

Influence of Zinc on Nodulation and Yield of Gram (Variety N-59)

G. U. Malewar, N. S. Jadhav, G. D. Lakhmale and L. M. Budhewar

Department of Agricultural Chemistry and Soil Science, MAU, Parbhani

Specific role of Zn in legumes has not been identified. However, Kapur *et al* (1975) reported that zinc plays an important function in the symbiotic nitrogen fixation by soyabean. In order to study influence of zinc

on nodulation and yield of gram, a pot culture experiment was conducted at Agricultural College Parbhani, on typical medium black soils, deficient and marginal in content of available zinc. Five levels of zinc (0.5, 7.5, 10.0 and 12.5 ppm zinc as $Zn SO_4$) were used and replicated three times. Nitrogen @ 20 kg N/ha and phosphorus @ 40 kg P_2O_5 /ha were applied to 7 kg pots as a basal dose. The optimum level of DTPA zinc is 0.6 ppm as defined by Takkar and Mann (1975).

TABLE 1

Influence of zinc nutrition on nodulation and yield of gram.

Zn application ppm/pot	Nodules plant	Wt. of nodules (g)	Wt. of roots (g)	Wt. of shoot (g)	Root: Shoot	Dry matter (g/pot)	Grain (g/pot)
Soil A (Available zinc = 0.40 ppm)							
0.0	47.0	0.330	0.717	5.030	0.1445	8.993	1.001
0.5	63.0	0.350	0.955	6.180	0.1545	10.534	1.592
7.5	64.0	0.417	1.030	5.615	0.1834	10.534	2.183
10.0	68.0	0.295	1.285	7.502	0.1712	10.716	2.240
12.5	76.0	0.415	1.120	6.455	0.1735	9.530	1.960
S.E.	2.74	0.01	0.098	0.351	—	—	0.114
C.D.	8.91*	0.84*	0.232*	1.147*	—	N.S.	0.373
Soil B (Available zinc = 0.64 ppm)							
0.0	57.0	0.380	1.085	3.1848	0.2819	8.110	1.074
5.0	65.0	0.420	0.935	4.0000	0.2337	9.981	1.828
7.5	85.0	1.258	1.050	4.2200	0.2488	8.515	2.021
10.0	65.0	0.615	0.970	4.4100	0.2623	10.828	2.313
12.5	69.0	0.585	0.980	3.7350	0.2623	10.358	2.097
S.E.	—	—	0.04	0.557	—	—	0.226
C.D.	N.S.	N.S.	0.13*	1.186*	—	N.S.	0.740*

*Significant at 5 per cent level.

The results presented in Table 1 reveal that application of zinc significantly increased the number of nodules and weight of nodules per plant

in zinc deficient soil. The maximum number of nodules (85 and 76) were noticed in 7.5 and 12.5 ppm treatments in marginal and deficient soils,

respectively. It is interesting to note that process of nodulation was enhanced upto the last level of zinc (12.5 ppm) in zinc deficient soil, however nodule formation process was arrested after 7.5 ppm level of zinc in marginal soil. Weights of root and shoot were significantly increased in both zinc deficient and marginal soils. This may be true because zinc helps in auxin production which initiates the root and shoot elongation process of plant development. Further, data on yield indicate that the application of zinc increased the dry matter which ranged from 5.6 to 25.29 per cent over control in both types of soils. However, application of zinc @ 12.5 ppm resulted in reduction in dry matter. Eventhough dry matter was increased considerably due to zinc application, it could not reach the level of significance in both types of soils. Increase in grain yield was however, statistically significant in zinc deficient soil. The per cent increase in grain yield ranged from 36.68 to 54.56 per cent over the control. These finding are in accordance with

the report of Raheja *et al.* (1959) who have reported 20 per cent increase in yield over control. Low availability of zinc in experimental soils and enhancing effect of zinc on nodulation and N fixation process may be the reasons to respond by gram to zinc fertilization. The beneficial effect of zinc on growth and yield of gram needs further confirmation.

(Received on Sept. 19, 1978)

REFERENCES

- Kapur O.C., M.S. Gangwar and B.R. Tilak. 1975. Influence of Zinc on symbiotic N fixation by soybean (*Glycine Max.* Linn) in Silt loam soil. *Indian J. Agril. Research* (2) (1&2) : 51.
- Raheja, P.C., K.S. Yawalkar and R. Singh. 1959. Crop response to mionr nutrients under *Indian Condition*. *Indian J. Agron.* 3 (4): 254.
- Takkar, P.N., and M.S. Mann. 1975. Evaluation of analytical methods for estimating available zinc and response of maize to applied zinc in major soil series of Ludhiana, Punjab (India) *Agrochimica* 21 : 420.