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Effect of micronutrients and organic fertilizers as foliar spray on growth parameter in coriander (*Coriandrum sativum* L.) var. Chhattisgarh Sri Chandrahasini Dhaniya-2

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Abstract

The current study entitled “Effect of micronutrients and organic fertilizers as foliar spray on growth parameter in coriander (*Coriandrum sativum* L.) var. Chhattisgarh Sri Chandrahasini Dhaniya-2” conducted during the year 2024-25 at Research and Instructional Farm, Bharrergaon under Pt. KLS, College of Horticulture and Research Station, Rajnandgaon (C.G.). The experiment was performed in randomized block design and replicated thrice with a total of twelve treatments. The treatments are T₁ (RDF + Water Spray), T₂ (RDF + 0.5% FeSO₄·7H₂O), T₃ (RDF + 0.5% ZnSO₄), T₄ (RDF + 0.5% Boric Acid), T₅ (RDF + 0.01% Humic Acid), T₆ (RDF + 3% Vermiwash), T₇ (RDF + 3% Panchgavya), T₈ (RDF + 3% Jeevamrita), T₉ (RDF + 3% Moringa Leaf Extract), T₁₀ (RDF + 3% Aloe vera Extract), T₁₁ (RDF + 3% Seaweed Extract), T₁₂ (RDF + 3% Neem Leaf Extract) where the highest/maximum value of Plant height (26.18, 67.29, 108.94 cm at 45, 65 DAS and at harvest), no. of primary branches per plant (7.29, 8.76 at 45 DAS and at harvest), no. of secondary branches per plant (9.46, 12.94, at 45DAS and at harvest), days to 50% flowering (50.56 days after sowing), no. of umbels per plant (48.46) and no. of umbellets per umbel (8.13), were recorded for T₃ (RDF + 0.5% ZnSO₄).

Keywords: Coriander, micronutrients, organic fertilizer and growth parameter

Introduction

Coriander (*Coriandrum sativum* L.) is an annual plant with chromosome number 2n = 22. The genus *Coriandrum* comes under family Umbelliferae (Apiaceae). It also known as dhaniya, cilantro, collender, ketumbar. It is dual purpose crop as it can be grown for leaf as well as seed. The seeds are widely used as spices and flavour enhancer in foods around the world. The stem, leaves and fruits of this widely acclaimed crop have a pleasant aromatic flavour and is used in preparing chutneys, sauces and soups. Medicinal potentialities of coriander are widely acclaimed (Samyiah, 2014) [9].

It is a native to Mediterranean region and cultivated in India for leaves and seed yield. It is a thin-stemmed, small bushy herb, having many branches and grows about 25 to 50 cm tall, with alternate and compound leaves getting highly segmented and linear as they reach upper extremities. Inflorescence of coriander is a compound umbel and usually comprises about five smaller umbellets. The fruits are globular, yellow brown towards maturity and are 3 to 4 mm in diameter. The fruits consist of two halves, the single seeded mericarps. Besides being used as spice it has several medicinal values and recently gaining popularity as an important value-added export item in the global market. It remains to be one of the most important seed spice as regards to export and foreign exchange earnings in India. Coriander is grown to a large amount in England and the USA, coriander is also widely grown in Argentina, India, Morocco, Romania, Russia, Spain, Yugoslavia, France, Italy, Holland, Bunna, Afghanistan, Pakistan, Turkey, Mexico, Canada and Bulgaria.

India is leading producer and consumer of coriander. Annual production of coriander was 11.14 lakh tonnes from 6.61 lakh ha area. In India coriander area is in maximum Madhya Pradesh followed by Gujarat, Rajasthan, Assam (Anon., 2024) [1, 2]. In Chhattisgarh the area of coriander seed is about 15.169 thousand Ha with production of 60.425 thousand MT in the year 2023-24 (Anon., 2024) [1, 2].

The main nutritional benefits of coriander leaves and seeds are their high vitamin A and C content. Fresh leaves have 359 an 87.9% moisture content, 3.3 percent protein, 6.5 percent carbohydrates, 1.7 percent total ash, 0.4 percent calcium, 0.06 percent phosphorus, 0.01 percent iron, 60 mg/100 gm vitamin B₂, 0.8 mg of niacin, 35 mg of vitamin C, and 10,460 international units (IU) of vitamin A per 100 grams of leaf. approximately 11g of starch, 20 g of fat, 11g of protein, and approximately 30 g of crude fiber are included in 100 g of coriander seed. (Pandey *et al.*, 2012)^[8]. Micronutrients play a catalytic role in nutrient absorption and balancing other nutrients. Micronutrients such as iron, zinc and boron are the important elements with specific and essential physiological functions in plants, required in small quantities for normal growth and development of plants. (Kalidasu *et al.*, 2011)^[5]. Reported that foliar application of micronutrients on crop growth may be due to the improved ability of the crop to absorb nutrients, enhances sink source relationship as these play vital role in various biochemical processes. Micronutrients are required in less amount for growth, development and production of crop but their deficiency severely damages the physiological and metabolic processes of the plant. zinc helps in building up the natural auxin (IAA) and enhance the cell division and cell enlargement. Iron is a necessary component of the enzymatic system in plants. (Dhakad *et al.*, 2021)^[3, 4]. Among various agronomical measures application of Panchagavya is the most important for harvesting potential production. Information on utilization of Panchagavya, Jeevamrut, seaweed extract in many crops is scarce. Among various agronomical factors responsible for increasing productivity of any crop, organic fertilizer management play important role for harvesting potential production of coriander under different agro-climatic conditions. Attempts are therefore made here to present a brief summary of research work carried out by eminent scientists. Whenever, the literature pertaining to various pulses including coriander is limited, information on other crop is incorporated.

Materials and Methods

The experiment was carried out during Rabi Season of year 2024-25 Research and Instructional Farm, Bharrergaon under Pt. KLS, College of Horticulture and Research Station, Rajnandgaon (C.G.). The experiment was performed in randomized block design and replicated thrice with a total of twelve treatments. The treatments are T₁ (RDF + Water Spray), T₂ (RDF + 0.5% FeSO₄·7H₂O), T₃ (RDF + 0.5% ZnSO₄), T₄ (RDF + 0.5% Boric Acid), T₅ (RDF + 0.01% Humic Acid), T₆ (RDF + 3% Vermiwash), T₇ (RDF + 3% Panchgavya), T₈ (RDF + 3% Jeevamrita), T₉ (RDF + 3% Moringa Leaf Extract), T₁₀ (RDF + 3% Aloe vera Extract), T₁₁ (RDF + 3% Seaweed Extract), T₁₂ (RDF + 3% Neem Leaf Extract). Experimental land was ploughed to bring the soil to fine tilth. Layout was made as per required dimensions and the flat beds of 2.5 m x 2.0 m size were prepared by leaving 0.5 m space between two replications. Coriander seeds were sown in rows and covered with thoroughly decomposed fine vermicompost before being watered. The recommended N, P, and K dosage of 19:19:19 kg/ha Nitrogen was applied as a basal application. Phosphorus and potash were applied entirely as a basal dose at the time of sowing. In order to keep the necessary spacing, extra seedlings were thinned out 15 days

after sowing and weak plants were removed. After full germination, gap filling was done to maintain desired plant population. Irrigation was started right after sowing and continued as needed. Protective irrigations were done every five to seven days during the cropping period. The foliar spray of micronutrient and organic fertilizer were applied after 45 days after sowing. Five plants at random were selected from each plot and tagged in order to record the observations on the plant height (cm), no. of primary branches per plant, no. of secondary branches per plant, days to 50% flowering (days after sowing), no. of umbels per plant, and no. of umbellets per umbel.

Result and Discussion

Growth parameter

The study of comparison of concentration of treatment T₃ (RDF + 0.5% ZnSO₄) exhibited superiority within all the treatments on plant height (cm), no. of primary branches per plant, no. of secondary branches per plant, days to 50% flowering (days after sowing), no. of umbels per plant and no. of umbellets per umbel. The interpretations were recorded on various growth parameter are presented in Table 1.

Plant height (cm)

The application of different foliar spray of micronutrients and organic fertilizers showed significant effect in plant height. The maximum plant height (25.48 cm, 67.29 cm and 108.94 cm) at 45 DAS, 65 DAS and at harvest was recorded in treatment T₃ (RDF + foliar spray of 0.5% of ZnSO₄), followed by treatments T₄ (RDF + foliar spray of 0.5 percent of boric acid) Whereas, minimum plant height (18.84 cm, 56.66 cm and 70.83 cm) at 45 DAS, 65 DAS and at harvest respectively were recorded in treatment T₁ (RDF + Water spray).

The response of treatment on plant height may be due to stimulatory effect of micronutrients on photosynthetic pigments and enzymatic activity which in turn increase vegetative growth of plants. Similar findings have also been reported by Lal *et al.* (2014)^[6] and Mounika *et al.* (2018)^[7] in coriander.

Number of primary branches per plant

The result revealed that the application of different foliar spray of micronutrients and organic fertilizers showed significant effect on number of primary branches per plant. The maximum number of primary branches per plant (7.29 and 8.76) at 45 DAS and at harvest was recorded in treatment T₃ (RDF + foliar spray of 0.5% of ZnSO₄), which was followed by with treatments T₄ (RDF + foliar spray of 0.5 percent of boric acid), T₁₁ (RDF + 3% Seaweed Extract) and T₂ (RDF + 0.5% FeSO₄·7H₂O) While, minimum number of primary branches per plant (4.12 and 5.72) at 45 DAS and at harvest respectively were recorded in treatment T₁ (RDF + Water spray).

The increase in number of primary branches might be due to involvement of zinc in the synthesis of tryptophan, a precursor of IAA, which is necessary for cell division and cell elongation which in turn promotes the primary branches in plants. These findings are in conformity with those of Singh *et al.* (2015)^[10] in coriander.

Number of Secondary branches per plant

The result revealed that the application of different foliar

spray of micronutrients and organic fertilizers showed significant effect on number of secondary branches per plant. The maximum number of secondary branches per plant (9.46 and 12.94) at 45 DAS and at harvest was recorded in treatment T₃ (RDF + foliar spray of 0.5% of ZnSO₄), followed by treatments T₄ (RDF + foliar spray of 0.5 percent of boric acid). However, minimum number of primary branches per plant (7.24 and 9.46) at 45 DAS and at harvest respectively were recorded in treatment T₁ (RDF + Water spray).

The increase in number of secondary branches might be due to Zinc is a component of carbonic anhydrase, as well as several dehydrogenases and auxin production which in turn enhance plant growth. These findings were in accordance with the results obtained by Singh *et al.* (2015) ^[10] in coriander.

Days to 50% flowering (days after sowing)

The less number of days required for 50% flowering (50.56) days after sowing recorded in treatment T₃ (RDF + foliar spray of 0.5% of ZnSO₄), which was statically at par with treatments T₄ (RDF + foliar spray of 0.5 percent of boric acid), T₁₁ (RDF + 3% Seaweed Extract) and T₂ (RDF + 0.5% FeSO₄·7H₂O). Whereas more number of days required for 50% flowering (63.45) days after sowing at were recorded in treatment T₁ (RDF + Water spray).

The significantly less number of days required for 50% flowering (50.56) days after sowing was recorded in treatment T₃ (RDF + foliar spray of 0.5% of ZnSO₄) might be due to zinc acts as an important catalyst in the enzymatic reactions of the metabolism and would have helped in larger biosynthesis of photo assimilates thereby enhancing growth of the plants and reach to maturity early. The results are in conformity with those of Kalidasu *et al.* (2011) ^[5] in coriander.

Number of umbels per plant

Application of different foliar spray of micronutrients and organic fertilizers showed significant effect in number of umbels per plant. The highest number of umbels per plant (48.46) recorded in treatment T₃ (RDF + foliar spray of 0.5% of ZnSO₄), which was followed by treatments T₄ (RDF + foliar spray of 0.5 percent of boric acid). Whereas, lowest number of umbels per plant (28.67) recorded in treatment T₁ (RDF + Water spray).

The highest number of umbels per plant was recorded in treatment T₃ (RDF + foliar spray of 0.5% of ZnSO₄) might be due to Zinc improves photosynthesis and assimilates transportation to sinks and finally increased number of umbels per plant. These findings were in accordance with the results obtained by Singh *et al.*, (2015) ^[10] in coriander.

Number of umbellets per umbel

The result revealed that the application of different foliar spray of micronutrients and organic fertilizers showed significant effect in number of umbellets per umbel. The maximum number of umbellets per plant (8.13) recorded in treatment T₃ (RDF + foliar spray of 0.5% of ZnSO₄), followed by treatments T₄ (RDF + foliar spray of 0.5 percent of boric acid). While, minimum number of umbellets per umbel (5.24) were recorded in treatment T₁ (RDF + Water spray).

The maximum number of umbellets per umbel was recorded in treatment T₃ (RDF + foliar spray of 0.5% of ZnSO₄) might be due to the positive effect of zinc with respect to plant vegetative growth and yield with its attributes is due to the fact that zinc favours the enzyme system, auxin and protein synthesis and umbellets production directly or indirectly. The results are in accordance with those of Lal *et al.* (2014) ^[6] in coriander.

Table 1: Effect of foliar spray of micronutrients and organic fertilizers on coriander.

Treatment	Treatment detail	Plant height (cm)			No. of primary branches per plant		No. of secondary branches per plant		Days to 50% flowering (days after sowing)	No. of umbels per plant	No. of umbellets per umbel
		45 days	65 days	At harvest	45 days	At harvest	45 days	At harvest			
T ₁	RDF + Water Spray	18.84	56.66	70.83	4.12	5.72	7.24	9.46	63.45	28.67	5.24
T ₂	RDF + 0.5% FeSO ₄ ·7H ₂ O	23.45	60.81	88.95	5.90	7.88	8.55	11.77	55.24	37.06	6.93
T ₃	RDF + 0.5% ZnSO ₄	26.18	67.29	108.94	7.29	8.76	9.46	12.94	50.56	48.46	8.13
T ₄	RDF + 0.5% Boric Acid	24.92	64.07	104.21	6.41	8.21	9.21	12.28	52.21	44.16	7.15
T ₅	RDF + 0.01% Humic Acid	23.32	60.11	84.98	5.77	7.69	8.42	11.42	56.23	35.53	6.52
T ₆	RDF + 3% Vermiwash	22.06	59.04	81.41	5.42	7.18	8.01	11.04	57.34	33.13	6.16
T ₇	RDF + 3% Panchgavya	21.53	58.26	80.36	5.46	7.05	7.88	10.66	57.86	32.86	6.02
T ₈	RDF + 3% Jeevamrita	22.81	59.21	82.59	5.61	7.40	8.21	11.16	56.78	34.46	6.34
T ₉	RDF + 3% Moringa Leaf Extract	23.89	60.52	86.20	5.85	7.77	8.04	11.66	55.81	34.59	6.78
T ₁₀	RDF + 3% Aloe vera Extract	20.96	57.88	75.49	5.39	6.72	7.69	10.34	58.64	30.81	5.81
T ₁₁	RDF + 3% Seaweed Extract	24.42	61.48	91.94	5.98	7.95	8.70	11.96	54.16	38.53	7.06
T ₁₂	RDF + 3% Neem Leaf Extract	20.22	54.80	73.22	4.81	6.15	7.52	10.08	59.45	30.25	5.56
	SE(m±)	0.69	2.09	3.65	0.26	0.27	0.26	0.36	1.77	1.50	0.34
	C.D. at	2.03	6.15	10.73	0.77	0.79	0.79	0.06	5.19	4.40	1.01
	CV	5.21	6.05	7.39	8.03	6.38	5.66	5.59	5.43	7.28	9.18

Conclusion

In light of the present experimental findings summarized above, it may be concluded that the foliar spray of micronutrients and organic fertilizers enhanced the plant

growth and yield influenced significantly in various micronutrients and organic fertilizers treatments. Thus, it can be concluded that the application of T₃ (RDF + 0.5% ZnSO₄) showed the better response with respect to the

coriander crop growth, yield, quality as well as plant height (cm), no. of primary branches per plant, no. of secondary branches per plant, days to 50% flowering (days after sowing), no. of umbels per plant and no. of umbellets per umbel.

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