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Effects of Nitrogen on Spaced Transplanted Sugarcane

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ABSTRACT

A field experiment was conducted to determine the N requirement of spaced transplanted sugarcane. Different rates of nitrogen fertilizer were applied in each plot, where equal number of settlings were transplanted. The response of sugarcane with increasing rate of nitrogen dose in terms of cane and sucrose content, number of millable cane and N percentage in cane leaves were determined. Yield increases due to N application were significant over control only, but insignificant among the treatments. Tiller production was found maximum in the month of May. Number of tiller and millable cane were significantly increased over control. Yield of cane was the highest at 160 kg N/ha. Sucrose content was not affected by application of nitrogenous fertilizer. N contents of third leaves of cane increased with the application of nitrogenous fertilizer.

INTRODUCTION

Sugarcane growth is mainly enhanced by nitrogen than any other plant nutrients. Nitrogen affects both cane yield and sugar production. Nitrogen deficiency at the primary growth stage of cane may decrease cane yield, while excess N during the ripening process deteriorate juice quality and sugar content (Thomas *et al.*, 1978). Standford and Ayres (1964) reported that sugarcane required about 1 kg of N for each metric ton of millable canes. In Louisiana, recommended N fetilization rate for sugarcane is 90 to 134 kg N/ha (Curitis and Loupe, 1975). Parishar (1971) reported that 112 kg N/ha increased cane yield and thereafter increased dose of N decreased the cane yield significantly for the southern region of Rajasthan. So, nitrogen requirement varies from place to place depending on the climatic and soil inherent condition. Therefore, on the basis of above situation an experiment on N requirement for spaced transplanted sugarcane was conducted at Ganges River Flood Plain soils.

MATERIALS AND METHODS

A field experiment was carried out at Sugarcane Research & Training Institute farm, Ishurdi during 1985 - 86 cropping season. The treatments of nitrogen were 0, 80, 120 and 160 kg/ha from urea and replicated four times in RCB design. The results of soil analysis prior to transplanting of sugarcane settlings are shown in Table 1.

Table 1. Soil analysis to a depth of 30 cm prior to the transplantation.

Texture	Organic carbon (%)	pH	Nitrogen (%)	Available P (ppm)	Exchange-able K (me %)	Available S (ppm)	Available Zn (ppm)
Sandy loam	0.66	7.5	0.047	10	0.17	4	1.2

Recommended doses of 120 kg P_2O_5, 110 kg K_2O, 30 kg S and 8 kg Zn/ha were applied from TSP, MP, gypsum and zinc oxide respectively. Half of K fertilizer and full of P, S, and Zn fertilizer were applied in the trenches at the time of transplantation. After 15 days, half dose of N-fertilizer was applied. The rest half of N and K were applied as top-dressing at 120 days of transplantation. Poiybag settlings of one month aged Isd-2/54 sugarcane variety were transplanted in November. Intercultural operations, pest and disease control measures were taken in due time.

The cane height, number of tiller, millable cane and total yield of cane were recorded. Juice of five randomly selected stalks from each plot was analysed for sucrose content. Leaf samples were collected from the third leaf at tillering stage and analysed for nitrogen content.

Particle size distribution was determined by hydrometer method, soil pH was measured by glass electrode, total N was determined by kjeldhal method (Jackson, 1973), organic carbon by wet oxidation method (Walkley and Black, 1947), available P ($NaHCO_3$ extractable) and total P (di-acid digest) by standard amonium molybdate method (Black, 1965), exchangeable K (NH_4OAC extractable) and total K (di-acid digest) by flame photometer (Black, 1965).

RESULTS AND DISCUSSION

Data on tiller production are shown in the Figure 1. Number of tiller counted monthly from February to June. Increasing amount of N fertilizer had a marked effect on the number of tiller before the formation of complete leaf conopy. Tiller production was highest in the month of May, beyond this period number of tillers decreased. At harvest millable cane number were found lower. Thomas *et al.* (1985) found that the maximum vegetative growth were attained during the fifth month of growth. Nitrogen application significantly increased number of tillers over control, but the increasing proportion among the treatments were small (Figure 1). Results showed that about 40% tillers did not produce any millable cane but millable cane was significantly increased with the application of nitrogen along with the recommended doses of P, K, S and Zn fertilizers as shown in the Table 2. Nitrogen application significantly increased cane yield over control which are shown in Table 2. Increasing amont of N application increased yield, but the results were statistically insignificant. Raghvaiah and Singh (1980) reported that maximum yield of cane was obtained with the application of 100 kg N/ha. The highest yield of cane was obtained at 160 kg N/ha, whereas, the application of 80 kg, 120 kg and 160 kg N/ha increased cane yield at about 38.11%, 44.25% and 47.4% over control respectively. The percent increase of cane yield among the N doses was negligible. A general decline of yields of nonfertilized sugarcane indicated that the soils capacity to supply N was not sufficient to obtain higher cane yield without supplying nitrogen from outside as fertilizer. Nitrogen application did not show any significant effect on sucrose content of cane. Thomas and Schmidt (1981) reported that the application of N fertilizer @ 112 kg N/ha significantly decreased the brix, pol and purity content of juice. The highest increasing yield of sugar was obtained with the corresponding yield of cane. The samples of third leaf were collected in the month of May. Leaf N content was increased with nitrogen application. N content of leaves due to

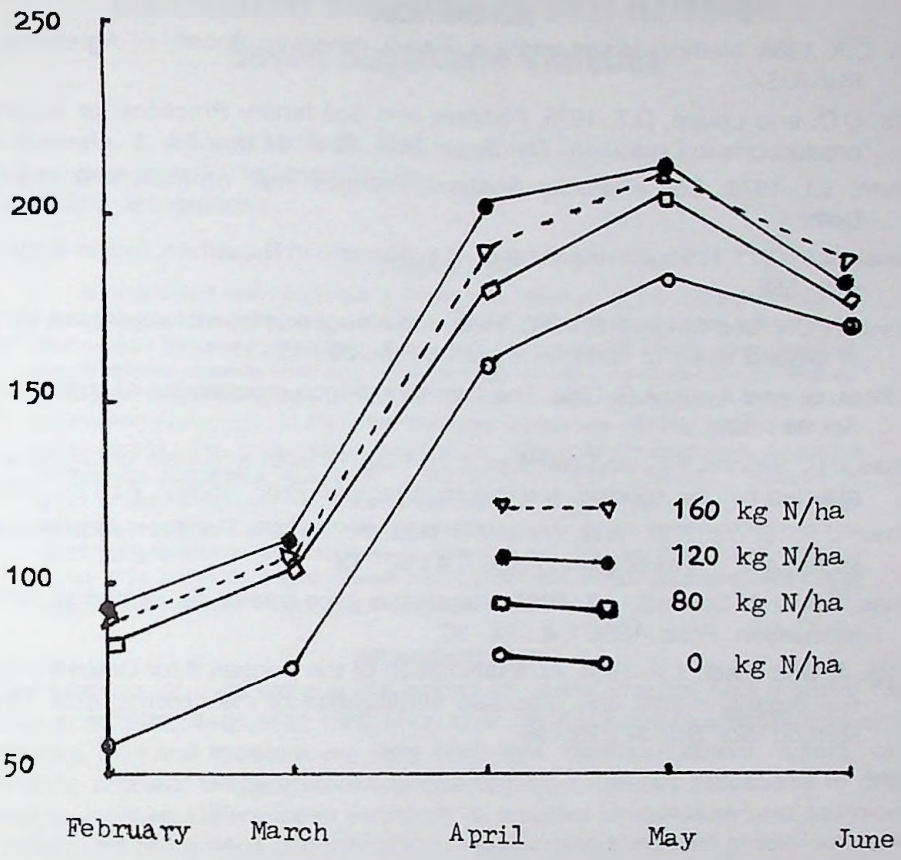

Figure 1. Effects of nitrogen on tiller population in different months.

N fertilizer application had little differences among the treatments (Table 2). It may be concluded that 160 kg N/ha could be recommended for spaced transplanting of sugarcane for Ganges river flood plain soil for profitable cane production.

Table 2. Effects of nitrogen on millable cane, cane yield, percent recovery, sugar yield and N content of leaf.

N (kg/ha)	Millable cane (10^3/ha)	Yield of cane (t/ha)	% Recovery	Yield of sugar (t/ha)	N-content of leaf (%)
0	73.1	80.7	10.6	7.6	1.2
80	83.9	104.6	10.5	10.5	1.4
120	84.5	107.1	10.7	10.9	1.5
160	86.8	111.8	10.3	10.8	1.5
LSD (5%)	7.7	11.4	1.0 (NS)	1.8	
LSD (1%)	11.1	16.5	- NS	1.2	

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