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Effect of micronutrients on growth and yield of Groundnut (*Arachis hypogaea* L.)

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ABSTRACT

The field experiment carried out during *Kharif* season of 2017 at Agricultural Research Station, S.D. Agricultural University, Aseda, Gujarat to study the effect of soil and foliar application of micronutrient. Application of $ZnSO_4$ @ 8 kg/ha + Foliar spray of $FeSO_4$ @ 1 % recorded higher pod yield (4078 kg/ha) and remained at par with treatment T_3, T_4, T_5, T_6, T_7, and T_{10}. Haulm yield was recorded higher (5700 kg/ha) in the treatment T_3 ($ZnSO_4$ @ 8 kg/ha) and remained statistically at par with the treatment T_9, T_7, T_{10} and T_6.

Key word: Micronutrient, Groundnut, Pod yield

Groundnut (*Arachishypogaea* L) is important oilseed crop. India is one of the largest producers of groundnut in the world. Among the oilseed crops, Groundnut (Arachishypogaea L.), the king of oilseeds, is the world's fourth most important source of edible oil and third most important source of vegetable protein. The special variety peanut of this area (Saurastra, Gujarat) is world famous in its flavor, taste and aroma. Groundnut contains more protein then meat, two and half more than eggs and more than any other vegetable food. It also contains phosphorous, thiamin and niacin that help in building resistance against all infections, such as hepatitis and tuberculosis. Zinc (Zn) and iron (Fe) deficiency is a well- documented problem in food crops, causing decreased crop yield and nutritional quality. Generally, the regions in the world with Zn and Fe deficient soils are also characterized by widespread Zn and Fe deficiencies in humans. Zinc plays significant role in various enzymatic and physiological activities of the plant. Zinc catalyses the process of oxidation in plant cells and is vital for transformation of carbohydrates, regulates the consumption of sugar, increases source of energy for the production of chlorophyll, aids in the formation of auxins which produce more plant cells and more dry matter, that in turn will be stored in seed as a sink and promotes absorption of water. Fe plays an important role in a series of metabolic activities involving respiratory enzymes and various photosynthetic reactions. Iron also plays an important role in legumes for nodulation and nitrogen fixation. Fe application also found to improve the protein content in groundnut kernels.

Application of micronutrients successfully prevented occurrence of chlorosis and increased chlorophyll content, pod yield and micronutrient uptake (Singh. 2001). Groundnut is one of the most important and economical oilseeds in Gujarat. Now a days yellowing of groundnut is common occurrence resulted in poor yield. It is might be due to deficiency of the iron and zinc in the soil. In order to correct deficiency of iron and zinc, field experiment was conducted with the objective to find out effectiveness of soil as well as foliar feeding of iron and Zn to groundnut crop for better growth and higher yield under North Gujarat conditions.

MATERIALS AND METHODS

The present experiment was conducted at Agricultural Research Station, Sardarkrushinagar Dantiwada Agricultural University, Aseda, Gujarat during *kharif* seasonof 2017. The soil of experimental site was loamy sand in texture with 7.64 pH, low in organic carbon (0.41 %), medium in available P_2O_5 (32.68 kg/ha) and higher in available K_2O (336 kg/ha). Groundnut variety Gujarat Groundnut -20 (GG 20) was sown at

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Table 1 Effect of micronutrient on plant population of groundnut.

Treatment	Plant population	
	20 DAS	At Harvest
T_1 – Water spray	5.73	5.13
T_2 – $FeSO_4$ @ 15 kg/ha	5.80	5.40
T_3 – $ZnSO_4$ @ 8 kg/ha	6.26	5.73
T_4 – Foliar spray of $FeSO_4$ @ 1 %	6.20	5.73
T_5 – Foliar spray of $ZnSO_4$ @ 0.5 %	6.00	5.63
T_6 – Foliar spray of $FeSO_4$ @ 1 % + Foliar spray of $ZnSO_4$ @ 0.5 %	6.33	5.80
T_7 – $FeSO_4$ @ 15 kg/ha + $ZnSO_4$ @ 8 kg/ha	5.26	4.73
T_8 – $FeSO_4$ @ 15 kg/ha + Foliar spray of $ZnSO_4$ @ 0.5 %	5.86	5.06
T_9 – $ZnSO_4$ @ 8 kg/ha + Foliar spray of $FeSO_4$ @ 1 %	6.60	5.40
T_{10} - Grade IV Multi micronutrient spray @ 1 %	6.33	5.60
SEm±	0.27	0.28
C.D. (P = 0.05)	0.80	0.84
C.V. (%)	7.71	9.00

Table 2 Effect of micronutrient on plant height (cm) of groundnut.

Treatment	Plant Height (cm)		
	60 DAS	90 DAS	At harvest
T_1 – Water spray	50.27	54.73	62.93
T_2 – FeSO4 @ 15 kg/ha	50.53	54.60	67.13
T_3 – ZnSO4 @ 8 kg/ha	55.20	59.20	83.40
T_4 – Foliar spray of FeSO4 @ 1 %	50.00	52.67	65.20
T_5 – Foliar spray of ZnSO4 @ 0.5 %	51.13	55.07	67.60
T_6 – Foliar spray of FeSO4 @ 1 % + Foliar spray of ZnSO4 @ 0.5 %	51.13	55.13	67.67
T_7 – FeSO4 @ 15 kg/ha + ZnSO4 @ 8 kg/ha	52.93	57.47	70.00
T_8 – FeSO4 @ 15 kg/ha + Foliar spray of ZnSO4 @ 0.5 %	49.20	53.20	62.73
T_9 – ZnSO4 @ 8 kg/ha + Foliar spray of FeSO4 @ 1 %	53.73	58.40	79.90
T_{10} - Grade IV Multi micronutrient spray @ 1 %	55.00	58.73	70.93
SEm±	4.32	3.94	4.07
C.D. (P = 0.05)	NS	NS	12.09
C.V. (%)	14.42	12.19	10.11

secondfortnight of Junewith line sowing method in randomized block design with nine treatments and three replications. The experimentconsist of ten treatments viz., T_1: Water spray, T_2: $FeSO_4$ @ 15 kg/ha, T_3:$ZnSO_4$ @ 8 kg/ha, T_4:Foliar Spray of $FeSO_4$ @ 1 %, T_5:Foliar spray of $ZnSO_4$ @ 0.5 %, T_6:Foliar spray of $FeSO_4$ @ 1 % + Foliar spray of $ZnSO_4$ @ 0.5 %, T_7:$FeSO_4$ @ 15 kg/ha + $ZnSO_4$ @ 8 kg/ha, T_8:$FeSO_4$ @ 15 kg/ha + Foliar spray of $ZnSO_4$ @ 0.5 %, T_9 – $ZnSO_4$ @ 8 kg/ha + Foliar spray of $FeSO_4$ @ 1 % and T_{10}- Grade IV Multi micronutrient Spray @ 1 %. Pre emergence herbicide (Pendimethalin @ 1 kg a.i / ha) was applied at next day after sowing (DAS) with knapsack sprayer fitted withflat-fan nozzle using 500 liter water/ha. The Recommended dose for groundnut was 25-50-00 NPK kg/ha. The half dose of N and full dose of P were applied through urea and diammonium

Table 3 Effect of micronutrient on pod yield (kg/ha) and haulm yield (kg/ha) of groundnut.

Treatment	Pod Yield (kg/ha)	Haulm yield (kg/ha)
T_1 – Water spray	2500	3856
T_2 – $FeSO_4$ @ 15 kg/ha	2678	4300
T_3 – $ZnSO_4$ @ 8 kg/ha	3878	5700
T_4 – Foliar spray of $FeSO_4$ @ 1 %	3567	4528
T_5 – Foliar spray of $ZnSO_4$ @ 0.5 %	3444	4089
T_6 – Foliar spray of $FeSO_4$ @ 1 % + Foliar spray of $ZnSO_4$ @ 0.5 %	3672	4989
T_7 – $FeSO_4$ @ 15 kg/ha + $ZnSO_4$ @ 8 kg/ha	3839	5406
T_8 – $FeSO_4$ @ 15 kg/ha + Foliar spray of $ZnSO_4$ @ 0.5 %	2989	3722
T_9 – $ZnSO_4$ @ 8 kg/ha + Foliar spray of $FeSO_4$ @ 1 %	4078	5489
T_{10} - Grade IV Multi micronutrient spray @ 1 %	3711	5072
SEm±	268.82	388.42
C.D. (P = 0.05)	798.58	1153.88
C.V. (%)	13.55	14.27

phosphate as basal at the time of sowing and remaining N was top dressed at 30 DAS.

RESULTS AND DISCUSSION

The result shown in table 1 indicates that effect of micronutrient on plant population at 20 DAS and at harvest was foundnon-significant.

Significantly higher plant height was observed under treatment T_3($ZnSO_4$ @ 8 kg/ha) (83.40 cm) and it was statistically at par with the treatment T_9 ($ZnSO_4$ @ 8 kg/ha + Foliar spray of $FeSO_4$ @ 1 %) (79.90 cm) at harvest. Whereas, at 60 and 90 DAS result reveals non-significant.Improvement in the growth attributes of groundnutwere observed by Sankar*et al* (1998) andRahevar*et al* (2015).

The result in above table indicated that effect of micronutrient on pod yield of groundnut found significant. Application of $ZnSO_4$ @ 8 kg/ha + Foliar spray of $FeSO_4$ @ 1 % recorded higher pod yield (4078 kg/ha) and remained at par with treatment T_3, T_4, T_5, T_6, T_7, and T_{10}. Haulm yield was recorded higher (5700 kg/ha) in the treatment T_3 ($ZnSO_4$ @ 8 kg/ha) and remained statistically at par with the treatment T_9, T_7, $T_{10}$and T_6.It might be due to improvement innutrient uptake particularly iron and zinc that increased transformation of photosyntheticactivity towards growing plant parts. Similar findingswere also observed by Rahevar*et al* (2015), Elayaraja D. (2014) and Gowthami andAnanda (2017).

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