPK fertilizers on growth, yield and sucrose content of sugarcane. *Bangladesh J. Sugarcane,* **3 :** 5-8.

Rahman, M.H. and Khalequzzaman, C. 1981. Studies on nitrogen requirement for sugarcane at Sugarcane Research and Training Institute farm. *Bangladesh J. Sugarcane,* **1 :** 18-24.

Singh, O. and Singh, B.P. 1972. Response of mid-season and late varieties of sugarcane to nitrogen. *Indian Sugar,* **21 :** 10.

Thomas, J.R.; Scott, A.W. and Wiedenfeld, R.P. 1985. Fertilizer requirement of sugarcane in Texas. *Proc. ASSCT,* **4 :** 62-72.