Effect of different sources and doses of sulphur on yield and juice quality of sugarcane under clay loam soil condition

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ABSTRACT
Field experiment was carried out at Research and Development Centre, E.I.D. Parry (India) Ltd., Pugalur during 2006-07 to study the different sources and levels of sulphur on growth and yield of sugarcane under clay loam soil condition. The treatment consisted of two sulphur source and four sulphur levels compared with current practice and absolute control. The results revealed that though the higher millable cane, single cane weight and cane yield was recorded with 200 kg S ha\(^{-1}\) (104 kg through N and P source and 96 kg through elemental sulphur), it was at par with 200 and 175 kg S ha\(^{-1}\) (104 kg through N and P source and remaining through gypsum) and 175 and 150 kg S ha\(^{-1}\) (104 kg through N and P source and remaining through elemental sulphur). Application of sulphur increased the juice quality and sugar yield. However, it was at par among sulphur treatments and significantly higher over the absolute control.

Key words : Sugarcane, Sulphur, Gypsum, Elemental sulphur, Clay loam soil

INTRODUCTION
Sulphur is an essential plant nutrient assuming large scale importance in crop production. Now it has been recognized as the fourth major nutrient besides NPK. Higher yields of sugarcane crop remove higher amounts of sulphur from the soil which necessitates replenishment. Due to intensive agriculture and use of high analysis sulphur free fertilizers, the sulphur level in the soil is in declining trend. The Pugalur Sugar Factory command area soil analytical results revealed that nearly 60 per cent of the soils are deficient in available sulphur. Rahman et al. (1992) observed that application of sulphur alone increased the cane yield by 16.20 per cent compared to control yield. Hence, it is necessary to evolve suitable source and optimize level of sulphur for sugarcane. Considering the above facts, the present study was carried out.

MATERIALS AND METHODS
The experiment was conducted at Research and Development Centre, E.I.D.- Parry (India) Ltd., Pugalur, Tamil Nadu during the main planting season of 2006-07. The soil was clay loam in texture, having the available N, P\(_2\)O\(_5\) and K\(_2\)O of 267, 29 and 333 kg ha\(^{-1}\), respectively. The sulphur level of the experimental site was 8.22 mg kg\(^{-1}\), which was quite below the critical limit. The treatments include two sulphur sources viz., gypsum and elemental sulphur and four sulphur levels viz., 125, 150, 175 and 200 kg ha\(^{-1}\). The recommended NPK schedule (275:150:150 kg N, P\(_2\)O\(_5\) and K\(_2\)O ha\(^{-1}\)) was supplied through single super phosphate (SSP), ammonium phosphate sulphate (APS), urea and muriate of potash. The SSP and APS supplied 104 kg S ha\(^{-1}\) along with N and P nutrients to all the treatments except the absolute control. Hence, the remaining sulphur for each treatment (21, 46, 71 and 96 kg ha\(^{-1}\)) was applied through gypsum (T\(_1\) to T\(_4\)) and elemental sulphur (T\(_5\) to T\(_8\)), respectively at the time of planting. The current practice of sulphur application @ 104 kg ha\(^{-1}\) through normal N and P applications is not adequate to meet the demand for sulphur in sugarcane.
fertilizers were kept as one control ($T_9$) and no sulphur application as an absolute control ($T_{10}$). The experiment was laid out in a randomized block design and replicated four times. The ruling sugarcane cultivar Co 86032 was used for the experiment. The bio-metric data on growth, yield and quality parameters were recorded and analysed statistically.

### RESULTS AND DISCUSSION

Among the different sources and levels of sulphur evaluated, S @ 200 kg ha$^{-1}$ ($T_8$, 104 kg through N and P source of fertilisers and 96 kg through elemental source) significantly registered the highest millable cane (1.52 lakhs ha$^{-1}$), single cane weight (1.81 kg) and cane girth (2.81 cm) with the cane yield of 193.45 t ha$^{-1}$ (Table 1). However, this was at par with 175 and 200 kg S ha$^{-1}$ ($T_5$ and $T_7$, portion applied through gypsum) and 150 and 175 kg S ha$^{-1}$ ($T_6$ and $T_7$, portion applied through elemental sulphur) but significantly higher over the absolute control ($T_{10}$). Sulphur application at higher doses might have exerted positive influence on uptake of plant nutrients there by increasing the cell activities and ultimately contributed for the higher yield attributes and cane yield in sulphur deficit soil (Thomas Mathew et al., 2003). The slow release of sulphur from elemental sulphur might have increased the S availability in the soil and contributed for higher yield compared to gypsum. Similar results were reported by Phonde (1999) and Zhi-Hui Yang et al. (2010).

The juice analytical results revealed that sulphur application had increased the quality parameters like brix, pol and pure obtainable cane sugar (POCS) per cent compared to no sulphur application. However, the additional dose of sulphur either through gypsum or elemental source were not influenced when compared to the current practice. The higher sugar yield of 25.95 t ha$^{-1}$ was recorded with S application @ 200 kg ha$^{-1}$ ($T_8$, portion through elemental source). It was at par with other sulphur levels and significantly higher over the absolute control ($T_{10}$). The increase in sugar yield was due to the beneficial effect of sulphur in raising the cane yield per unit area and increase in sucrose per cent. The results are in agreement with the earlier findings of Shukla and Lal (2007).

### Conclusion:

The present study indicated that application of S @ 150 kg ha$^{-1}$ (104 kg through N and P source and 46 kg through elemental source) was effective in increasing the cane yield, juice quality and sugar yield under clay loam soil condition.

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### REFERENCES


