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The Effect of Split application of Nitrogen and Potash Fertilizers on Sugarcane

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ABSTRACT

An experiment was carried out in two locations at Sugarcane Research & Trianing Institute and Setabganj Sugar Mills farm to find out the critical period and effect of time application of the recommended dose of N and K fertilizers.

In both locations split application of Nitrogen and Potash did not affect germination. Split application of N and K into two equal halves i. e. 1/2N+1/2K at planting and the rest 1/2N+1/2K after 120 days of planting significantly improved yield of cane and sugar.

INTRODUCTION

Yield of cane per unit area is low in Bangladesh. The purpose of fertilizers applications is to increase production per unit area. Sugarcane being a long duration and high yielding crop removes large quantity of nutrients from soil. Parthasarathy (1972) reported that a 46 ton crop of sugarcane removes from soil 164 lbs nitrogen and 398 lbs potash. Requirement of nutrients have to be supplemented through application of fertiiizers in time. Timely fertilization is the key for maximum benefit from the added fertilizers. Untimely application often leads to considerable loss of nitrogen and other elements through leaching surface runoff and volatilization as gaseous ammonia and thereby results in poor crop response (Singh, 1974). There are differences of opinion regarding time of nitrogen fertilizer application. Some workers recommend full dose of nitrogen fertilzer application at planting and others prefer split application.

Parthasarathy (1972) found that 40-50% of N and K_2O are taken up in October-December and 15-20% of P_2O_5 taken up in the first 6 months of plantation. Bhoj *et. al.* (1974) reported that the best practice would be to apply the fertilizer in two instalments i.e. half at the time of planting and the rest half at tillering. The application of full dose of ammonimum sulphate at planting is generally harmful to the crop. The suitable time of nitrogen fertilizer application is 90-120 days for spring planted crop (Srivastava, 1971).

Therefore, present study was undertaken to find out the proper time of application of nitrogen and potash.

MATERIALS AND METHODS

The experiment was conducted at Sugarcane Reasearch Institute and Setabganj Sugar Mills, Kanta Farm and their soil series are as calcarious, Silty Clay, Ganges River flood plain, and Non-Calcareous, sandy loam, flood plain soil. Major properties of these soils are given below.

Location	Texture	pH	Cation exchange capacity (m.e.%)	Organic C (%)	Total N (%)	Available P (ppm)	Exchangeable K (m.e.%)
SRTI	Clay loam	7.80	38.00	0.68	0.068	12.00	1.02
STSM	Sandy loam	5.55	13.50	0.58	0.042	15.30	0.76

Soil analysis:Soil texture was determined by soil hydrometer method, organic carbon was determined by wet oxidation mathod. Total N was determined by macro Kjeldahl method. The 0.5 M $NaHCO_3$ extraction method described by Black (1965) was followed for the determination of available P. Exchangeable K^+ was determined from neutral normal ammonium acetate extract by flame photometer (Black, 1965).

The experiments were laid out in randomized block design with nine treatments replicated four times. The variety Isd.16 was used in both experiments. The treatments consisted of spliting the usually applied dose of 125 kg/ha N and 110 kg/ha K_2O at SRTI and 123 kg/ha N and 163 kg/ha K_2O at STSM as follows :-

T_1 — Full N and K at planting.

T_2 — Full N + $^1/_2$ K at planting and $^1/_2$ K after 120 days of planting.

T_3 — Full N + $^1/_3$ K at planting ; $^1/_3$ K after 120 days of planting and $^1/_3$ K after 180 days of planting.

T_4 — $^1/_2$ N + Full K at planting and $^1/_2$ N after 120 days of planting.

T_5 — $^1/_2$ N + $^1/_2$ K at planting and $^1/_2$ N + $^1/_2$ K after 120 days of planting.

T_6 — $^1/_2$ N + $^1/_3$ K at planting, $^1/_2$ N + $^1/_3$ K after 120 days of planting and $^1/_3$ K after 180 days of planting.

T_7 — $^1/_3$ N+Full K at planting, $^1/_3$ N after 120 days of planting and $^1/_3$ N after 180 days of planting.

T_8 — $^1/_3$ N + $^1/_2$ K at planting, $^1/_3$ N + $^1/_2$ K after 120 days of planting and $^1/_3$ N after 180 days of planting.

T_9 — $^1/_3$ N + $^1/_3$ K at planting, $^1/_3$ N + $^1/_3$ K after 120 days of planting and $^1/_3$ N + $^1/_3$ K after 180 days of planting.

Three budded equal number of assorted setts were planted in end to end method. Plot size was 9.6 m x 6.4 m. Spacing of cane rows was 1.00 m and the distance between blocks and between plot 1.8 m and 1.5 m respectively. Blanket doses of 123 kg/ha P_2O_5 at SRTI and163 kg/ha P_2O_5 at STSM were applied in all plots at the time of planting. Cane was planted in November, 1980 and harvested in January, 1982. Soil samples were collected before plantation of crop and analysed for N,P,K and other related properties. From the experimental data on germination, millable cane, yield of cane, recovery (%) of sugar and total sugar production were collected and analysed.

RESULTS AND DISCUSSION

Data of cane yield and other growth parameters of SRTI and STSM farms are presented in the Tables 1 & 2 respectively.

The data presented in the Tables 1 & 2 reveals that the different time of application of fertilizer did not effect germination in both the locations. Islam *et. al.*, (1980) also noted that split application of nitrogen did not affect germination. Table 1 indicates that split application of nitrogen and Potash had a positive

Table 1. Effect of different treatments on germination, millable cane, MTCH % recovery and MTSH at SRTI.

Treatments	Germination (%)	No. of millable cane/ha.('000')	Yield of cane (MTCH)	% recovery	Yield of sugar. (MTSH)
T_1	36.55 a*	71.56 a	71.95 ab	11.94 a	8.56 a
T_2	37.69 a	72.86 ab	74.88 abc	11.88 a	8.90 ab
T_3	35.75 a	74.00 abc	68.32 a	11.66 a	7.97 a
T_4	35.98 a	82.54 cd	84.98 cde	12.00 a	10.10 cd
T_5	38.14 a	84.81 d	92.02 e	12.14 a	11.17 d
T_6	36.95 a	84.21 d	89.11 de	11.85 a	10.55 cd
T_7	37.96 a	81.89 bcd	83.25 cde	10.05 a	9.97 bc
T_8	34.57 a	80.10 abcd	79.58 bcd	12.31 a	9.79 bc
T_9	32.27 a	84.25 d	81.89 bcde	12.04 a	9.86 bc

* Figures having different letters are significant at 5% level as per DNMR test.

Table 2. Effect of different treatments on germination, millable, MTCH' % recovery and MTSH at STSM.

Treatments	Germination (%)	No. of millable cane/ha. ('000')	Yield of cane (MTCH)	Recovery(%) of sugar	Yield of sugar (MTSH)
T_1	28,30 a*	72.82 a	53.25 a	11.30 a	6.00 a
T_2	31.74 a	73.64 a	56.50 a	11.32 a	6.39 a
T_3	32.89 a	74.81 a	53.98 a	11.31 a	6.10 a
T_4	31.74 a	74.16 a	56.36 a	11.60 a	6.52 a
T_5	33.16 a	83.03 a	58.37 a	11.39 a	6.64 a
T_6	32.77 a	81.89 a	53.07 a	11.23 a	6.97 a
T_7	30.51 a	70.14 a	54.06 a	11.42 a	6.17 a
T_8	32.80 a	76.36 a	53.88 a	11.29 a	6.08 a
T_9	32.98 a	78.03 a	55.38 a	11.25 a	6.22 a

* Figures having different letter are significant at 5% level as per DNMR test.

effect on millable cane and the results were significant. Maximum millable cane was obtained from T_5 (84,806 millable cane/ha) treatment i. e. split application of half nitrogen and potash at planting and rest half after 120 days of planting Lowest number of millable cane pet hector was found T_1 treatment. At STSM also T_5 treatment produced higher number of millable cane, but the results ware insignificant.

It was evident from the data that cane yield was significantly increased with the application of nitrogen and potash in time (Table 1). T_5 produced highest cane yield (92.02 Tons/ha) and it was statistically significant among the treatments. This may be due to the higher number of millable cane. Narwal and Malik (1981) also found increased yield due to split application of fertilizers. Lowest yield (68.32 MTCH) was obtained, where all the N was applied at the time of planting. It happened due to volatilization of nitrogen. The late planted cane the highest yiele ot cane and sugar was obtained from T_3. where 50% urea at planting and 50% after 120 days of planting were applied (Anon., 1981). The application of fertilizer did not affect recovery (%) of sugar. Time of application of nitrogen and potash failed to cause any significant change in the juice quality in both locations (Tables 1 & 2). Norwal & Malik (1981) found insignificant effect on juice quality with the application of nitrogen. Rahman & Khalequzzaman (1981) had the similar results. T_6 produced highest commercial sugar (11.17 MTSH). Highest yield of cane and sugar were obtained in T_5 treatment at STSM but results were not significant.

The above mentioned results indicated that the spliting application of nitrogen and potash into two equal halves and applying the Ist half at planting and the rest half after 120 days of planting seems to be best for both cane yield and total sugar production.

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