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Relative performance of different water soluble phosphatic fertilizers on nutrient uptake and soil fertility status in sugarcane

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ABSTRACT
Field experiment was conducted at Mahatma Phule Krishi Vidyapeeth, Rahuri ,to evaluate effect of different water soluble phosphatic fertilizers viz. 30%, 50%,60% and 100% WSP on nutrient uptake and soil fertility status in sugarcane cultivar co-86032. Differences in nutrient uptake and available nutrient in soil at harvest were found to be non significant among different solubility of phosphatic fertilizers but significant over the control. The relative efficiency of P sources were in the order of 30% >50 % > 60% >100%WSP with sugarcane.

Key words : Sugarcane, Uptake of nutrient, Sources of phosphatic fertilizers.

INTRODUCTION

Sugarcane (*Saccharum Officinarum L*.) is one of the important cash crops and plays pivotal roles in Indian agricultural and industrial economy. Sugarcane takes 12-18 months for maturity and requires heavy doses of NPK fertilizers. Fertilizers are the basic important input to get the potential yield from improved varieties. Out of the major plant nutrients, phosphorus is one of the major nutrients required in huge amounts for best development of sugarcane and quality of sugar. The presence of phosphorus in available form in the soil is essential for normal growth and timely maturity of sugarcane.

The phosphorus availability in Indian soil is low to medium (Rammoorthy and Bajaj, 1969). The black soils of Maharashtra are mostly calcareous and alkaline in nature where the availability of phosphorus is a serious problem. The soluble phosphorus added to such soils get converted into less soluble form (Zende, 1983).Hence, the present investigation was carried out to study the effect of different water soluble phosphatic fertilizers on nutrient uptake and soil fertility status in sugarcane.

MATERIALS AND METHODS

The experiment was laid out in Randomized Block Design with five treatments and four replications to find out an appropriate water soluble source of phosphatic fertilizers viz., 30%, 50%, 60% and 100% WSP through different sources of commercial phosphatic fertilizers for sugarcane. Recommended dose of fertilizer was applied and compared with the absolute control. The soil of the experimental field was well drained, taxonomically classified as fine clayey in texture, low in available N (176 kg/ha, moderate in available phosphorous (18.7 kg/ha) and high in potassium (496 kg/ha). The soil was moderately alkaline in reaction (pH 8.2).

The soil samples were drawn before commencement and on harvest of the experiments were analysed for available nitrogen (Subbaih and Asija 1956), phophorus(Olsen,et al. 1954) and potassium (Knudsen et al.1982). Whole cane samples were drawn and analysed for N by Kejeldahl's method, potash by flame photometer method (Jackson 1967) and P by molybdovanado phosphate yellow colour method. The values obtained were used to workout N, P and K uptake by following formula

$$\text{Uptake kg ha}^{-1} = \frac{\text{Dry matter yield(t ha}^{-1}\text{) X 1000}}{100} \text{X-\% nutrient content}$$

The fertilizer use efficiency was worked out from the value obtained by nutrient uptake using following formula. (Singh *et al*, 1991).

$$\text{FUE} = \frac{\text{Uptake in treated plot - Uptake in control plot}}{\text{Amount of nutrient applied}} \times 100$$

RESULTS AND DISCUSSION

Effect on uptake of NPK

The data pertaining to uptake (Table 1) indicated that the sources of phosphorus significantly increased uptake of NPK by preseasonal sugarcane over control. Significantly maximum NPK uptake was observed with 30% WSP than control. However, it was on par with the all other sources of phosphorus. Uptake of NPK was significantly lowers in control.

Application of phosphorus through different water soluble sources improved the total uptake of the nitrogen, phosphorus and potassium but all sources were at par. these findings are in accordance with those of the Desai et al.(1988).and Singh *et al*.(1991). Khurana *et al*. (2003) also made similar observation and reported that the three water soluble carrier of P (DAP, NNP and Suphala) did not differ significantly for total P uptake in long term experiments on potato sunflower pearl millet sequence. However, water insoluble source like rock phosphate favored the uptake of phosphate than soluble source like SSP in the later stage of the crop growth is also reported by Minhans *et al*. (1974)

Effect on available NPK in soil

The maximum available P and K in soil was recorded

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Table 1 : Total uptake of NPK as influenced by various treatment

Treatment	N kg/ha	P_2O_3 kg/ha	K_2O
T_1 100% WSP	185.168	67.136	327.651
T_2 30% WSP	202.408	71.374	357.390
T_3 50% WSP	200.388	70.900	346.334
T_4 60% WSP	190.165	68.335	333.810
T_5 Control	135.825	48.894	242.065
SE ±	8.426	2.252	11.309
CD at 5%	25.962	6.945	34.845
General Mean	182.791	65.328	321.450

with 100% WSP through SSP than that of available P & K in soil with control and was on par with other sources of phosphorus. The mean data (Table 2) indicated that available P and K after harvest of sugarcane in the soil was higher with increasing water solubility of phosphorus. Available Pand K in soil followed revase trend as that of yield of sugarcane. Available N in soil after harvest by the sugarcane crop .Singh *et al.* (1991) and (1988) recorded similar observation when test crop was sugarcane, rice and wheat.

The higher fertilizers use efficiency was recorded with fertilizers mixtures like Suphala 15:15:15 than the other sources of phosphorus. The trend of different water-soluble phosphatic fertilizers in respect of fertilizer use efficiency

Table 2 : Availability of nitrogen, phosphorus and potassium (kg ha^1) in soil at harvest as influenced by different treatments.

Treatment	N	P2O5	K2O
T1 100%WSP	193.00	20.85	532.50
T2 30%WSP	208.50	20.09	497.50
T3 50%WSP	203.00	20.31	501.75
T4 60%WSP	201.25	20.38	520.25
T5 Absolute Control	148.00	16.37	409.50
SE ±	5.68	0.41	16.61
CD(0.05)	17.51	1.25	51.18
GENERAL MEAN	190.75	19.60	492.30

increased significantly with the P application and significantly maximum available N in soil was observed in case of 30% WSP through 15:15:15 than the control but it was at par with other sources of phosphorus tried. Available N was increased with decrease in water solubility of phosphate fertilizers.

The available phosphate followed the trend 100 > 60 > 50 > 30 per cent WSP. This might be due to its utilization followed a trend of 30 > 60 > 50 > 100 per cent WSP. The similar results in the crop of sugarcane were reported by Singh *et al*.(1991)when the sources were fertilizer mixture (IFFCO) >DAP>SSP>MRP.

Table 3 : Fertilizer use efficiency as influenced by different treatments.

Treatment	FUE of N	FUE of P_2O_5	FUE of K_2O
T1 100%WSP	12.33	10.73	50.03
T2 30%WSP	16.60	13.22	67.78
T3 50%WSP	16.14	12.94	61.33
T4 60%WSP	13.58	11.43	53.96
T5 Absolute Control	-	-	

REFERENCES

Desai , R.M., Patel,M.L., Patel, N.K., and Patel , H.S. (1988). Efficacy of different phosphatic sources on yield and nutrient utilization by sugarcane grown on Vartisols. *Indian Sugar.* **38 (5) :**349-356.

Jackson , M.L. (1973). Soil chemical analysis . Prentice Hall oo India, New Delhi.pp-498.

Khurana , H.S., Saroa, G.S., and Vig, A.C. (2003). Direct and residual effect of nitrophosphates of varying water solubility on crop yield and Olsen P in a Typic Haplustept *J.Indian Soc.Soil Sci*. **51(1) :** 51-55.

Knudsen , D., Peterson, G. A., and Pratt, P.P. (1982). Lithium ,Sodium and potassium in methods of soil analysis – Part-II .Chemical and microbial properties, Page, A L (ed) –II .American Soc. Agron.Inc., Publisher Madison, Wisconsin, U S A. 225-245.

Minhans, R. S. and Kick, H. (1974). Comparative availability of superphosphate and rock phosphate and their distribution into different inorganic phosphate fraction after addition of heavy doses .*Fert.News*.**19 (7):**12

Olsen , S.R., Cole, C. V., Watanabe, F. S., and Dean , L. A. (1954). Estimation of available phosphorus in soil by extraction with sodium carbonate U.S. Deptt. Agric.:939.

Ramamoorthy , B., and Bajaj, I. D., 1969. Available NPK status of Indian soils . *Fert.News*.**14 (8):** 25-46.

Singh, K. D. N., Rai ,Y., Singh , D., and Prasad, C.R. (1988). Relative performance of rock phosphate as compared to super phosphate in an amended calcarious saline sodiac soil. *J. Indian Soc. Soil Sci. 36* **(4) :** 733-738.

Singh, K. D. N., Rai, Y., Singh, D., and Singh, Y. P. (1991). Relative performance of phosphatic fertilizer sources on yield and quality of sugarcane.in calcarious soil. *Indian Sugar*., **41 (6) :** 429-432.

Subbiah , B. V. and Asija, G. L. (1956). A rapid procedure for the estimation of available nitrogen in soils. *Curr. Sci.,* **25 :** 259-266.

Zende, G. K. (1983). Behavior of rock phosphate in different soils of Maharastra.*Indian J. Agric. Chem.,* **15(3):** 29.

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