

EFFECT OF FOLIAR SPRAYS OF TRACE ELEMENTS (MANGANESE SULPHATE AND COBALT CHLORIDE) ON NODULE DEVELOPMENT, SHOOT AND ROOT LENGTH OF *VIGNA SINENSIS* L. SEVI EX. HASSK.

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The effect of foliar spray of trace elements (manganese sulphate and cobalt chloride) on nodule development, shoot and root length of *Vigna sinensis* L. Sevi ex Hassk was studied. Foliar sprays of trace elements in higher concentrations have significant adverse effect on nodule number and shoot length but do not cause significant adverse effect on root length. Manganese sulphate is more toxic than cobalt chloride.

Keyword : Cobalt chloride; Foliar application; Manganese sulphate; Nodule number; Shoot and root length.

The effect of foliar application of trace elements on nodulation of leguminous plants have been studied only by few workers. Jones¹ and Kumar and Gupta² reported that the increase in concentration of manganese sulphate inhibited the nodule number. More and Jadhav³ studied the effect of cobalt on nodulation of soybean. The present study was designed to study the effect of foliar sprays of manganese sulphate and cobalt chloride on nodule development and shoot and root length of *Vigna sinensis* L. Sevi ex. Hassk.

Seeds were surface sterilized with 0.1 percent aqueous HgCl₂ solution and sown in earthenware pots containing equal amounts of double sterilized soil. Pots were kept in glass house and precaution was taken to prevent contamination of soil with *Rhizobium* until inoculation. Six days after the sowing 10 seedlings of equal size in each pot were selected and the rest were removed. Before spraying, the pots were inoculated with equal amounts of a homogeneous suspension of an appropriate strain of *Rhizobium*. Latter was isolated from the effective (pink) nodules and was grown on the yeast extract mannitol agar medium of the following composition: Mannitol 10 g; K₂HPO₄ 0.5 g; MgSO₄ 7H₂O 0.2 g; NaCl 0.1 g; CaCO₃ 3.0g; Yeast extract 5.0 g; Agar-agar 15.0 g; distilled water 1000 ml for each chemical. Three concentrations of MnSO₄ and COCl₂ viz., 50 ppm, 100 ppm and 200 ppm were prepared for the each chemical. Two sprays were made, first on 15 days old seedlings for two consecutive days and the second after six days of the first spray. Control plants were sprayed with sterilized distilled water. Soil contamination of solutions was prevented by covering the soil surface with sterilized cotton. Solutions were sprayed at the rate of 10 ml per plant. Sixteen days after the second spray, nodule number, shoot and root length were recorded and data were

subjected to 't' test.

In the case of manganese sulphate and cobalt chloride treated plants an insignificant increase in the nodule number was noticed in 50 ppm whereas a significant decrease was noticed in 100 and 200 ppm treatments.

Maximum shoot and root lengths were observed in controls as compared to the growth in treated plants (Table 1 and 2).

The present findings, so far as higher concentrations are concerned, are in accordance with the earlier observations^{1,2} who reported that the increasing concentration of manganese sulphate caused a decrease in both number of nodules and nodule volume. Several workers have also reported that foliar sprays of trace elements have adverse effect on nodulation at higher concentrations^{4,7}.

Previously there are reports that the increasing concentrations of trace elements⁸⁻¹⁴ caused a decrease in both nodule number and volumes.

It is apparent from the studies that the lower concentration of trace elements favoured the growth while higher concentrations proved to be toxic for the growth of the leguminous plants.

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Table 1. Effect of foliar spray of manganese sulphate on nodule number, shoot and root length.

Treatment MnSO ₄	Mean number of nodule	Value of 't'	Mean shoot length (cm)	Value of 't'	Mean root length (cm)	Value of 't'
Control	29.9	-	23.15	-	24.73	-
50 ppm	32.6	1.56	22.85	0.80	24.28	0.93
100 ppm	24.2	3.19**	20.07	10.87**	24.09	1.33
200 ppm	19.8	5.56**	19.17	15.18**	23.65	1.69

Table 2. Effect of foliar spray of cobalt chloride on nodule number, shoot and root length.

Treatment CoCl ₂	Mean number of nodule	Value of 't'	Mean shoot length (cm)	Value of 't'	Mean root length (cm)	Value of 't'
Control	29.9	-	23.15	-	24.73	-
50 ppm	31.7	1.09	22.56	1.63	24.63	0.21
100 ppm	23.5	3.69**	20.26	8.84**	24.37	0.75
200 ppm	22.2	4.54**	19.79	9.86**	23.66	1.78

Significant at 1 % level = **

Significant at 5 % level = *

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