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Influence of micronutrients on growth and yield of coriander (*Coriandrum sativum*) in rainfed vertisols

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Abstract

Coriander crop is grown as a rainfed rabi crop in vertisols of Andhra Pradesh. The crop generally suffers from periods of moisture stress from the flowering to maturity stage depending on precipitation during November and December months. During these stress periods, the crop shows deficiency symptoms of micronutrients such as Copper, Manganese, Zinc and Iron. The foliar application of $ZnSO_4$ 0.5%, $FeSO_4$ 0.5% and combination of $ZnSO_4$ + $FeSO_4$ + $CuSO_4$ + $MnSO_4$ all at 0.5%, had significant positive influence on all growth parameters and yield of Coriander crop. Among the treatments, $ZnSO_4$ + $FeSO_4$ + $CuSO_4$ + MnSO4 all at 0.5% recorded maximum plant height, number of primary branches and secondary branches, umbels per plant and umbellets per umbel, which are significantly superior to control. Crop maturity differed significantly among the treatments though the difference between the maximum and minimum days was only 3.3 days. The treatments, Zn SO_4 + Fe SO_4 + Cu SO_4 + Mn SO_4 all at 0.5%, recorded significantly highest yield (940 kg/ha) followed by Fe SO_4 0.5 % (927 kg/ha) and Zn SO_4 0.5 % (922 kg/ha) which are on par with each other and significantly superior over control (801 kg/ha).

Keywords: Coriander, Micronutrients, Iron, Copper, Manganese, Zinc

Micronutrients play important role in nutrition of crops. Many crops respond to foliar and soil application of micronutrients in terms of growth and crop yields. It is widely reported that foliar application of micronutrients at active growth stages will improve plant growth and consequently yield and quality in various crops. Coriander is grown as a rainfed rabi crop in vertisols of Andhra Pradesh. The crop generally suffers periods of moisture stress from the flowering to maturity stage depending on precipitation during November and December. During this stress period, the crop shows deficiency symptoms of micronutrients such as Copper, Manganese, Zinc and Iron. Since this is a general phenomenon occurring in coriander growing areas every year, a study was taken up to investigate the impact and influence of these foliar sprays of micronutrients on crop growth and yield of Coriander.

The field experiment was conducted for during 2004-05 rabi season at Regional Agricultural Research Station, Lam using the pre-release variety LCC-128. The experimental soil was vertisols with medium available N (301 kg/ha), medium available P2 O 5 (33 kg/ha) and high exchangeable K2 O (988 kg/ha). The soil organic carbon content

was 0.40% (low). The micronutrient status of the soil was 0.80, 6.8 and 1.6 and 1.2 ppm DPTA extractable Zn, Fe, Mn and Cu respectively. The experiment was laid out in Randomized Block Design with twelve treatments in three replications. The treatments were Zn SO_4, Fe SO_4, Cu SO_4, Mn SO_4 at 0.25% and 0.5%, combination of these four at 0.25% and 0.5% as foliar spray twice, once at 40 DAS and the second at 60 DAS in comparison with water spray and control. The data on plant height (cm), number of primary branches, number of secondary branches, number of umbels per plant, number of umbellets per umbel, days to 50% flowering, days to maturity and yield (kg/ha) were recorded. The data recorded was analyzed for ascertaining the influence of micronutrients on crop growth and yield.

The results presented in Table-1, revealed positive changes in crop growth and yield of coriander. The foliar application of Zn SO_4 0.5% , Fe SO_4 0.5% and combination of Zn SO_4 + Fe SO_4 + Cu SO_4 + Mn SO_4 all at 0.5%, had significant positive influence on all crop growth parameters and yield of Coriander crop. Among the twelve treatments evaluated, maximum plant height was recorded in Zn SO_4 + Fe SO_4 + Cu SO_4 + Mn SO_4 all at 0.5% (77.5 cm) followed by Fe SO_4 0.5 % (74.4 cm) which are on par with each other and are significantly superior to control (59.4 cm). Control recorded the minimum plant height among the treatments (59.4 cm). Maximum number of primary branches was recorded in Zn SO_4 + Fe SO_4 + Cu SO_4 + Mn SO_4 all at 0.5% (6.7) followed by Zn SO_4 + Fe SO_4 + Cu SO_4 + Mn SO_4 all at 0.25% (6.4) and Fe SO_4 0.25 % (6.4) which were significantly superior to control (4.7) i.e. control being the minimum.

Regarding number of secondary branches, maximum number was recorded in Zn SO_4 + Fe SO_4 + Cu SO_4 + Mn SO_4 all at 0.5% (15.0) followed by Zn SO_4 + Fe SO_4 + Cu SO_4 + Mn SO_4 all at 0.25% (13.3) which were significantly superior to control (9.3). All the treatments including water spray extended the days to 50% flowering significantly when compared to control. Zn SO_4 0.25 % recorded maximum number of days to 50% flowering (46.3) followed by Cu SO_4 0.25 % (45.7) and

Table 1. Influence of micronutrients on crop growth of rain fed coriander

Name of the treatment	Plant height (cm)	No. of primary branches	No. of secondary branches	No. of days to 50% flowering	Days to Maturity
Zn SO_4 0.25 %	67.5	5.5	11.5	46.3	85.0
Zn SO_4 0.5 %	69.4	5.5	11.2	45.3	85.0
Fe SO_4 0.25 %	69.1	6.4	12.9	44.3	86.3
Fe SO_4 0.5 %	74.4	5.5	14.3	44.7	85.0
Cu SO_4 0.25 %	71.6	5.4	12.2	45.7	83.7
Cu SO_4 0.5 %	67.7	5.6	10.9	44.3	85.0
Mn SO_4 0.25 %	61.7	4.8	11.5	45.3	84.7
Mn SO_4 0.5 %	61.6	5.0	11.7	45.7	84.7
Zn SO_4 + Fe SO_4 + Cu SO_4 + Mn SO_4 0.25%	68.0	6.4	13.3	45.0	84.3
Zn SO_4 + Fe SO_4 + Cu SO_4 + Mn SO_4 0.5%	77.5	6.7	15.0	45.3	84.7
Water Spray	62.6	5.2	11.6	44.7	84.7
Control	59.4	4.7	9.3	42.3	83.0
CD	11.0	1.0	2.7	1.0	1.4
CV%	9.6	10.9	13.4	1.4	1.0

Table 2. Influence of micronutrients on umbels and yield of rain fed coriander.

Name of the treatment	No. of umbels per plant	No. of umbellets per umbel	Yield per ha (kg)
Zn SO_4 0.25 %	19.6	5.7	818
Zn SO_4 0.5 %	19.6	5.7	922
Fe SO_4 0.25 %	22.5	6.3	862
Fe SO_4 0.5 %	27.1	6.4	927
Cu SO_4 0.25 %	21.4	6.0	822
Cu SO_4 0.5 %	22.7	4.9	855
Mn SO_4 0.25 %	19.7	5.2	794
Mn SO_4 0.5 %	20.4	5.5	783
Zn SO_4 + Fe SO_4 + Cu SO_4 + Mn SO_4 0.25%	25.4	6.2	908
Zn SO_4 + Fe SO_4 + Cu SO_4 + Mn SO_4 0.5%	27.4	6.4	940
Water	20.8	5.0	808
Control	18.2	4.4	801
CD	3.7	1.0	109.77
CV%	9.8	10.3	7.6

Mn SO_4 0.5 % (45.7) which were significantly superior to control (42.3). Maximum number of umbels were recorded in Zn SO_4 + Fe SO_4 + Cu SO_4 + Mn SO_4 all at 0.5% (27.4) followed by Fe SO_4 0.5 % (27.4) which were on par with each other and significantly superior to control (18.2). The control recorded the lowest number of umbels per plant (18.2). Zn SO_4 + Fe SO_4 + Cu SO_4 + Mn SO_4 all at 0.5% and Fe SO4 0.5 % recorded maximum number of umbellets per umbel (6.4) followed by Fe SO_4 0.25 % (6.3) which were significantly superior to the control (4.4, lowest among the treatments). Crop maturity differed significantly among the treatments though the difference between the treatment that took maximum days to maturity (Fe SO_4 0.25 %) and minimum days to maturity (control) was only 3.3 days.

Among the twelve treatments, Zn SO_4 + Fe SO_4 + Cu SO_4 + Mn SO_4 all at 0.5% recorded significantly highest yield (940 kg/ha) followed by Fe SO_4 0.5 % (927 kg/ha) and Zn SO_4 0.5 % (922 kg/ha) which are on par with each other and significantly superior over control (801 kg/ha). Significant increase in crop growth, yield and essential oil content in Coriander was reported following application of 200 ppm microelements (Fe, Zn and Mn) (Khattab and Omer, 1999). Similarly, improvement in Coriander grain yield and essential oil yield with foliar sprays of Zn SO_4 0.5%, Fe SO_4 2%, Cu SO_4 0.2%, and Mn SO_4 0.5% among which best treatment being $CuSO_4$, was reported by Maurya (1990).

The positive influence of foliar application of micronutrients on crop growth may be due to the improved ability of the crop to absorb nutrients, photosynthesis and better sink-source relationship as these play vital role in various biochemical processes. The increase in yield may be attributed to increased plant height, maximum number of primary branches and secondary branches, and maximum number of umbels and umbellets, which were positively affected by the foliar application of micronutrients.

References

Khattab M E & Omer E A 1999 Influence of excessive fertilization with micro-nutrients on the growth, yield, essential oil and micro-elements of some Apiaceae plants. Egyptian Journal of Horticulture. 26, 3: 249-266.

Maurya K R 1990. Effect of micronutrients on yield and essential oil content of coriander (*Coriandrum sativum* Linn.). Indian Perfumer. 34, 4: 263-265.