

Studies on NPK Fertilizer Requirement of Isd.16

M. K. A. Chowdhury, M. H. Rahman and S. M. S. Hasan
Sugarcane Research & Training Institute,
Ishurdi, Pabna, Bangladesh.

ABSTRACT

An experiment was conducted in the Gangetic river flood plain soil condition of SRTI Farm with a view to studying the response of newly developed sugarcane variety to N, P & K fertilizers. The yield of cane was found to be positively correlated with the increasing level of NPK fertilizer, but in respect of varietal difference Isd.16 gave maximum yield of cane. Fertilizer application did not affect recovery (%) of sugar, on the other hand new variety ISD.16 gave highest recovery (%) of sugar. The fertilizer level such a $N_{125} P_{125} K_{110}$ appeared to be the most profitable combination in this study.

INTRODUCTION

Sugarcane is a heavy consumer of plant nutrients. Nutrient requirement of Sugarcane varieties differs from place to place according to the soil and climatic conditions (Davidson, 1962; Rao and Narasimham, 1956). Some varieties have the ability to absorb and utilize more nutrients from a soil under the same climatic conditions and produce more cane and sugar (Humbert 1968). Increased yields of sugarcane have been obtained from applications of nitrogen, phosphate and potash to most of soils (Tabayoyong and Robeniol, 1962). Fertilizers are generally applied when deficiency exists in a soil. The application of one element usually results in changes in the concentrations of other element (Humbert, 1968). Improper balance of nutrients affects the effectiveness of the added fertilizer and this also deteriorates physical properties of soil which ultimately affect the growth and yield of sugarcane. In order to get optimum sugarcane yield nutrient requirements have to be supplemented through applications of nitrogen, phosphate and potash. Therefore, present study was undertaken to determine the maximum requirement of nitrogen, phosphate and potash for Isd.16 variety.

MATERIALS AND METHODS

The experiment was carried out with Isd.16 under SRTI farm soil conditions. SRTI farms soils fall under the physiographic unit of the Ganges river flood plain. The characteristic of SRTI soil is silty clay, having pH-7.6, total N-O. 088%, available P-7 ppm, exchangeable (m.e. %) K-1.20 and organic matter 1.453%, A newly developed variety Isd. 16 along with a commercial variety Co.1158 used as a check were grown with different levels of N, P & K fertilizer.

Treatments were as follows :-

	N (kg/ha)	P ₂ O ₅ (kg/ha)	K ₂ O (kg/ha)
T ₀	= 0	0	0
T ₁	= 83	83	55
T ₂	= 123	125	110
T ₃	= 165	165	165
T ₄	= 206	206	221

Nitrogen, phosphate and potash were used as Urea, TSP and MP respectively. The experiment was laid out in split plot design. Five treatments were replicated four times. The size of each plot was 10m x 10m and spacing between blocks, between rows were 1.8m and 1m respectively. Fertilizer was put in main plot and variety in sub-plot. Three budded equal numbers of assorted setts were planted in end to end method to each plot. Intercultural operations were done as and when necessary. The cane was planted in December, 1979 and harvested in December, 1980. Before planting soil samples were collected and analysed for pH organic matter, N,P and K. Data on yield of cane were recorded, recovery (%) of sugar were determined from where total sugar production were calculated.

RESULTS AND DISCUSSION

Data on yield of cane, recovery (%), and yield of sugar as well as the data on economic yield of cane are shown in table 1 and 2 respectively. The yield of cane was increased gradually at higher levels of fertilizer (Table 1). Optimum yield

Table 1. Effect of NPK fertilizer on the yield of cane, % recovery and sugar yield.

Treatments (kg/ha)	Yield of cane (Tons/ha)		Recovery % of sugar		Yield of sugar (Tons/ha)	
	Isd. 16	Co. 1158	Isd. 16	Co. 1158	Isd. 16	Co. 1158
T ₀ =N ₀ P ₀ K ₀	87.76	88.13	10.70	8.41	9.39	7.41
T ₁ =N ₈₃ P ₈₃ K ₅₅	101.34	95.74	10.67	9.45	10.81	9.05
T ₂ =N ₁₂₅ P ₁₂₅ K ₁₁₀	111.57	104.88	10.27	9.00	11.46	9.44
T ₃ =N ₁₆₅ P ₁₆₅ K ₁₆₅	109.37	107.44	10.40	8.97	11.37	9.64
T ₄ =N ₂₀₆ P ₂₀₆ K ₂₂₁	109.57	98.80	10.72	8.77	11.75	8.66
Mean	103.92	99.00	10.55	8.92	10.95	8.84
LSD(5%) between levels of NPK	10.84		1.12	NS	1.62	
LSD(5%) between varieties	5.04		0.37		0.62	

was obtained at T_2 & T_3 levels in Isd.16 & Co. 1158 respectively. Result were statistically significant over control. Results showed that the application of 125 kg N, 125 kg P_2O_5 and 110 kg K_2O per hectare improved cane yield in both varieties. Over all T_2 treatment produced higher cane yield (111.57 tons/ha) as compared with other treatments in Isd. 16. Raghaviah & Singh (1980) also obtained maximum yield with the application of 100 kg and 150 kg N per hectare in variety Co.1136 and Co.1148 respectively. In comparison with the commercial variety Co. 1158, the new variety Isd.16 proved higher yielder (Table 1). Chemical analysis of juice was performed at the time of harvest. Different doses of applied NPK fertilizer did not cause any improvement on juice quality (Table 1). This agrees with results of Lakshmikanthan (1974) who reported that the application of phosphate or potash individually or in combination, to crops grown on normal soils where large quantities of nitrogenous fertilizer have been applied would result in a significant improvement in the sucrose content of the juice. Kadian *et al.* (1981) also had the same observation. As the sucrose % between levels of fertilizer did not indicate significant variation the cane yield factor might have contributed to the enhanced sugar/ha for higher levels of added fertilizer. Isd.16 produced the highest sugar at T_4 (11.75 tons/ha) at par with T_2 (11.46 tons/ha) and T_3 (11.37 tons/ha). Co. 1158 produced highest sugar at T_3 (9.64 tons/ha) level at par with T_2 (9.44 tons/ha). These treatments were significant over control.

The return per taka investment in NPK fertilizer for Isn-16 was high at T_2 level (Tk. 4.23). The return per taka investment for Co.1158 was also high (Tk. 3.00) at T_2 level (Table 2). Table 2 indicates that the return per taka investment was high in new variety Isd-16 than commercial variety Co.1158 at the same level of fertilizer i.e. at T_2 level.

Table 2. Economy on yield of sugarcane in different levels of NPK fertilizer*

Treatment (kg/ha)	Isd. 16			Co. 1158		
	Yield of cane (tons/ha)	Yield response to NPK fertilizers (tons/ha)	Cost/benefit ratio between fertilizer & yield per taka investment	Yield of cane (tons/ha)	Yield response to NPK fertilizers (tons/ha)	Cost of benefit ratio between fertilizer & yield per taka investment
$T_0 = N_0P_0K_0$	87.76	—	—	88.13	—	—
$T_1 = N_{83}P_{83}K_{55}$	101.34	13.59	1:3.83	95.74	7.61	1:2.15
$T_2 = N_{125}P_{125}K_{110}$	111.57	23.81	1:4.23	104.88	16.75	1:3.00
$T_3 = N_{165}P_{165}K_{165}$	109.37	21.61	1:2.83	107.44	19.31	1:2.50
$T_4 = N_{200}P_{200}K_{221}$	109.57	21.81	1:2.25	98.90	10.67	1:1.00

Cost of Urea : Tk. 3.54/kg.

Cost of cane : Tk. 0.40/kg

Cost of TSP : Tk. 2.95/kg

Cost of MP : Tk. 2.41/kg

* Cost of General cultivation and cultural practices were the same in all treatments.

It is suggested from the results of the experiment at SRTI farm and also from the economic point of view that the fertilizer rate for plant cane of new variety Isd.16 may be 125 kg N, 125 kg P_2O_5 and 110 kg K_2O per hectare.

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