

## RESPONSE OF SOYBEAN TO MICRONUTRIENT APPLICATION

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Field experiments one each in black loam and red loamy soils were conducted with Co-1 soybean as test crop to study the effect of Mn, Zn and Fe applications. Foliar sprays with 1 per cent  $MnSO_4$  or 0.5%  $ZnSO_4$  significantly increased the grain yield and uptake of Mn in black soil, while in red soil application of 25 kg/ha of  $MnSO_4$  or  $ZnSO_4$  resulted in marked increase in grain yield. The influence of  $FeSO_4$  fertilisation was not marked in both the soils

The cultivation of soybean is increasingly becoming popular in Tamil Nadu. The importance of soybean as an oil seed/pulse crop is very well known and the potentiality of growing this crop in different agroclimatic regions of the country has also been indicated (Anon, 1979). Earlier reports had shown that apart from major nutrients, some of the micronutrients were also observed to be important in increasing

the grain yield (Sureshkumar *et al.*, 1977 and Pandian, 1980). Hence, a study was conducted to find out the effect of Zn, Fe and Mn application on yield and nutrition of soybean.

### MATERIAL AND METHODS

The field experiments were conducted to study the effect of soil and foliar application of Zn, Fe and Mn with CO 1 soybean in black and red soils.

The initial analytical data of the soils are given below.

	Black soil Typic chromustert	Red soil Udic Haplustalf
PH	8.1	7.8
E. C.	0.53 m.mhos/cm	0.08 m.mhos/cm
DTPA-Zn	1.1 ppm	0.74 ppm
DTPA-Cu	1.5 ppm	1.4 ppm
DTPA-Fe	3.4 ppm	3.4 ppm
DTPA-Mn	12.8 ppm	15.4 ppm

The experiment was laid out in RBD with four replications in black soil and three replications in red soil. The treatments were as follows:

N:P <sub>2</sub> O <sub>5</sub> :K <sub>2</sub> O	40: 80: 40 Kg/ha
N:P <sub>2</sub> O <sub>5</sub> :K <sub>2</sub> O +	25 Kg MnSO <sub>4</sub> /ha
N:P <sub>2</sub> O <sub>5</sub> :K <sub>2</sub> O +	50 Kg MnSO <sub>4</sub> /ha
"	1.0% MnSO <sub>4</sub> F.S.
"	25. Kg ZnSO <sub>4</sub> /ha
"	0.5% ZnSO <sub>4</sub> F.S.
"	100 Kg FeSO <sub>4</sub> /ha
"	1.0% FeSO <sub>4</sub> F.S.

The foliar sprays were given on 20th, 30th and 40th day after sowing. The grain and straw samples were analysed for Zn, Cu, Fe and Mn contents and their uptake, were also calculated.

## RESULTS AND DISCUSSION

### *Grain and straw yield*

a) *Black soil*: Perusal of the data on grain yield (Table 1) showed response to the foliar spray of 0.5% ZnSO<sub>4</sub>. The yield was increased by 4.75 q/ha over NPK treated control. The response is quite expected since the soil was deficient in DTPA-Zn status (1.1 ppm). Soil application of ZnSO<sub>4</sub> also resulted in increased grain yield. Response to Zn application was also observed in soybean by Goepfert *et al.* (1978). Though the soil is deficient in DTPA-Fe status response was not seen for Fe application. However, foliar spray with 1.0% FeSO<sub>4</sub> solution increased the grain yield by 1.5 q/ha over control. Inspite of the presence of sufficient amount of DTPA-Mn, significant response was obtained for the foliar spray of 1.0% MnSO<sub>4</sub> which was in con-

sonance with the results reported by Randall *et al.* (1975) and Sureshkumar *et al.* (1977). The absence of response in stover yield for the application of Zn, Fe and Mn indicated more involvement of micronutrients in grain formation rather in foliage production (Anon. 1982). Further at harvest stage major portion of the foliage was found to fall leaving only the stems which would have resulted in the observed trend.

b). *Red soil* (Table 1): The results showed a significant response for the application of 25Kg MnSO<sub>4</sub>/ha followed by 25 Kg ZnSO<sub>4</sub>/ha. Despite the deficient nature of soil in available Fe, significant increase in grain yield was not observed for the application of FeSO<sub>4</sub>, either to the soil or to the foliage.

### *Uptake of micronutrients*(Table1):

#### a.) Black Soil

Treatments failed to have significant effect on the content of micronutrients in grain and straw. Application of ZnSO<sub>4</sub> resulted in increased uptake of Zn both in grain and straw irrespective of the method of application. Increased uptake of Fe in straw alone was observed for FeSO<sub>4</sub> application. Foliar spray with MnSO<sub>4</sub> resulted in increased uptake of Mn both in grain and straw by way of increased dry matter production and higher concentration. No Fe x Mn interaction was observed in the present investigation probably due to the lower levels tried.

b). *Red soil* (Table 1): Zn uptake in grain was found increased significantly by the soil application of ZnSO<sub>4</sub> in grain and foliar spray with 0.5% ZnSO<sub>4</sub> exhibited positive effect in its nutrition both in

TABLE 1. Effect of Mn, Zn and Fe application on the grain yield and uptake of Zn, Fe and Mn in grain.

	Grain yield k/ha		Uptake of nutrients in grain g/ha					
	Black soil	Red soil	Zn		Fe		Mn	
	Black soil	Red soil	Black soil	Red soil	Black soil	Red soil	Black soil	Red soil
1	993	1151	43	67	172	105	46	48
2	1118	2152	55	93	229	309	37	83
3	754	1100	33	57	159	161	34	56
4	1336	1158	65	56	189	192	61	70
5	1208	1760	72	107	218	217	49	70
6	1468	1668	84	124	289	219	67	85
7	948	1523	41	85	179	169	42	62
8	1113	1344	48	86	178	138	60	52
S.E.	92	207	7.1	13	22	—	3.7	—
C.D.	266	601	14.6	38	64	N.S.	10.7	N.S.

grain and straw. Application of Fe and Mn did not have any significant influence in its nutrition. However, marginal increase in uptake was observed for their addition.

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