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Response of Coriander (*Coriandrum sativum* L.) Varieties to Different Levels of Zinc

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

An experiment was conducted during *kharif* season 2023 at Horticulture Research Farm, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (Uttar Pradesh). To find out the. Response of Coriander *(Coriandrum Sativum L.)* Varieties to Different Levels of Zinc. experiment have different varieties and different concentrations of zinc with sixteen treatments were arranged in Factorial randomized block design (FRBD). This experiment has proved that, with the combination of 0.25% of zinc along with shashvi shows medium range of growth and development. With the combination of 0.5% of zinc result is higher among all varieties. Comparing the varieties, TMCO 24-003 is the lowest performer while green coronet gives the best results with treatment of zinc. The above results show how the plant grows according to varieties treated with zinc levels on their parameters. The cost of cultivation and net returns will give profit according to the above resultant. The parameters were taken is Growth habit

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(erect/semierect/spreading),days to germination, plant height (15,30 and 45 DAS),number of basal leaves, length of longest basal leaf (cm),leaf margin of longest basal leaf (Deeply Serrated /Serrated),leaf cluster of longest basal leaf (Non-shiny/shiny)leaf color of longest basal leaf (Green/Dark green), leaf yield per plant(g), leaf yield per plot, leaf yield per ha, cost of cultivation (Rs/ha), gross Returns, net Returns, benefit cost ratio, total soluble solids (B), vitamin C.

Keywords: Zinc; varieties; growth habit; plant height; basal leaf.

1. INTRODUCTION

Coriander (*Coriandrum sativum* L.) is one of the major seed spices grown in India. The country is the largest producer of coriander in the world and is mainly cultivated in Rajasthan, Gujarat Andhra Pradesh, Madhya Pradesh, Tamil Nadu, Orissa, Karnataka, Uttar Pradesh, and Bihar, where 52.4 million tons are produced from 54.3 million hectares (NHB, 2013). Andhra Pradesh ranks second in production of coriander and ranks first in the Southern states of the country. The share of Andhra Pradesh is maximum ire. 26,000 metric tons from 21,800 hectares (NHB, 2015). In Andhra Pradesh, it is grown in Ananthapur, Cuddapah, Kurnool, Guntur, East and West Godavari districts. Besides domestic consumption, the crop has export potential [1-4]. At present only five percent of the total produce is exported. During 2011-12, India exported 28,100 tons of coriander worth Rs. 16.401.85 lakhs. The meagre quantity of exports may be due to low productivity and inability to withstand international quality standards of the produce [5-8]. Therefore, there is a need to upgrade the quality and productivity so that it can withstand competition in the international market. Coriander seeds are rich in carbohydrate and protein content [9,10]. The aromatic nature of the plant is due to the presence of an essential oil (terpene tertiary alcohol i.e., linalool or Coriandrum) present in seeds and leaves. The oil is used in perfumery, confectionery, cosmetics, for flavoring liquors and beverages [11,12].

Micronutrients are present in lower concentrations in soil than macronutrients but are equally significant in plant nutrition, since plants grown in micronutrient deficient soils show similar reductions in productivity as those grown in macronutrient-deficient soils (Havlin et al., 2005). The prerequisite criteria for improved growth, yield and quality of crops is balanced fertilization. However, nutrients can be applied either by conventional methods or by foliar application but the major advantage of foliar application is the instant availability of nutrients to plants [13-15]. Thus, the aim of this investigation is to evaluate the application of balanced nutrition not only to enhance production but also to increase the total productivity and efficient use of fertilizers in coriander. Keeping the above point the present investigation related Response of Coriander (*Coriandrum sativum* L.) varieties to different levels of Zinc.

2. MATERIALS AND METHODS

The present investigation was carried out to study the “Response of Coriander *(Coriandrum Sativum L.)* Varieties to Different Levels of Zinc”. The experiment was carried out during *kharif* season 2023 at Research farm in Department of Horticulture, Naini Agriculture Institute, Sam Higginbottom University of Agriculture, Technology, and sciences, Prayagraj (U.P). Allahabad is situated at an elevation of 78 meters above sea level at 25.87 ^{0}North latitude and 81.15^{0}E longitude. This region has a sub-tropical climate prevailing in the South-East part of U.P. with both the extremes in temperature, i.e., the winter and the summer. In cold winters, the temperature sometimes is as low as 32 °F in December–January and very hot summer with temperature reaching up to 115°F in the months of May and June. During winter, frosts and during summer, hot scorching winds are also not uncommon. The experiment materials consist of Shashvi, Surabhi, TMCO 24-003, Green Cornet. A total of twelve treatments were tried to including control in FRBD an replicated thrice. The treatments consisted of M1(control), M2 ZNSO4 (0.25%), M3 ZNSO4 (0.5%) applied as a foliar spray in four varieties. Three plants were randomly selected for recording observations on growth parameters, yield parameters, quality parameters and attributing parameters. The data collected during the course of investigation were subjected to statistical analysis by adopting appropriate method of analysis of variance as described by Fisher (1950).

Table 1. Treatment combination

S. No.	Treatment Notation	Treatment Details
1	T1	V1 (TMCO 24-003) + M1 (Control)
2	T2	V1 (TMCO 24-003) + M2 $ZnSO_4$ (0.25%)
3	T3	V1 (TMCO 24-003) + M3 $ZnSO_4$ (0.5%)
4	T4	V2 (Surabhi) + M1 (Control)
5	T5	V2 (Surabhi) + M2 $ZnSO_4$ (0.25%)
6	T6	V2 (Surabhi) + M3 $ZnSO_4$ (0.5%)
7	T7	V3 (Green Coronet) + M1 (Control)
8	T8	V3 (Green Coronet) + M2 $ZnSO_4$ (0.25%)
9	T9	V3 (Green Coronet) + M3 $ZnSO_4$ (0.5%)
10	T10	V4 (Shashvi) + M1 (Control)
11	T11	V4 (Shashvi) + M2 $ZnSO_4$ (0.25%)
12	T12	V4 (Shashvi) + M3 $ZnSO_4$ (0.5%)

3. RESULTS AND DISCUSSION

Growth habit: Both concentrations of zinc treatment positively influenced the growth habit of coriander plants, resulting in healthier and more robust growth compared to untreated plants 0.5% of zinc concentrated showed minimum growth and 0.25% of zinc concentration will grow maximum growth, while the control was the least. As for varieties green coronet showed maximum response to zinc spray, with shashvi and Surabhi being medium and the least is TMCO 003-24.

Days to germination: Coriander seeds treated with both 0.5% and 0.25% zinc solutions exhibited faster germination compared to untreated seeds, indicating an accelerated initial growth stage 0.5% of zinc concentrated will germinate minimum and 0.25% of zinc concentration will germination maximum control will be the least.

Plant height: Zinc-treated coriander plants, particularly those treated with 0.5% concentration, displayed increased height compared to untreated plants, suggesting enhanced vertical growth 0.5% of zinc concentrated will grow minimum and 0.25% of zinc concentration will grow maximum control will be the least according to varieties green coronet will grow maximum shashvi and Surabhi will grow medium least is TMCO 003-24 with zinc spray.

Number of basal leaves: Both concentrations of zinc treatment led to a higher number of basal leaves per plant, indicating improved foliage development at the base of the plants 0.5% of zinc concentrated will grow minimum and 0.25% of zinc concentration will grow maximum control will be the least according to varieties green coronet will grow maximum shashvi and Surabhi will grow medium least is TMCO 003-24 with zinc spray.

Length of longest basal leaf: The longest basal leaves on coriander plants treated with 0.5% zinc solution were notably longer than those treated with 0.25% or left untreated, indicating superior leaf growth 0.5% of zinc concentrated will grow minimum and 0.25% of zinc concentration will grow maximum control will be the least according to varieties green coronet will grow maximum shashvi and Surabhi will grow medium least is TMCO 003-24 with zinc spray.

Table 2. Plant height at 45 days after sowing

	M0: Control	M1:ZNSO4 (0.5%)	M2:ZNSO4 (0.25%)	Mean
V1: Shashi	28.12	37.34	35.34	33.600
V2: Surabhi	27.63	37.60	33.51	32.912
V3: TMCO 24-003	25.70	32.94	30.25	29.630
V4: Green Coronet	28.27	38.53	35.34	34050
Mean	27.432	36.603	33.610	
	C.D at 0.5 %	**Sed (±)**	**SE (m)**	**F-Test**
Due to Varieties	*0.495*	0.237	0.168	S
Due to Treatment	0.428	0.205	0.145	S
Due to Varieteis x Tretments	0.857	0.41	0.29	S

Table 3. Leaf Yield per plant at harvest

	M0: Control	M1:ZNSO4 (0.5%)	M2:ZNSO4 (0.25%)	Mean
V1: Shashi	30.61	31.72	31.71	31.351
V2: Surabhi	21.82	23.92	22.85	22.863
V3: TMCO 24-003	18.85	20.30	19.90	19.682
V4: Green Coronet	31.83	40.78	32.30	34.971
Mean	25.778	29.180	26.693	
	C.D at 0.5 %	**Sed (±)**	**SE (m)**	**F-Test**
Due to Varieties	*0.28*	0.099	0.07	S
Due to Treatment	0.18	0.086	0.061	S
Due to Varieteis x Tret	0.359	0.17	0.122	S

Table 4. Leaf yield per hectare (q ha-1)

	M0: Control	M1:ZNSO4 (0.5%)	M2:ZNSO4 (0.25%)	Mean
V1: Shashi	39.93	43.03	39.90	40.954
V2: Surabhi	23.01	24.01	23.34	23.463
V3: TMCO 24-003	21.58	22.37	22.03	21.994
V4: Green Coronet	43.21	45.12	44.64	44.320
Mean	31.931	33.639	32.479	
	C.D at 0.5 %	**Sed (±)**	**SE (m)**	**F-Test**
Due to Varieties	0.55	0.263	0.186	S
Due to Treatment	0.476	0.228	0.161	S
Due to Varieteis x Tret	0.952	0.456	0.323	S

Table 5. Total soluble solids (B^0)

	M0: Control	M1:ZNSO4 (0.5%)	M2:ZNSO4 (0.25%)	Mean
V1: Shashi	3.23	3.25	3.24	3.241
V2: Surabhi	3.13	3.21	3.16	3.168
V3: TMCO 24-003	2.76	3.04	3.08	2.960
V4: Green Coronet	3.35	3.47	3.44	3.422
Mean	3.119	3.243	3.231	
	C.D at 0.5 %	**Sed (±)**	**SE (m)**	**F-Test**
Due to Varieties	0.046	0.022	0.016	S
Due to Treatment	0.04	0.019	0.014	S
Due to Varieteis x Tret	0.08	0.038	0.027	S

Leaf margin of longest basal leaf: Zinc treatment, especially at the 0.5% concentration, resulted in smoother and more defined leaf margins on the longest basal leaves compared to untreated plants.

Leaf cluster of longest basal leaf: The leaves of coriander plants treated with both concentrations of zinc exhibited a shinier and glossier appearance compared to untreated plants, indicating better leaf health and vigor.

Leaf colour of longest basal leaf: Zinc-treated coriander plants, particularly those treated with 0.5% concentration, displayed richer and greener leaf coloration compared to untreated plants, suggesting improved chlorophyll production and photosynthetic activity.

Leaf yield per plant: Coriander plants treated with both concentrations of zinc produced a higher yield of leaves per individual plant compared to untreated plants, indicating increased productivity.

Leaf yield per plot: The overall yield of coriander leaves per plot was significantly higher in plots treated with both concentrations of zinc compared to untreated plots, suggesting better overall plant performance and yield.

Leaf yield per hectare: Extrapolating from the plot yield, the yield per hectare for coriander

treated with both concentrations of zinc is expected to be higher compared to untreated crops, indicating the potential for increased commercial production and profitability.

4. CONCLUSION

From the present observation we conclude that the combination of 0.25% of zinc along with shashvi show medium range of growth and development according to this yield shows. With the combination of 0.5% of zinc result is higher than the 0.5% among all varieties. Comparing the tested varieties, TMCO 24-003 is the lowest performer while green coronet gives the better resultant with treatment of zinc. The above results show how the plant grows according to varieties treated with zinc levels on their parameters. The cost of cultivation and net returns will give profit according to the above resultant. The parameters were taken is Growth habit (erect/semi erect/spreading),days to germination, plant height (15,30 and 45 DAS),number of basal leaves, length of longest basal leaf (cm),leaf margin of longest basal leaf (Deeply serrated /Serrated),leaf cluster of longest basal leaf (Non-shiny/shiny)leaf color of longest basal leaf (Green/Dark green), leaf yield per plant(g), leaf yield per plot, leaf yield per ha, cost of cultivation (Rs/ha), gross Returns, net Returns, benefit cost ratio, total soluble solids (B), vitamin C.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Khan MT, Ahmed S, Shah AA, Noor Shah A, Tanveer M, El-Sheikh MA, Siddiqui MH. Influence of zinc oxide nanoparticles to regulate the antioxidants enzymes, some osmolytes and agronomic attributes in *Coriandrum sativum* L. grown under water stress. Agronomy. 2021;11(10): 2004.
2. Prathibha R, Vasanthi D, Selvi D. Effect of IPNS and foliar nutrition on the yield and quality attributes of coriander (*Coriandrum sativum* L.). Madras Agricultural Journal. 2018;105(4-6):234-237.
3. Wong KW, Yap CK, Nulit R, Omar H, Aris AZ, Cheng WH, Leow CS. An in vegetables: A review and some insights. Integrative Food, Nutrition and Metabolism. 2019;6:1-7.
4. Sharma A, Gupta PK, Dongre P, Parihar N, Dangi JPS, Bhayal D. Effect of micronutrients and biofertilizer treatments on yield and its attributes of coriander (*Coriandrum sativum* L.) cv. RCR-41. International Journal of Environment and Climate Change. 2023;13(11):4250-4260.
5. Lal G, Mehta RS, Maheria SP, Sharma Y. Influence of sulphur and zinc on growth and yield of coriander (*Coriandrum sativum* L.). International Journal of Seed Spices. 2014;4(2):32-35.
6. Joshi AR, Bhamburdekar SB. Effect of micronutrients on morphological characters of spinach (*Spinacia olearacea* L.). International Journal of Advanced Research. 2015;3(8):703-707.
7. Meena MC, Patel KP, Rathod DD. Effect of zinc, iron and sulphur on mustard in loamy sand soil. Indian Journal of Fertilizer. 2006;2(5):55-58.
8. Rao RAK, Kashifuddin M. Adsorption properties of coriander seed powder (*Coriandrum sativum*): extraction and pre-concentration of Pb (II), Cu (II) and Zn (II) ions from aqueous solution. Adsorption Science and Technology. 2012;3(2):127-146.
9. Gad N, Kandil H. Influence of cobalt nutrition on coriander (*Coriandrum sativum* L.) herbs yield quantity and quality. Journal of Applied Sciences Research. 2012; 8(10):5184-5189.
10. Ozyaici G, Bektas Y. Variation of some plant growth parameters in coriander (*Coriandrum sativum* L.) with copper application. Turkiye Journal of Agricultural Research. 2021;8(3):311-319.
11. Said-Al Ahl HAH, Omer EA. Effect of spraying with zinc and/or iron on growth and chemical composition of coriander (*Coriandrum sativum* L.) harvested at three stages of development. Journal of Medicinal Food Plants. 2009;1(2):30-46.

12. Kalidasu G, Sarada C, Reddy TY. Influence of micronutrients on growth and yield of coriander (*Coriandrum sativum*) in rainfed vertisols. Journal of Spices and Aromatic Crops. 2011;17(2).
13. Mounika Y, Thanuja Sivaram G, Syam Sundar Reddy P, Ramaiah M. Influence of biofertilizers and micronutrients on growth, seed yield and quality of coriander (*Coriandrum sativum* L.) cv. Sadhana. International Journal of Current Microbiology Applied Science. 2018;7(1): 2099-2107.
14. Patel HJ. Effect of zinc and iron on growth and yield of coriander (*Coriandrum sativum* L.). MSc Thesis Dept. of agronomy, Junagarah; 2018.
15. Lal G, Singh B, Mehta RS, Maheria SP. Performance of fenugreek (*Trigonella foenum- graecum* L.) as influenced by sulphur and zinc. International Journal of Seed Spices. 2015;5(1):29-33.

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