

Influence of Different Organic Manures on Sugarcane Productivity

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ABSTRACT

An experiment was conducted at Crew & Co. mills farm to study the influence of different organic manures applied with two different rates of NPK fertilizers. Cane yield increased significantly due to application of press-mud, cowdung and mustard oil cake 10, 10, 0.5 ton per hectare respectively along with NPK fertilizer over NPK alone. Post-harvest soil analysis indicated enhanced uptake of S contributing to higher yield. Higher rate of NPK alone failed to increase the yield level indicating that organic manuring should be an integral part of nutritional management of organic matter deficient soil for higher yield of sugarcane.

INTRODUCTION

Sugarcane is an exhaustive crop with heavy nutritional requirement. The continuous use of commercial fertilizer alone for a long period causes deterioration of physical condition, lowers the organic matter status and reduces the yield. Use of organic manures, agricultural and industrial waste substantially improves the organic matter content of the soil and supplements the usage of chemical fertilizers. In recent years several investigators analysed various organic manures and studied their effects on soil and ultimately on the yield of sugarcane (Patil, *et. al.* 1983; Sarkar, *et. al.* 1983; Singh and Sharma, 1983) Parthasarathy (1972) reported that if a field receives adequate or optimum quantities of organic matter, such fields rarely deteriorate in productivity of any crop. According to Samuels and Landrau (1956) press-mud has very little residual action on the soil. Patil Shingate (1981) observed that press-mud, cowdung and other organic manures showed equally efficient in producing yield of cane. The present investigation was undertaken at an organic matter deficient soil to find out the effect of press-mud, cowdung and mustard oil cake on sugarcane production.

MATERIALS AND METHODS

The experiment was conducted during 1985-86 cropping season at Carew & Co. sugar mills farm, Darsana under the Ganges River Flood Plain. The initial

physio-chemical status of the soil was as follows :

Texture	: Sandy loam	Available P (ppm) : 8.7
pH	: 7.5	Exchangeable K : 0.11 (meq %)
Organic Carbon (%)	: 0.40	Available S (ppm) : 3.75
Nitrogen (%)	: 0.04	

The experiment comprised of the following eight treatments laid out in a randomised complete block design with three replications. Sugarcane variety used was Isd-16 and plot size 8m x 7m.

T_1 : 80-35-92 kg N-P₂O₅-K₂O ha⁻¹

T_2 : T_1 + 10,000 kg Cowdung (CD) ha⁻¹

T_3 : T_1 + 10,000 kg Press-mud (PM) ha⁻¹

T_4 : T_1 + 500 kg Mustard Oil Cake (MOC) ha⁻¹

T_5 : 120-52-133 kg N-P₂O₅ - K₂O ha⁻¹

T_6 : T_5 + 1,000 kg CD ha⁻¹

T_7 : T_5 + 1,000 kg PM ha⁻¹

T_8 : T_5 + 500 kg MOC ha⁻¹

The entire amount of P from triple super phosphate (TSP), and organic manures of each treatment were applied at planting. Half of K from muriate of potash (MP) and N from Urea were also applied at planting and rest half of these fertilizers were applied at 120 days after planting as top dressing. Intercultural operations were done as and when required. Post harvest soil status was determined and presented in Table 2. Physio-chemical analyses of the soil and organic manures were done according to the following methods :

Soil texture	: Hydrometer method.
Organic carbon	: Wet oxidation method.
Soil pH	: Glass electrode PH meter.
Total-N	: Macro-Kjeldah method.
Available-P	: 0.5 M NaHCO ₃ extraction & spectrophotometry.
Exchangeable-K	: 1M Ammonium acetate extraction & ame photometry.
Available-S	: Turbidimetric (Black, 1965).

RESULTS AND DISCUSSION

Application of manures along with NPK fertilizers at both lower and higher rates had no significant effects on germination and tillering of sugarcane. This could possible be due to the fact that the organic manures are broken down slowly and nutrients released from the manures become available gradually. Cane yield was significantly increased due to application of 10 ton/ha press-mud followed by 10 ton/ha cowdung and 0.5 ton/ha mustard oil cake in addition to NPK fertilizers at both higher and lower rates compared to NPK alone. Application of organic manures did not affect the recoverable sugar content. However, the increased sugar yield was attributed to the increased cane yield. Organic manuring had virtually no effect on the production of millable cane indicating that organic manuring increased the unit stalk weight through better nutrition thus contributing to the overall yield of cane (Table 1).

Table 1. Effects of different organic manures with different rates of NPK on sugarcane yield contributing parameters.

N	Treatments (kg/ha)					Germination %	Tillers ($\times 10^3/\text{ha}^{-1}$)	Millable Cane ($\times 10^3 \text{ ha}^{-1}$)	Recoverable sugar %	Yield of cane (TCH)	Yield of sugar (TSH)
	P_2O_5	K_2O	CD ¹	PM ²	MOC ³						
80	35	92	0	0	0	44.70a*	131.75ab	77.88ab	8.95ab	56.15c	5.04de
80	35	92	10,000	0	0	46.97a	144.69a	75.18b	9.81a	71.03ab	6.92b
80	35	92	0	10,000	0	40.15a	141.75a	80.59ab	9.79a	71.69ab	7.02b
80	35	92	0	0	500	46.46a	138.57a	79.52ab	9.57a	62.62bc	5.98c
120	52	133	0	0	0	46.46a	128.65a	68.81b	9.00ab	51.43c	4.62c
120	52	133	10,000	0	0	43.18a	146.00a	78.80ab	7.81b	71.31ab	5.55cd
120	52	133	0	10,000	0	47.23a	152.62a	91.85a	9.93a	81.79a	8.12a
120	52	133	0	0	500	40.91a	133.49a	77.09ab	9.75a	74.17ab	7.16a

1/ CD- Cowdung containing 1.2% N, 0.07% P, 0.09% K, and 0.42% S.

2/ Press mud containing 2.5% N, 0.04% P, 0.13% K, 0.53% S.

3/ MOC- Mustard oil cake containing 1.5% N, 0.04% P, 2.31% K and 0.52% S.

* Figures followed by the same letter do not differ significantly as per DNMR test at level 0.05.

Urgel and Hernandez (1972) recorded increased cane yield with the application of 10-20 ton/ha press-mud. Sarker, *et. al.* (1983) obtained significant increase in cane yield due to application of 10 ton/ha press-mud in two splits, 5 ton/ha at planting and 5 ton/ha at tillering stage. Patil and Kale (1983) also obtained higher cane and sugar yield from the successive crops than 400 kg/ha or two different NPK rates used in the experiment. Increased cane and sugar yields due to the application of filter press-mud were also reported by Golden (1975) in Louisiana. However, he reported adverse effect of press-mud on juice quality. It further appears from Table 1 that the higher rate of NPK fertilizer alone failed to increase the yield level. This could be attributed to some potential deficiency apparently taken care of by organic manuring. Post-harvest analysis of soil from the experimental plots showed a lower level of S compared to their initial status indicating higher uptake of the element supplemental through organic manuring (Table 2). It appears to be plausible that soil having lower levels of S must be supplemented by S to obtain higher yield. The yield increase due to the application of organic manuring might also be contributed by other related factors like improvement of soil texture, higher water holding capacity and enhanced availability of plant food elements other than S. Results of this study indicate that application of organic manures accompanying lower rates of NPK fertilizers should be taken into serious consideration for higher productivity of sugarcane in this particular types of soil rather than increasing the application of commercial fertilizers containing NPK alone.

Table 2. Post harvest nutrient status of experimental soil under different treatment.

Treatment (kg/ha)						Organic carbon %	Total nitrogen %	Available P (ppm)	Exchange- able K (meq %)	Available S (ppm)
N	P ₂ O ₅	K ₂ O	CD	PM	MOC					
80	35	92	0	0	0	0.48	0.041	8.0	0.15	2.50
80	35	92	10,000	0	0	0.46	0.045	4.5	0.15	1.25
80	35	92	0	10,000	0	0.44	0.046	2.5	0.19	2.50
80	35	92	0	0	500	0.46	0.052	5.0	0.15	1.30
120	52	133	0	0	0	0.42	0.042	4.7	0.13	2.50
120	52	133	10,000	0	0	0.46	0.054	3.7	0.16	0.13
120	52	133	0	10,000	0	0.44	0.052	6.0	0.16	2.50
120	52	133	0	0	500	0.48	0.054	5.5	0.15	1.20

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