ure is not practicable. So a possible choice is the use of biparental mating in early generation among selected crosses or use of selection procedure such as diallel selective mating (Jensen, 1970) to exploit both the additive and non-additive genetic components.

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NEED FOR MICRONUTRIENT FERTILIZATION IN INCREASING YIELD AND QUALITY OF SUGARCANE

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A survey of sugarcane growing soils of Tamil Nadu state indicated micronutrient deficiencies of Zn (74%) followed by Fe (32%) and Cu (19%). Field experiments at five locations were conducted in the farmers field. The treatments comprised of different levels of $ZnSO_4$ (0, 37.5, 75 kg/ha), $FeSO_4$ (0, 100, 200 300 kg ha), $CuSO_4$ (0, 12.5, 25 kg/ha) as soil application and foliar application of 0.5% $ZnSO_4$, 1 to 2% $FeSO_4$ on 90th, 110th, and 130th days. The sugarcane varieties tested were COC 671, COC 8001. Over all consideration of the five trials indicated that individual application of $ZnSO_4$ 37.5 kg/ha, $FeSO_4$ 100 kg/ha and $CuSO_4$ 12.5 kg/ha to the soils wherever these elements are deficient increased the cane yield. The increase was ranged form 0.75 to 11.8 tons/ha Foliar application of 0.5% $ZnSO_4$ and $FeSO_4$ were found to be equally effective. Combined application of Zn, Cu, and Fe failed to have an additional advantage and also at higher levels of $ZnSO_4$ 112.5 kg/ha and $FeSO_4$ 300 kg/ha, the cane yield was decreased. Micronutrient fertilisation of Zn and Fe improved the pole per cent of cane juice by 0.1 to 2.3%. The effect was more pronounced for Zn rather than Fe. COC 671 and COC 8601 had responsed well for the micronutrient fertilisation in increasing the cane yield and juice quality.

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Micronutrient nutrition in sugarcane is enormously increasing because of their widespread deficiencies caused chlorosis of leaves There are many regions where natural supplies of these micronutrients may be inadequate for healthy growth and satisfactory yields especially in sugarcane. The deficiencies of micronutrients is normally observed in light textured soils, calcareous soils It is interesting to point out that monoculture of sugarcane crop for more than a century is the main cause of these nutrients becomes limiting. A survey conducted on the sugarcane growing soils of Tamil Nadu showed that deficiency of Zn, Fe and Cu were seen in most part of the monoculture area (Anon, 1984) The present investigation was initated to assess the response of chemical source of micronutrient fertilizer viz., $ZnSO_4$, $FeSO_4$ and $CuSO_4$ on sugarcane yield, pole per cent.

MATERIALS AND METHODS

Analysis of soil samples collected from cane growing areas of EID Parry (India) Limited, Nellikuppam, Cuddalore, South Arcot district of the Tamil Nadu State indicated Zn deficiency to a greater extent (74%) followed by Fe (32%) and Cu (19%) (Kumaresan *et al.*, 1985). Field experiments at five locations were conducted in the farmers field involving the deficient micronutrients. The treatments comprises of $ZnSO_4$ at 37.5, 75 and 112.5 kg/ha; $FeSO_4$ at 0, 100, 200 and 300 kg/ha and $CuSO_4$ at 0, 12.5 and 25 kg/ha besides keeping a normal dose of $N:P_2O_5:K_2O$ 275:62.5:112 kg/ha as control. Treatments were formulated according to the prevalence of the limiting elements and to study the individual as well as combined effect of these micronutrient application to the soil as basal and to the foliage as foliar application at 90th. 110th and 130th days. Phosphorus applied at the time of planting. Nitrogen and K were applied in two equal splits on 45th and 90th days after planting.

The cane was harvested and the weight of the cane from net plot area was recorded. The sucrose content (pole per cent) was estimated by sucrolyser. The juice samples were clarified as per Hornes dry lead subacetate method (Meade - chem, 1977) before feeding to the instrument.

The soil samples where analysed for the available micronutrients using 0.005 M DTPA extract with Varian techtron AA-120, atomic absorption spectrophotometer (Lindsay and Norvell, 1978).

RESULTS AND DISCUSSION

The cane yield significantly increased for the application of $ZnSO_4$ 75 kg/ha (115 3t/ha) followed by the combined application $ZnSO_4$ 37.5kg/ha and $FeSO_4$ 100 kg/ha (116.3t/ha) over NPK treatment (111.0 and 104.3 t/ha) at Vanpakkam (COC 8001) and

Table 1 Effect of treatments on yield and pole % in cane (Var : COC 8001)

Treatments	Kolipakkam		Sornavur	
	Yield (t/ha)	Pole (%)	Yield (t/ha)	Pole (%)
Control N : P_2O_5 : K_2O 275 : 62.5 : 112 kg/ha	88.5	20.5	127.8	17.5
NPK+37.5 kg/ha $ZnSO_4$	89.3	20.4	135.3	18.4
NPK+75 kg/ha $ZnSO_4$	90.0	19.8	135.8	18.7
NPK+112.5 ,, ,,	89.5	21.1	134.8	18.4
NPK+100 kg/ha $FeSO_4$	92.5	20.2	135.8	18.3
NPK+200 ,, ,,	94.5	20.4	131.5	18.4
NPK+300 ,, ,,	92.0	20.7	140.0	18.2
NPK+12.5 kg/ha $CuSO_4$	94.3	20.2	131.5	18.7
NPK+25 ,, ,,	92.3	20.7	131.0	18.7
NPK+$CuSO_4$+$FeSO_4$+ZnSO 12.5+100+37.5 kg/ha	90.8	20.8	135.3	18.7
NPK+12.5+200+37.5 kg/ha	92.0	19.5	138.0	18.4
NPK+12.5+100+75 kg/ha	94.8	20.5	133.8	18.2
NPK+12.5+200+75 kg/ha	92.5	21.1	132.3	18.4
C. D.	—	—	5.8	—

Pulavanoor (COC 671). Though the above said treatments recorded maximum cane yield among other locations, it is interesting to note that $FeSo_4$ 100 kg/ha application alone is enough to attain significant cane yield than that of other two treatments. In these locations, as the cane yield increased to the levels of $ZnSO_4$ increased but the reverse trend was observed in the case of $FeSO_4$ treatment. It is obvious both Zn and Fe fertilization facilitate the availability of soil Zn and Fe contents and thus the balanced nutrition of these may attribute the increased cane yield which was also reflected in the uptake of these elements. Though numerical increase in cane yield was observed in COC 8001 at P. N. Palayam it was not attained the level of significance.

The cane yield significantly increased at Sornavoor for the application of $FeSO_4$ 300 kg/ha (140t/ha) followed by $CuSO_4$ 12.5 kg/ha and $FeSO_4$ 200 kg/ha. But it was also on par with $ZnSO_4$ 37.5 kg/ha and $FeSO_4$ 100kg/ha (135.0 t/ha). Comparison of the yield data between soil and foliar

Table 2 Effect of treatments on yield and pole % in cane

Treatments	Vanpakkam (COC 8001)		P. N. Palayam (COC 8001)		Pulavanur (COC 671)	
	Yield (t/ha)	Pole %	Yield (t/ha)	Pole %	Yield (t/ha)	Pole%
Control NPK N : P_2O_5: K_2O 275 : 62.5 : 112.5 kg/ha	111.0	17.1	104 3	18.2	104 0	18.9
NPK+$ZnSO_4$ 37 5 kg/ha	113.0	18.7	107 0	19.6	107.3	20.5
NPK+$ZnSO_4$ 75 kg/ha	115.3	19.4	107 0	19.4	108.5	20 2
NPK+ ,, 112.5 kg/ha	115.3	19 8	106 8	20.0	110.8	20.3
NPK+$FeSO_4$ 100 kg/ha	114.8	18.7	104.8	19.8	112.8	19.8
NPK+$FeSO_4$ 200 kg/ha	112 0	18 8	104.8	19 4	111.8	20.4
NPK+ ,, 300 kg/ha	114.3	16.7	107.0	20.6	107 8	20.2
NPK+$ZnSo_4$+$FeSo_4$ 37.5 kg/ha+ 100 kg/ha	113.3	17.3	106.8	19.5	116.3	20.4
NPK+37.5 kg/ha+200kg/ha	113.3	17.7	109.3	20.7	113.3	20.1
NPK+$ZnSO_4$+$FeSO_4$ 75kg/ha+ 100 kg/ha	113.5	17.4	107.0	19.6	110.8	20 2
NPK+ ,, + 200 kg/ha	113.0	17.2	107.9	20.4	113.3	19 8
C. D.	1.7	—	—	1.0	4.1	0.74

the soil application of individual micronutrient fertilizers viz, $ZnSo_4$, $FeSo_4$ and $CuSo_4$ was found to be good. This is in line with the findings of Nayyer *et al.* (1984). The foliar application of 0.5% $ZnSO_4$ and 1% $FeSO_4$ found equally good in increasing the cane yield. This is due to it abates the problem of fixation and antagonism in the soils and helps in their quick absorption through foliage (Singh and Lallan Singh, 1954; Ekambaram and Sakunthala, 1976).

The sucrose content (pole per cent in juice was significantly increased for the combined application of $ZnSO_4$ 37.5 kg/ha and $FeSO_4$ 200kg/ha (271.6 t/ha) at P. N. Palayam. This in line with the findings of Kumaresan *et al.* (1985). However it was par with the individual application of $ZnSO_4$ 37.5 kg/ha and $FeSO_4$ 100 kg/ha. The increase in sucrose content varied from 1.2 to 2.4%. The sucrose content significantly increased for the soil application of $ZnSO_4$ 37.5kg/ha (20.5%)

over NPK control (18.9%) at Pulavanoor. Here again it was observed that reduction in sucrose content due to the higher levels of individual as well as combined addition of $ZnSO_4$ and $FeSO_4$.

CONCLUSIONS

From the above result, it is depicted that the micronutrient fertilizer is highly beneficial in increasing the yield and quality of cane crop, wherever these elements are limiting. Also negligence of micronutrient fertilization will struck the balanced nutrition in soil and plant system may lead a threat in depletion of the production. Hence proper micronutrient management may help in future for getting better crop production.

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