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CHELATED MICRONUTRIENTS ON THE YIELD AND NUTRIENT UPTAKE BY GROUNDNUT

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ABSTRACT

Field experiment conducted with groundnut var. CO 2 to evaluate the efficacy of micronutrient chelates on the yield, yield attributes, micronutrient availability and their uptake by the crop revealed that, the soil application of either FeSO4 or ZnSO4 influenced the yield attributes in early stages while at later stages, the foliar spray of chelated micronutrient mixture @ 0.5% registered the highest values. With regard to micronutrient availability and their uptake, foliar spray of chelated mixtures increased the respective micronutrient concentrations besides their uptake.

KEY WORDS : Yield, yield attributes, chelated micronutrients, DTPA micronutrients, content, uptake

Micronutrient deficiency in the cultivable lands of recent years resulted in a heavy loss of crop yield. Intensive agricultural practices with prolonged use of micronutrient free high analysis fertilisers and mining of plant nutrients through removal of produce without returning the residues to the soil resulted in wide spread micronutrient deficiency in soils. To alleviate this problem, inorganic micronutrient fertilisers are commonly recommended. But the escalating prices besides their rapid solubility and unavailability to plants due to soil reactions suggest to recommend chelates as an alternative source to enhance the availability of native and applied micronutrient to the plants. On reviewing the literature, it was observed that very little work has been reported on the use of chelated micronutrients and their mixtures in Tamil Nadu. Hence a study was carried ot to evaluate the efficacy of chelated micronutrients on the yield, nutrient availability and their uptake by groundnut.

MATERIALS AND METHODS

Field experiment was conducted during the *rabi* seasons on sandy clay soil (Typic Haplustalfs) of the cotton breeding station, Tamil Nadu Agrl. University, Coimbatore, using groundnut var. CO2 as test crop in a randomised block design. The experimental soil was tested to be neutral in reaction (pH 7.0) with EC of 0.096 dSm- 1. The OC, CEC of the soil were 0.36 % and 18.7 c mol (p+) kg-1 soil. The available N, P, K were 389, 16, 698 kg / ha respectively. The soil was deficient in Zn (0.60 mg/kg) and sufficient in other micronutrients.

The chelated micronutrients and their mixtures were supplied by M/s. Bhagyanagar Laboratories, Hyderabad. The nutrient content of the chelated micronutrients was as follows : Zn EDTA - 11.5 % Zn ; Cu EDTA - 9.5 % Cu ; Fe EDTA - 11.0 % Fe ; Mn EDTA - 9.5 % Mn ; Ca EDTA - 8.5 % Ca ; Mg EDTA - 5.25 % Mg. The treatment schedule composed of eight treatments and replicated thrice (Table 1). Healthy kernals were sown at the rate of one seed/hole with a spacing of 30 x 10 cm. Basal fertiliser application of 17 : 34 : 54 Kg NPK / ha was given along with calculated quantities of ZnSO4, FeSO4, chelated micronutrient and their mixture. Proper plant protection measures were taken up and the crop was gorwn to maturity and harvested. The yield and yield attributes were recorded besides analysing the soil and plant

Table 1. Treatment details

Treatment No.	Details
T1	Control (NPK alone)
T2	ZnSO4 @ 25 kg/ha
T3	FeSO4 @ 50 kg/ha
T4	ZnSO4 @ 25 kg/ha + FeSO4 @ 50 kg/ha
T5	0.5 % Zn chelate foliar spray twice at 30 th and 40 DAS
T6	1.0 % Fe chelate foliar spray twice at 30 th and 40 DAS
T7	0.5 % CMM foliar spray twice at 30 th and 40 DAS
T8	1.0 % CMM foliar spray

DAS : Days after sowing ; CMM : Chelated micronutrient mixture

Table 2. Effect of Treatments on yield and yield attributes of Groundnut var.CO 2.

Treat-ment	Yield		No. of Matured Pods/m2	1000 kernel Weight (g)	Shelling (%)
	Pod (kg/ha)	Haulm (kg/ha)			
T1	891	6931	607	30.1	60.7
T2	946	7145	646	31.8	63.1
T3	1075	7485	708	30.8	61.2
T4	1142	7344	749	32.2	63.5
T5	1086	8279	719	31.4	61.9
T6	1204	8095	828	32.5	66.2
T7	1327	8311	871	32.9	67.6
T8	1186	7852	719	31.1	66.3
CD (0.05 %)	179	816	64	1.2	NS

samples for their nutrient content by following standard procedures.

RESULTS AND DISCUSSION

Foliar spray of 0.5 % chelated micronutrient mixture twice at 30 and 40 days after sowing (DAS) significantly influenced the yield and yield attributes. The highest pod (1327 kg/ha) and haulm (8311 kg/ha) yield besides the yield attributes *viz.*, number of matured pods /m2 (871), 1000 Kernel weight (32.9 g) and shelling percentage of 167.6 were recorded by this treatment (Table 2). The minimum values were observed in control plots. This was closely followed by 1 % spray of Fe chelate twice at 30 and 40 DAS. The combination of various micronutrients in the chelated micronutrient mixture might be the reason for the increase in yield attributes and yield (Hartzootk *et al.*, 1971). Poor response of yield attributes observed to higher concentration of spray fluid of CMM could be attributed to the excess dose of Zn and Mn EDTA which caused the cutting of roots and reduced the growth (Wallace and Wallace, 1983).

Gradual decrease in the DTPA Zn and Cu content was observed with crop growth period, whereas a reverse trend was observed with the DTPA Fe and Mn (Fig. 1). The decrease in DTPA Zn and Cu status might be due to concomittant increase in the uptake of these nutrients by the crop (Sundarsan, 1989). The slower dissolution of native nutrients under cropping conditions might be the reason for their increased content of DTPA Fe and Mn. The availability of Zn and Cu in the soil was found to be increased with the foliar spray of 0.5 % CMM and ZnSO4 at 30 and 40 DAS, but the antogonistic effect of Fe on Mn might be the reason for high DTPA Mn in the soil (Abdulla, 1963). With regard to micronutrient content and uptake the addition of Zn as chelate and ZnSO4 increased the availability inturn the uptake. This could be attributed to the increased availability and additive effect of Zn fertilisation.

In the case of Cu and Fe, the foliar spray of 0.5 % chelated micronutrient mixture induced the plant to absorb more of Cu and Fe which might have resulted in the increased uptake of these elements (Krishnasamy, 1982). Though the soil application of FeSO4 enhanced the Fe absorption in the initial stages, the foliar spray of either Fe chelate or CMM significantly influenced the content and uptake at later stages (Table 3). The trend of result obtained for Fe was best fitted for Mn also. The synergestic effect of Zn and Fe increased the Mn content and uptake by the crop (Chatterjee and Mandal, 1985).

Table 3. Micronutrient uptake by groundnut (g/ha)

Treat-ment	Zinc				Copper				Iron				Manganese			
	S1	S2	Kern.	Haulm	S1	S2	Kern.	Haulm	S1	S2	Kern.	Haulm	S1	S2	Kern.	Haulm
T1	30	148	135	12.0	11.7	141	85	7.8	573	4117	3990	84	100	474	373	125
T2	46	242	186	19.3	14.7	211	104	10.4	847	6477	4170	101	128	202	460	161
T3	36	230	165	17.0	15.3	187	96	10.3	918	6853	4710	135	131	642	482	153
T4	53	218	189	28.3	15.0	162	92	12.7	910	6427	4810	144	136	666	466	201
T5	32	193	231	26.0	11.3	160	120	11.1	593	5680	4730	109	107	576	542	140
T6	28	183	194	31.0	13.0	157	146	12.5	583	5670	5950	176	105	560	551	184
T7	32	174	222	29.0	11.7	171	131	16.8	569	5943	5250	159	104	666	598	258
T8	31	164	205	25.0	13.0	171	120	15.0	607	5820	5040	153	107	639	567	193
CD (0.05)	8	50	40	2.4	3.7	46	34	2.4	180	1606	781	25	NS	192	100	19.6

S1 : Vegitative : S2 : Flowering ; Kern - Kernel

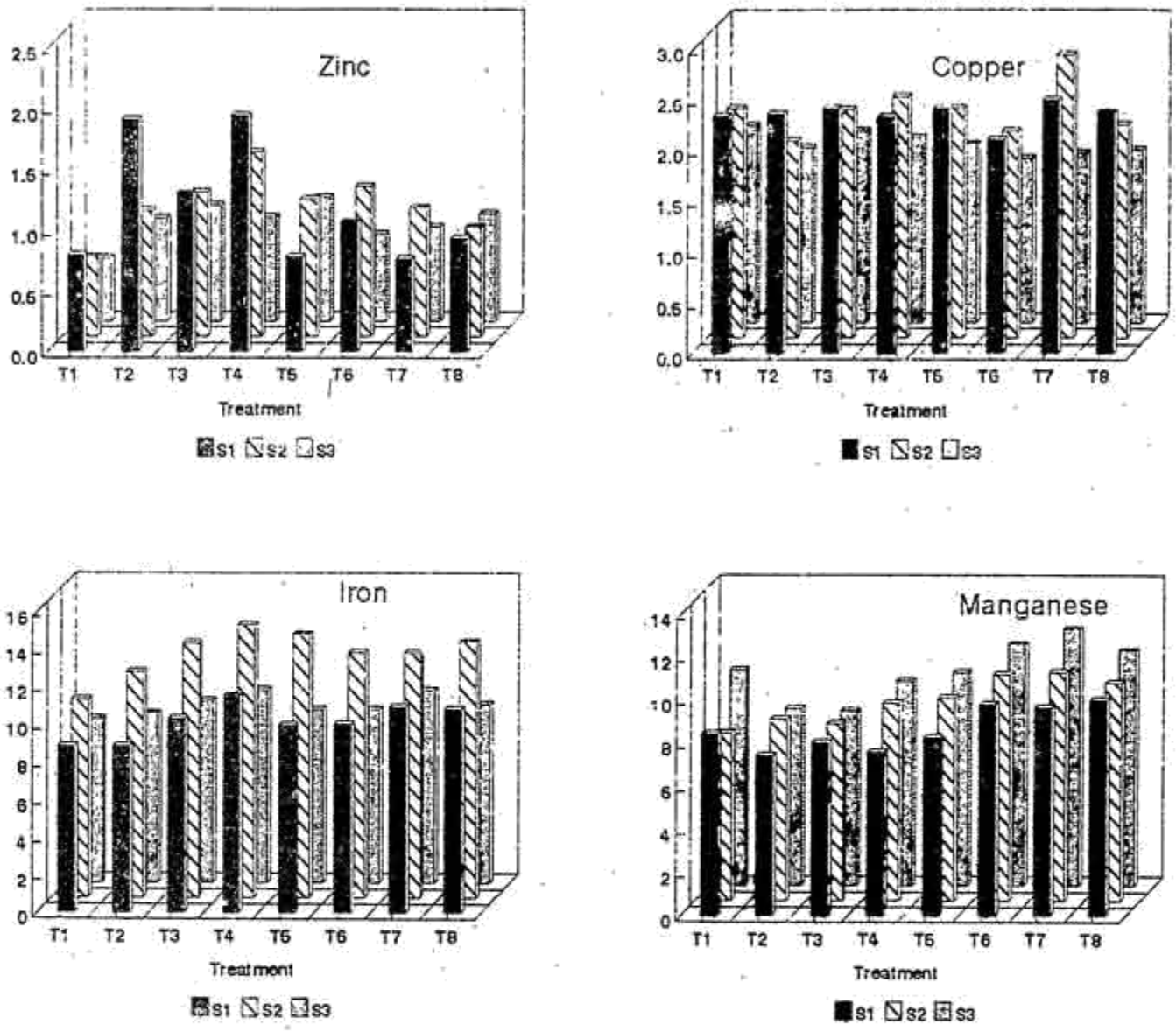

Fig. 1. DTPA micronutrient status at different growth stages of groundnut (mg kg-1)

Thus, it was concluded that the foliar spray of 0.5 % chelated micronutrient mixture twice at 30 and 40 DAS significantly increased the yield and yield attributes besides increasing the micronutrient content and their uptake by the plant.

REFERENCES

ABDULLA, I. (1963). Influence of chelating agents on the concentration of some nutrients for plants growing in soil under acid and alkaline conditions. **J. Sci. Food Agric., 14**: 98 - 109.

CHATTERJEE, A.K. and MANDAL, L.N. (1985). Zinc sources for rice in soil at different moisture regimes and organic matter levels. **P1. Soil 87**: 393 - 404.

HARTZOOTK, A.K. KARSTADT, D. MARCH, M. and FIELDMAN, S. (1971). Differential iron adsorption efficiency of peanut cultivars grown on calcareous soils. **Agron. J., 66**: 114 - 115.

KRISHNASAMY, R. (1982). **Dynamics of Zinc in Major Soil Series of Tamil Nadu**. PhD thesis, Tamil Nadu Agricultural University Coimbatore.

UNDARSAN, S. (1989). **Influence of Zinc and Boron on Yield and Quality of Groundnut**. MSc thesis, Tamil Nadu Agricultural University, Coimbatore.

WALLACE, A. and WALLACE, G.A. (1983). Phytotoxicity effect of high levels of iron chelates on bean plants in nutrient solutions. **J. Plant Nutr.**, 6 : 461 - 463.

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SELECTION RESPONSE AS ASSESSED THROUGH INTER-GENERATION CORRELATION AND REGRESSION IN SESAME

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ABSTRACT

The correlation and regression coefficient between F_3 means and corresponding parental F_2 values were positive and significant in crosses SVPR1 x TMV3, SVPR 1 x Co 1 and TMV 3 x SVPR 1 at + SD level, in crosses SVPR 1 x TMV 3 and SVPR 1 x Co 1 at - SD level indicated that the selection for single plant yield at these levels should be effective in the respective crosses.

KEY WORDS : Sesame, correlation, regression

Recombination breeding has been recognised as successful method to develop new sesame (*Sesamum indicum* (L.) varieties. This involves a systematic pedigree selection initiated in the F_2 population which exhibits a wide array of variations among the segregating generations. According to Allard (1960), high mean with high variability for a character in the F_2 population constituted the ideal source for exercising selection. Selection made in F_2 as a single plant yield is insufficient since single plant yield is the result of cumulative effect of both genotype and environment. Selection will be effective if only the performance of F_3 is more dependable on that of F_2 performance. Hence, it is necessary to evaluate as to how far the F_2 values have a bearing on F_3 generation mean and whether such parameter can be relied upon for selection. Its real genetic potentiality can be ascertained only in progeny performances of the individual selection since the mean of the progeny is more reliable estimate than the individual values of the selected plants. One way of ascertaining influence of environment on different characters, is the parent-progeny regression (Lush, 1940). In the present study, the inter generation correlation between F_2 and F_3 mean values and regression of F_3 on F_2 for the three levels of selection namely $\bar{x}$ level, $\bar{x}$+ SD and $\bar{x}$ - SD level for single plant yield and other unselected traints were discussed.

MATERIALS AND METHODS

The materials for the present study consisted of F_2 and F_3 generations for four cross combinations of sesame *viz.*, SVPR 1 x TNAU 22 (Cross 1), SVPR 1 x TMV 3 (Cross 2), SVPR 1 x Co 1 (Cross 3) and TMV 3 x SVPR 1 (Cross 4). Three hundred F_2 plants per cross per replications were raised in randomised block design with three replications at the Agricultural College and Research Institute, Madurai. From each cross combinations, 30 F_2 plants consisting 10 plants each on $\bar{x}$ level, $\bar{x}$ + SD level and $\bar{x}$ - SD level and seed from each plant were sown for family study. Altogether, 120 families were raised as F_3 generations. Observations were recorded on 75 plants in each cross combination and 20 plants per family per replication in F_2 and F_3 generation respectively. The estimates of parent-progeny regression analysis was calculated (Lush, 1940). The significance of regression co-efficient was tested by using 't' test (Singh and Chaudhary, 1985).

RESULTS AND DISCUSSION

Single plant yield, an important criterion for selection showed significant positive correlation