

## **Influence of sulphur fertilization on yield, nutrient content and uptake by sugarcane in sulphur deficient soil of Thiruppuvanam block of Sivagangai District.**

### **Abstract**

Effect of various levels of sulphur (50,100,150 kg ha<sup>-1</sup>) and three sources of sulphur was studied on sugarcane crop in a field experiment conducted in *Typic ustropept* at Thiruppuvanam block of Sivagangai district during 2018-2019. The results revealed that the application of sulphur @ 100 kg ha<sup>-1</sup> as FeSO<sub>4</sub> as soil application along with application of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O on STCR basis registered the maximum nutrient content of N,P,K,S in cane and leaf, total nutrient uptake and cane yield (162 t ha<sup>-1</sup>), followed by the treatment receiving 150 kg sulphur as FeSO<sub>4</sub> inconjoint with N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O on STCR basis (156.80 t ha<sup>-1</sup>).

### **Introduction**

Sugarcane is a commercial crop occupying premier status in India. Sugar is commercially produced from sugarcane (*Saccharum* sp.). Approximately, every year in India 35.5 crore tonnes and 3 crore tonnes of sugarcane and sugar respectively is produced. Not only in production but also in consumption of sugar, India is in the second place next to Brazil and Cuba. According to the estimation of current financial year, around 2.6 crore tons of sugar is used for domestic purpose. In India, around 35% of sugar is used in house and consumed as food. In the manufacture of beverages and food products, more than 65 per cent of sugar is used as industrial raw material and main ingredient (NITIAYOG., 2020). In 2019-2020, the total area under sugarcane cultivation in India was 4867 (000' ha), with production of 376.905 million tonnes and productivity of 77.6 t ha<sup>-1</sup>. In Tamil nadu the total cultivated area was 206 (000' ha) with production of 20600('000 tonnes) and productivity of 100 tonnes ha<sup>-1</sup> (Indian Sugarmill Association., 2020).

Sulphur is one of the essential nutrient elements in crop production, and play an important role improving the yield and quality of crops often ranked next to nitrogen, phosphorus and potassium (Jeschke and Diedrick., 2010). Sulphur is placed in the 4<sup>th</sup> position next to N, P, K (Tandon, 1991). Sulphur plays an important role photosynthesis and protein metabolism of plants. Sulphur requirement is higher for the sugarcane and it was found that the application of sulphur increases the yield and quality of sugarcane (Singh *et*

al., 2003). Sulphur is a vital element for all organisms due to its important role in methionine and cysteine biosynthesis. The amino acid cysteine which forms protein thiamine, biotine and hormones for which sulphur nutrition is needed (Rao,1977). Among the various diffidence of sugarcane production the sulphur deficiency plays an important role (Singh *et al.*, 1997). Sulphur deficiency in soil is on the rise, due to agricultural practices involving non application of sulphur based fertilizers (or) organic manures. Since S is essential for the development and nutritional quality of sugarcane it must be replenished to avoid yield losses. In the present study an attempt has been made to evaluate the effect of various sources and levels of sulphur on cane yield, yield attributes, content and uptake of nutrients in a sulphur deficient soils of *Typic Ustropept*.

### Materials and method

A field experiment was carried out to study the response of sulphur on growth and yield of sugarcane in a farmer's field at Sottathatti village of Thiruppuvanam block in Sivagangai district, Tamil Nadu during the year 2018 - 19. The experimental soil classified under *Typic Ustropept*. It was neutral in soil reaction (pH 7.78), low in available N (179 kg ha<sup>-1</sup>), medium in available P and K (20,176.8 kg ha<sup>-1</sup>). The soil was deficient in available sulphur.

There were 12 treatments and replicated thrice with the test crop of Sugarcane (var.CO 86032). The treatment details are follows T<sub>1</sub> – Control, T<sub>2</sub> - Recommended dose of fertilizer (275:62.5:112.5 kg N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O ha<sup>-1</sup>), T<sub>3</sub> - N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O on **STCR** basis, T<sub>4</sub>-T<sub>3</sub> + Sulphur @ 50 kg ha<sup>-1</sup> as Gypsum, T<sub>5</sub> - T<sub>3</sub> + Sulphur @ 100 kg ha<sup>-1</sup> as Gypsum, T<sub>6</sub> - T<sub>3</sub> + Sulphur @ 150 kg ha<sup>-1</sup> as Gypsum, T<sub>7</sub>– T<sub>3</sub> + Sulphur @ 50 kg ha<sup>-1</sup> as Elemental S, T<sub>8</sub>- T<sub>3</sub>+ Sulphur @ 100 kg ha<sup>-1</sup> as Elemental S, T<sub>9</sub> – T<sub>3</sub>+ Sulphur @ 150 kg ha<sup>-1</sup> as Elemental S, T<sub>10</sub> - T<sub>3</sub> + Sulphur @ 50 kg ha<sup>-1</sup> as FeSO<sub>4</sub>, T<sub>11</sub> – T<sub>3</sub>+ Sulphur @ 100 kg ha<sup>-1</sup> as FeSO<sub>4</sub>, T<sub>12</sub> - T<sub>3</sub> + Sulphur @ 150 kg ha<sup>-1</sup> as FeSO<sub>4</sub>.

From each treatment five plants were randomly selected and tagged for observing the yield parameters Number of millable canes, Cane length, Cane girth and Cane yield were recorded. The plant samples were collected at **critical growth stage** and analysed for N, P, K and S contents and uptake was computed at harvest stage.

### Results and discussion

#### Yield parameters

##### Number of millable canes (Table 1)

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The effect of sulphur fertilization on number of millable cane (NMC) was found to be significant. It ranged from 104.52 ('000 ha<sup>-1</sup>) to 52.63 ('000 ha<sup>-1</sup>). Among the various sources of sulphur, application of sulphur as FeSO<sub>4</sub> performed better as compared to gypsum and elemental sulphur in registering the number of millable canes. The highest number of number millable canes were observed while applying 100 kg sulphur as FeSO<sub>4</sub> in combination with STCR based N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O (T<sub>11</sub>) (104.52(000 ha<sup>-1</sup>). Application of N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O on STCR basis recorded the millable canes of 88.44(000) ha<sup>-1</sup>. The absolute control recorded of the lowest value 52.63 (000 ha<sup>-1</sup>) (Table 1). Number of millable cane is an important yield attributing factor that decides the cane yield. The increase in number of millable cane due to sulphur application increases the nitrate reductase activity, vegetative growth of the plants. Aneg singh *et al.* (2007) reported that application of sulphur @ 80 kg ha<sup>-1</sup> registered highest number of millable cane.

#### **Single cane weight (Table 1)**

Application of sulphur had a positive influence on cane weight of sugarcane. The maximum cane weight of 1.55 kg was recorded in the treatment which has received STCR based N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O along with sulphur @ 100 kg ha<sup>-1</sup> as FeSO<sub>4</sub> (T<sub>11</sub>) and it is statistically onpar with T<sub>12</sub> (1.54 kg cane<sup>-1</sup>). Using the various sources of sulphur application of elemental sulphur showed the lowest impact on cane weight because of its slow oxidation rate (Weidenfeld, 2011). The lowest cane weight (0.95 kg cane<sup>-1</sup>) was observed in T<sub>1</sub>. The treatments T<sub>5</sub> and T<sub>9</sub> were onpar with each other (1.41 and 1.40 kg cane<sup>-1</sup>). Similar observation was already made by, Vijay kumar *et al.* (2011). Baluram *et al.* (2014) found that application of sulphur increased the test weight of rice crop as sulphur application increases the energy transformation and translocation from source to sink.

#### **Length and girth of millable cane**

The effect of sulphur fertilization on the length of millable cane clearly indicated that a positive response was observed irrespective of source and levels of sulphur. It ranged from 248.70 to 182.40 cm. The highest cane length was observed in the T<sub>11</sub> treatment (248.70) (Table 1). Similar to the cane length the effect of sulphur fertilization on girth of millable cane was also found to be significant. The mean value varied between 10.90 and 6.50 cm (Table 2). The treatments T<sub>5</sub> ( 9.50 cm) and T<sub>9</sub> ( 9.40cm ) were onpar with each other and recorded lower girth as compared to T<sub>11</sub> (10.90) while comparing with FeSO<sub>4</sub> lower response was observed in gypsum. The reason attributed could be due to poor

solubility of gypsum ( $K_{sp} = 2.4 \times 10^{-5}$ ). Similarly, due to poor oxidation of elemental sulphur, the sulphate availability in the labile pool could have been reduced. These findings are in corroboration with earlier report of Shukla and Menhail (2002).

#### **Number and length of internode of millable cane (Table 2)**

A marked influence on sulphur fertilization on number of internodes of sugarcane was observed. The mean values ranged from 12.60 to 28.60. Application of STCR based N,  $P_2O_5$  and  $K_2O$  with sulphur @ 100 kg ha<sup>-1</sup> as  $FeSO_4$  ( $T_{11}$ ) recorded the maximum number of internodes (28.60) which was on par with  $T_{12}$  (27.20). Similarly the treatment  $T_5$  and  $T_9$  were on par with each other (22.50), (21.70). The least number of internodes of 12.60 was observed in  $T_1$  (absolute control). Similar to the girth, length of internodes in millable cane was also found to be significant and varied between 7.80 and 13.70 cm. Conjoint incorporation of STCR based N,  $P_2O_5$  and  $K_2O$  with sulphur @ 100 kg ha<sup>-1</sup> as  $FeSO_4$  ( $T_{11}$ ) recorded the maximum length of internodes per millable cane (13.70 cm) which was on par with  $T_{12}$  (13.30cm). Shinde,(2005) registered high intermodal length while applying 80 kg S ha<sup>-1</sup>. Vijay kumar *et al.*(2011) reported that application of sulphur increases the number of internodes and length of internode in sugarcane crop.

#### **Cane yield**

A profound influence on the application of sulphur on cane yield was recorded irrespective of its levels and sources. The cane yield varied from 50.00 to 162.00 t ha<sup>-1</sup> (Table 3). Among the treatment combination, application of sulphur @ 100 kg ha<sup>-1</sup> as  $FeSO_4$  in combination with STCR based N,  $P_2O_5$  and  $K_2O$  ( $T_{11}$ ) recorded the maximum cane yield of 162.00 t ha<sup>-1</sup> followed by  $T_{12}$  (157 t ha<sup>-1</sup>) However, they were statistically on par with each other. As the experimental field was deficient in sulphur (9 mg kg<sup>-1</sup>), application of external sources of sulphur made a higher impact on cane yield. Aneg singh *et.al.* (2007) reported that application of sulphur @80 kg ha<sup>-1</sup> increased the sugarcane yield significantly. The positive response for the application of sulphur on cane yield could be due to increased uptake of N,P,K as evidenced from the present study because of synergistic relationship between sulphur and N,P and K. Application of sulphur increases the photosynthetic rate and carbohydrate assimilation which would have helped in improving the yield attributes and ultimately cane yield (Singh *et al.*, 2003). Johnson and Richard, (2005) reported a strong positive relationship between sulphur application and sugarcane yield and quality.

#### **Effect of sulphur fertilization on nutrient content of leaf and cane of sugarcane. (Table. 4)**

### **Nitrogen content**

The highest nitrogen content of cane and leaf (0.122 and 1.12 % ) was registered in the treatment which received 100 kg ha<sup>-1</sup> S as FeSO<sub>4</sub> in combination with STCR based N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O (T<sub>11</sub>) and it is on par with the T<sub>12</sub> (0.119 and 1.09 %). The lowest nitrogen content of cane and leaf (0.053 and 0.77 %-) was recorded in the T<sub>1</sub> (absolute control). The result further showed that the N content decreased with advancement of growth stage. This might be due to dilution effect of N with growth period. Verma *et al.* (2014) reported that application of sulphur @ 40 kg ha<sup>-1</sup> along with recommended dose of NPK significantly increased the N content in rice crop .

### **Phosphorus content**

The phosphorus content in cane and leaf of sugarcane at harvest stage varied from 0.042 to 0.025 and 0.161 to 0.108 per cent respectively. Application of 100 kg sulphur ha<sup>-1</sup> as FeSO<sub>4</sub> in combination with STCR based N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O (T<sub>11</sub>) recorded the highest value of 0.042 and 0.161 in cane and leaf respectively. Sudhir Kumar *et al.* (2014) reported that application of sulphur @ 60 kg ha<sup>-1</sup> along with recommended dose of NPK resulted in highest content of P. Sulphur nutrition enabled the plant to maintain high rate of metabolic and physiological activities, increase the sink size and utilize the photosynthate at a faster rate, which would have been the possible reason for increased P content in sugarcane. This findings are in corroboration with earlier work of Bokhtiar *et al.* (2002) and Kumar *et al.* (2004).

### **Potassium content**

The potassium content of cane and leaf at harvest stage is depicted in Table 4. Application of 100 kg S ha<sup>-1</sup> as FeSO<sub>4</sub> in combination with STCR based N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O (T<sub>11</sub>) recorded the highest K content in both cane and leaf (0.141 and 0.970 %). The treatments T<sub>5</sub> (0.135 and 0.95%) and T<sub>9</sub> (0.126 and 0.90% ) were on par with each other in registering the K content of leaf and cane. Similar synergistic effect of S on K content was reported by Teotida *et al.* (2001) on mung bean. Caldwell *et al.* (1969) reported that application of sulphur maintain the electro neutrality or ionic balance with in the plant system which would have helped to increase the extracting ability and higher K content.

### **Sulphur content**

The sulphur content in the leaf and cane of sugarcane at harvest stage clearly indicates that sulphur fertilisation significantly increased the sulphur content. A linear

increase in sulphur content was observed with sulphur fertilisation. The S content was the highest with application of 100 kg S ha<sup>-1</sup> as FeSO<sub>4</sub> in combination with STCR based N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O (T<sub>11</sub>) which accounted for 0.024 and 0.113 per cent in cane and leaf respectively. The lowest sulphur content in cane and leaf (0.009 and 0.070 %-) was recorded in the T<sub>1</sub> (absolute control). Joshi and Amodkar (2000) reported that application of 60 kg S ha<sup>-1</sup> increased the S content in leaves (0.238 %-) as compared to the treatments which had not received sulphur (0.188 %).

#### **Effect of Sulphur fertilization on uptake of nutrients of sugarcane (Table.5)**

##### **Total nitrogen uptake**

The results exhibited that a positive influence of application of sulphur on N uptake of sugarcane crop. It varied between 305.6 and 95.2 kg ha<sup>-1</sup>. The application of 100 kg ha<sup>-1</sup> as FeSO<sub>4</sub> in combination with STCR based N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O (T<sub>11</sub>) significantly recorded the maximum N uptake 305.6 kg ha<sup>-1</sup> which is on par with T<sub>12</sub> (295.10 kg ha<sup>-1</sup>). The lowest N uptake 95.2 kg ha<sup>-1</sup> was recorded in T<sub>1</sub> (control). The positive effect of application of sulphur on N uptake might be due to synergistic relationship of sulphur on N absorption. The sulphate being developed anion (SO<sub>4</sub><sup>2-</sup>) would have released the monovalent anion (NO<sub>3</sub><sup>-</sup>) from the colloidal complex and brought to the labile pool which would have enhanced the N uptake. Verma *et al.* (2014) reported that application of sulphur @ 40 kg ha<sup>-1</sup> along with recommended dose of NPK significantly increased the total uptake of N in rice crop which may be due to increased biomass by the enhanced uptake of nitrogen.

##### **Total phosphorus uptake**

The effect of sulphur fertilization of sugarcane on total P uptake at harvest varied between 17.75 and 59.14 kg ha<sup>-1</sup>. The application of sulphur 100 kg ha<sup>-1</sup> as FeSO<sub>4</sub> in combination with STCR based N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O (T<sub>11</sub>) significantly recorded the maximum P uptake 59.14 kg ha<sup>-1</sup> which is on par with T<sub>12</sub> (56.80 kg ha<sup>-1</sup>). The addition of SO<sub>4</sub><sup>2-</sup> would have replaced the H<sub>2</sub>PO<sub>4</sub><sup>-</sup> from the sesquioxide through anion exchange mechanism and released to the labile pool which would have favoured for the higher uptake of P by the crop. The lowest P uptake of 95.2 kg ha<sup>-1</sup> was recorded in T<sub>1</sub> (absolute control). Sudhir Kumar *et al.* (2014) reported that application of sulphur @ 60 kg ha<sup>-1</sup> registered the highest content and uptake of phosphorus. This may be due to synergistic effect of S on P.

##### **Total potassium content and uptake**

The effect of sulphur fertilization on total K uptake of sugarcane at harvest stage varied between 97.08 and 289.33 kg ha<sup>-1</sup>. The application of sulphur @ 100 kg ha<sup>-1</sup> as

FeSO<sub>4</sub> in combination with STCR based N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O (T<sub>11</sub>) recorded the maximum total K uptake of 289.33 kg ha<sup>-1</sup>. Higher K uptake due to application of sulphur may be due to the formation of K<sub>2</sub>SO<sub>4</sub> which is highly soluble and favoured the uptake of K. Dharmesh Verma and Harendra Singh (2012) reported that maximum uptake of K was registered while adding S @ 60 kg ha<sup>-1</sup>.

#### **Total sulphur uptake**

The sulphur uptake in sugarcane at harvest stage is exhibited in Table 5. The result showed that a positive influence of sulphur uptake by sugarcane crop due to application of various levels of sulphur. The highest sulphur uptake of 47.4 kg ha<sup>-1</sup> was registered in the treatment receiving a conjoint incorporation of 150 kg S ha<sup>-1</sup> as FeSO<sub>4</sub> and STCR based N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O (T<sub>11</sub>). The lowest S uptake was observed in the T<sub>1</sub> (10.20 kg ha<sup>-1</sup>). Shaheen *et al.* (2013) who found the favourable positive effect of sulphur on plant growth parameters, consequently increasing the uptake of sulphur by improved rooting system and also sulphur application at higher doses exerted positive influence on uptake of sulphur there by increasing the cell activities and ultimately contributed for the higher yield attributes and cane yield in sulphur deficit soil.

#### **Conclusion**

From the above results, it can be concluded that the STCR based application of NPK along with sulphur fertilization is extremely important for improving the productivity of sugarcane crop and also for maintaining the soil fertility. Hence application of 100 kg sulphur as FeSO<sub>4</sub> in combination with STCR based N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O can be recommended district to harvest the maximum yield in sugarcane in the sulphur deficient soils of Sivagangai district.

**Table.1.Effect of sulphur on yield attributes of sugarcane in *Typic Ustropept***

<b>Treatment</b>	<b>Number of millable cane ('000 ha<sup>-1</sup>)</b>	<b>Cane weight (kg cane<sup>-1</sup>)</b>	<b>Length of millable cane (cm)</b>
<b>T<sub>1</sub></b>	52.63	0.95	182.40
<b>T<sub>2</sub></b>	91.68	1.01	193.50
<b>T<sub>3</sub></b>	88.44	1.09	201.20
<b>T<sub>4</sub></b>	90.81	1.24	217.40
<b>T<sub>5</sub></b>	99.29	1.41	233.50
<b>T<sub>6</sub></b>	102.04	1.47	240.10
<b>T<sub>7</sub></b>	88.03	1.17	209.50
<b>T<sub>8</sub></b>	94.74	1.33	224.60
<b>T<sub>9</sub></b>	103.57	1.40	231.40
<b>T<sub>10</sub></b>	103.85	1.30	225.20
<b>T<sub>11</sub></b>	104.52	1.55	248.70
<b>T<sub>12</sub></b>	101.82	1.54	247.30
<b>Mean</b>	<b>93.45</b>	<b>1.29</b>	<b>221.23</b>
<b>SEd</b>	<b>2.16</b>	<b>0.03</b>	<b>2.93</b>
<b>CD(P=0.05)</b>	<b>4.51</b>	<b>0.06</b>	<b>6.11</b>



**Table.2.Effect of sulphur on girth, number and length of internode of sugarcane in *Typic Ustropept***

Treatment	Girth of millable cane (cm)	Number of internodes per millable cane	Length of internode in millable cane (cm)
T <sub>1</sub>	6.50	12.60	7.80
T <sub>2</sub>	6.80	13.80	7.90
T <sub>3</sub>	6.90	14.10	8.20
T <sub>4</sub>	7.80	16.30	9.30
T <sub>5</sub>	9.50	22.50	11.60
T <sub>6</sub>	9.90	24.90	12.40
T <sub>7</sub>	7.30	14.20	9.10
T <sub>8</sub>	8.30	18.70	10.20
T <sub>9</sub>	9.40	21.70	11.20
T <sub>10</sub>	8.90	19.20	10.30
T <sub>11</sub>	10.90	28.60	13.70
T <sub>12</sub>	10.50	27.20	13.30
<b>Mean</b>	<b>8.56</b>	<b>19.48</b>	<b>10.42</b>
<b>SEd</b>	<b>0.54</b>	<b>1.19</b>	<b>0.34</b>
<b>CD (P=0.05)</b>	<b>1.12</b>	<b>2.47</b>	<b>0.71</b>

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**Table.3.Effect of sulphur on sugarcane on cane yield (t ha<sup>-1</sup>) in *Typic Ustropept***

<b>Treatment No.</b>	<b>Cane yield (t ha<sup>-1</sup>)</b>
<b>T<sub>1</sub></b>	50.00
<b>T<sub>2</sub></b>	92.60
<b>T<sub>3</sub></b>	96.40
<b>T<sub>4</sub></b>	112.60
<b>T<sub>5</sub></b>	140.00
<b>T<sub>6</sub></b>	150.00
<b>T<sub>7</sub></b>	103.00
<b>T<sub>8</sub></b>	126.00
<b>T<sub>9</sub></b>	145.00
<b>T<sub>10</sub></b>	135.00
<b>T<sub>11</sub></b>	162.00
<b>T<sub>12</sub></b>	157.00
<b>Mean</b>	<b>122.45</b>
<b>SEd</b>	<b>2.7250</b>
<b>CD(P=0.05)</b>	<b>5.6842</b>

**Table.4. Effect of sulphur fertilization on nutrient content (%) of leaf and cane at harvest stage in sugarcane in *Typic Ustropept***

Treatment	<i>Typic Ustropept</i>							
	N (%)		P (%)		K (%)		S (%)	
	Cane	Leaf	Cane	Leaf	Cane	Leaf	Cane	Leaf
T <sub>1</sub>	0.053	0.77	0.025	0.108	0.087	0.710	0.009	0.070
T <sub>2</sub>	0.069	0.85	0.027	0.109	0.097	0.82	0.010	0.076
T <sub>3</sub>	0.075	0.90	0.029	0.111	0.107	0.77	0.011	0.078
T <sub>4</sub>	0.092	0.94	0.033	0.114	0.116	0.79	0.012	0.091
T <sub>5</sub>	0.111	1.04	0.039	0.148	0.130	0.92	0.018	0.104
T <sub>6</sub>	0.116	1.05	0.040	0.147	0.135	0.95	0.021	0.112
T <sub>7</sub>	0.085	0.91	0.031	0.112	0.112	0.78	0.012	0.086
T <sub>8</sub>	0.096	0.95	0.034	0.118	0.120	0.83	0.014	0.097
T <sub>9</sub>	0.111	1.01	0.036	0.135	0.126	0.90	0.018	0.105
T <sub>10</sub>	0.107	1.00	0.035	0.131	0.123	0.84	0.016	0.098
T <sub>11</sub>	0.122	1.12	0.042	0.161	0.141	0.97	0.024	0.113
T <sub>12</sub>	0.119	1.09	0.040	0.158	0.140	0.97	0.023	0.110
<b>Mean</b>	<b>0.10</b>	<b>0.97</b>	<b>0.03</b>	<b>0.13</b>	<b>0.12</b>	<b>0.85</b>	<b>0.02</b>	<b>0.09</b>
<b>SEd</b>	<b>0.002</b>	<b>0.017</b>	<b>0.001</b>	<b>0.003</b>	<b>0.03</b>	<b>0.018</b>	<b>0.003</b>	<b>0.003</b>
<b>CD=0.05</b>	<b>0.004</b>	<b>0.036</b>	<b>0.002</b>	<b>0.006</b>	<b>0.07</b>	<b>0.037</b>	<b>0.006</b>	<b>0.007</b>

**Table.5. Effect of sulphur fertilization on total uptake (kg ha<sup>-1</sup>) of macro nutrients in sugarcane in *Typic Ustropept* soil**

Treatment	<i>Typic Ustropept</i>			
	N	P	K	S
T <sub>1</sub>	95.2	17.75	97.08	10.20
T <sub>2</sub>	159.1	28.66	167.03	17.69
T <sub>3</sub>	187.3	32.18	178.53	19.90
T <sub>4</sub>	220.6	38.80	207.38	27.40
T <sub>5</sub>	264.9	50.83	251.17	35.50
T <sub>6</sub>	293.1	55.24	283.10	41.21
T <sub>7</sub>	179.0	31.63	172.40	21.09
T <sub>8</sub>	228.6	40.04	218.24	28.84
T <sub>9</sub>	271.9	49.41	258.23	36.96
T <sub>10</sub>	253.1	45.23	232.35	33.27
T <sub>11</sub>	305.6	59.14	289.33	47.41
T <sub>12</sub>	295.1	56.80	282.85	45.01
<b>Mean</b>	<b>279.46</b>	<b>41.15</b>	<b>219.81</b>	<b>30.37</b>
<b>SEd</b>	<b>4.58</b>	<b>0.66</b>	<b>5.09</b>	<b>0.8320</b>
<b>CD=0.05</b>	<b>9.56</b>	<b>1.38</b>	<b>10.62</b>	<b>1.7355</b>

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