Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2582-2845.7893

ISSN: 2582 – 2845

Ind. J. Pure App. Biosci. (2019) *7*(6), 351-355

Research Article

Effect of Micronutrients Application on Plant Growth of Coriander (*Coriandrum sativum* L.) var. DH-228

Ravinder Kumar[1*], V. P. S. Sangwan[1], V. S. Mor[1] and S. K. Tehlan[2]

[1]Department of Seed Science and Technology, [2]Department of Vegetable Science,
CCS Haryana Agricultural University, Hisar- 125004

*Corresponding Author E-mail: ravisehrawat.hau@gmail.com

Received: 4.11.2019 | Revised: 13.12.2019 | Accepted: 19.12.2019

ABSTRACT

A field experiment was conducted during the Rabi season of 2017-18 and 2018-19 at research farm of the department of seed science and technology, CCSHAU, Hisar, Haryana, to study the plant growth characters as influenced by varying levels of iron sulphate, zinc sulphate and boric acid. Treatments comprising of soil application of $FeSO_4$ (5, 7.5 and 10 kg/ha), $ZnSO_4$ (3, 4 and 5 kg/ha) and H_3BO_3 (2, 3 and 4 kg/ha) and foliar application of $FeSO_4$ (0.4, 0.5 and 0.6 %) , $ZnSO_4$(0.4,0.5 and 0.6 %) and H_3BO_3 (0.2,0.3 and 0.4 %) were studied in factorial randomized block design with four replications. Foliar application of micronutrients was done at 45 and 90 DAS. A perusal of data revealed that fresh weight and dry weight per plant increased progressively with advancement in crop stage (60 DAS, 105 DAS and at harvest) irrespective of treatments and it was maximum at harvest during both the years. Maximum fresh weight at all the stages of growth (15.25, 31.72 and 47.25 g respectively) and dry weight (5.10, 7.72 and 17.69g) was recorded with the soil application of 5 kg zinc sulphate/ha (T_7). The highest number of branches per plant (10.29) and maximum plant height (130.63 cm) was observed with the soil application of 5 kg zinc sulphate/ha where as lowest was recorded in control (T_1).

Keywords: *Coriander, Growth, Micronutrient, Zinc sulphate, Iron sulphate, Boric acid*

INTRODUCTION

Coriander (*Coriandrum sativum* L.), belongs to the family Apiaceae and possessing chromosome number 22 with cross pollination mode of reproduction, is an important and remunerative spice crop. It is native to Mediterranean region and is grown throughout the country in Rabi season. It is one of the earliest herbaceous annual spices used by mankind (Luayza et al., 1996) and known as early as 5000 BC. Sanskrit writings dating from about 1500 BC also spoke it. The Chinese have been cultivating it since the fourth century. Around 550 BC, coriander became an important and popular condiment in Persia due to its essential oil content. Hippocrates (father of medicine) wrote so many treatises on medicinal plants that included coriander (460-377 B.C.).

Cite this article: Kumar, R., Sangwan, V.P.S., Mor, V.S., & Tehlan, S.K., (2019). Effect of Micronutrients Application on Plant Growth of Coriander (*Coriandrum sativum* L.) var. DH-228, *Ind. J. Pure App. Biosci. 7*(6), 351-355. doi: http://dx.doi.org/10.18782/2582-2845.7893

Coriander is cultivated for its stems, leaves and seeds of high commercial value and considered as natural source of essential oil containing petroselinic acid, geraniol, limonene and linalool, used in pharmaceutical and food industries (Carrubba, 2009; Hassan & Ali, 2013). It occupies a prime position in flavouring substances. This not only adds flavor and taste to food but also enhances its keeping quality. Its leaves, stems and fruits having a pleasant aromatic odour are used for flavouring soups and some other food.

Although India is the largest producer of coriander in the world but the average yield is very low as compared to European countries. Despite its importance, its productivity in India continues to be low. Also, Indian coriander is poor in essential oil content (0.04-0.8%) as compared to European countries (1.4-1.7%). Low productivity of coriander may be ascribed to many reasons, of which, inadequate and imbalanced micronutrients with limited moisture is the major factor. Therefore, the production technology of coriander on scientific basis is need of the day. Out of various inputs applied to the crops, judicious use of micronutrients assumes a greater significance.

Micronutrients application plays an important role in the production of good quality and high yield of crops (Amjad et al., 2014). The role of micronutrients in photosynthesis, N-fixation, respiration and other metabolic processes of the plant is well documented (Naga Sivaiah et al., 2013). Hence, the present study was undertaken to assess the potential of micronutrients on plant growth of coriander.

MATERIALS AND METHODS

The present investigation entitled "Effect of micronutrients application on plant growth of coriander (*Coriandrum sativum* L.)" var. DH-228 was carried out at Research Farm of the Department of Seed Science and Technology, CCS Haryana Agricultural University, Hisar, Haryana during 2017-18 and 2018-19. Micronutrients basal and foliar spray treatments i.e., (T_1) RDF as control, (T_2) RDF+ Ferrous sulphate 5 Kg/ha (Soil application), (T_3) RDF+ Ferrous sulphate 7.5 Kg/ha (Soil application), (T_4) RDF+ Ferrous sulphate 10 Kg/ha (Soil application), (T_5) RDF+ Zinc sulphate 3 Kg/ha (Soil application), (T_6) RDF+ Zinc sulphate 4 Kg/ha (Soil application), (T_7) RDF+ Zinc sulphate 5 Kg/ha (Soil application), (T_8) RDF+ Boric acid 2 Kg/ha (Soil application), (T_9) RDF+ Boric acid 3 Kg/ha (Soil application), (T_{10}) RDF+ Boric acid 4 Kg/ha (Soil application), (T_{11}) RDF+ water spray, (T_{12}) RDF+ Ferrous sulphate 0.4 % (foliar spray), (T_{13}) RDF+ Ferrous sulphate 0.5 % (foliar spray), (T_{14}) RDF+ Ferrous sulphate 0.6 % (foliar spray), (T_{15}) RDF+ Zinc sulphate 0.4 % (foliar spray), (T_{16}) RDF+ Zinc sulphate 0.5 % (foliar spray), (T_{17}) RDF+ Zinc sulphate 0.6 % (foliar spray), (T_{18}) RDF+ Boric acid 0.2 % (foliar spray), (T_{19}) RDF+ Boric acid 0.3 % (foliar spray), (T_{20}) RDF+ Boric acid 0.4 % (foliar spray) were evaluated in randomized block design (RBD) with four replications. Foliar application of micronutrients was done at 45 and 90 DAS.

RESULT AND DISCUSSION

Data presented in (Table 1 and 2) revealed that the application of micronutrients significantly influenced the fresh weight and dry weight per plant at 60,105 DAS and at harvest. The maximum fresh weight at all the growth stages (15.25, 31.72 and 47.25 g respectively) was recorded with the soil application of 5 kg zinc sulphate/ha (T_7) which was closely followed with the soil application of 4 kg zinc sulphate/ha (T_6) *i.e.* 15.13, 30.73 and 46.89 g respectively. The minimum fresh weight was recorded under T_1 (control) which was 9.94, 23.13 and 39.00 g respectively. Similar results for maximum dry weight at 60 DAS (5.10g), 105 DAS (7.72g) and at harvest (17.69g) were recorded with the soil application of 5 kg zinc sulphate/ha (T_7), which was closely followed with the soil application of 4 kg zinc sulphate/ha (T_6) *i.e.* 5.08, 7.66 and 17.07 g respectively at all the growth stages i.e. 60, 105 DAS and at harvest. The minimum dry weight was recorded under T_1 (control) which was 3.08, 5.72 and 12.23 g respectively. Application of zinc might also be due to better

growth and development of plant parts in terms of dry matter per plant. The similar results have also been reported by Lal et al. (2014) and Mounika et al. (2018) in coriander and Lal et al. (2015) in fenugreek.

Results revealed that application of micronutrients had significant effect on number of branches per plant during harvest (Table 3). The treatment with soil application of 5 kg zinc sulphate/ha (T_7) recorded higher number of branches (10.29) which was at par with the soil application of 4 kg zinc sulphate/ha (10.22), while minimum number of branches (7.29) were recorded under control (T_1) at harvest. The addition of zinc and iron to the soil might have caused higher activation of micronutrients mainly due to its beneficial effects in mobilizing the native nutrients to increase their availability besides addition of zinc and iron to the soil to provide better nutrition over longer time and synergistic effect of both nutrients on yield component (Gaffar et al., 2011) which ultimately may have led to increased crop growth of the plant and thereby improved the plant architecture by an increase in the number of branches per plant. Similar results were also reported with soil application of zinc by Singh and Gupta (1996) in chick pea.

Application of micronutrients significantly affected the plant height due to different doses of micronutrients (Table 3). The maximum plant height (130.63 cm) at harvest was recorded with the soil application of 5 kg zinc sulphate/ha (T_7) which was at par with the soil application of 4 kg zinc sulphate/ha (T_6) i.e. 130.35 cm, soil application of 10 kg iron sulphate/ha (T_4) i.e. 129.76 cm, soil application of 7.5 kg iron sulphate/ha (T_3) i.e. 129.24 cm and soil application of 3 kg zinc sulphate/ha (T_5) i.e. 128.51 cm whereas lowest plant height (120.96 cm) was recorded under T_1 (control). 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) and Mounika et al. (2018) in coriander and Lal et al. (2015) in fenugreek.

Table 1: Effect of micronutrients on fresh weight per plant at 60, 105 DAS and at harvest of coriander cv. Hisar Bhoomit

Treatments		60 DAS			105 DAS			At harvest		
		2017-18	2018-19	Pooled	2017-18	2018-19	Pooled	2017-18	2018-19	Pooled
T_1	Control (RDF)	9.82	10.05	9.94	22.76	23.49	23.13	38.76	39.23	39.00
T_2	$FeSO_4$ 5 kg/ha (Soil application)	13.33	13.58	13.46	29.21	29.96	29.59	44.77	45.26	45.02
T_3	$FeSO_4$ 7.5 kg/ha (Soil application)	14.24	14.53	14.39	29.54	30.33	29.94	46.02	46.55	46.29
T_4	$FeSO_4$ 10 kg/ha (Soil application)	14.86	15.05	14.96	30.02	30.71	30.37	46.44	46.87	46.66
T_5	$ZnSO_4$ 3 kg/ha (Soil application)	13.09	13.29	13.19	29.03	29.73	29.38	43.57	44.01	43.79
T_6	$ZnSO_4$ 4 kg/ha (Soil application)	15.02	15.24	15.13	30.37	31.09	30.73	46.66	47.12	46.89
T_7	$ZnSO_4$ 5 kg/ha (Soil application)	15.13	15.36	15.25	31.35	32.08	31.72	47.01	47.48	47.25
T_8	H_3BO_3 2 kg/ha (Soil application)	12.57	12.76	12.67	29.01	29.70	29.36	42.79	43.22	43.01
T_9	H_3BO_3 3 kg/ha (Soil application)	12.72	13.00	12.86	29.78	30.56	30.17	42.99	43.51	43.25
T_{10}	H_3BO_3 4 kg/ha (Soil application)	13.09	13.34	13.22	29.93	30.68	30.31	43.12	43.61	43.37
T_{11}	Water spray	10.52	10.76	10.64	23.61	24.35	23.98	39.07	39.55	39.31
T_{12}	$FeSO_4$ 0.4 % (Foliar spray)	11.55	11.81	11.68	26.34	27.10	26.72	41.26	41.76	41.51
T_{13}	$FeSO_4$ 0.5 % (Foliar spray)	11.76	12.01	11.89	27.00	27.75	27.38	41.48	41.97	41.73
T_{14}	$FeSO_4$ 0.6 % (Foliar spray)	11.87	12.09	11.98	27.58	28.30	27.94	41.95	42.41	42.18
T_{15}	$ZnSO_4$ 0.4 % (Foliar spray)	12.01	12.15	12.08	27.97	28.61	28.29	42.19	42.57	42.38
T_{16}	$ZnSO_4$ 0.5 % (Foliar spray)	12.34	12.64	12.49	28.34	29.14	28.74	42.05	42.59	42.32
T_{17}	$ZnSO_4$ 0.6 %(Foliar spray)	12.36	12.60	12.48	28.67	29.41	29.04	42.38	42.86	42.62
T_{18}	H_3BO_3 0.2 % (Foliar spray)	10.81	11.01	10.91	23.91	24.61	24.26	39.74	40.18	39.96
T_{19}	H_3BO_3 0.3 % (Foliar spray)	11.08	11.27	11.18	24.74	25.43	25.09	40.33	40.76	40.55
T_{20}	H_3BO_3 0.4 % (Foliar spray)	11.43	11.61	11.52	25.87	26.55	26.21	40.73	41.15	40.94
SE(m)		0.12	0.12	0.08	0.27	0.21	0.18	0.42	0.47	0.28
C.D. (p=0.05)		0.35	0.34	0.24	0.76	0.60	0.51	1.19	1.33	0.81

Table 2: Effect of Micronutrients on Dry Weight Per Plant (G) At 60, 105 DAS and at Harvest of Coriander Cv. Hisar Bhoomit

Treatments		60 DAS			105 DAS			At harvest		
		2017-18	2018-19	Pooled	2017-18	2018-19	Pooled	2017-18	2018-19	Pooled
T_1	Control (RDF)	3.02	3.14	3.08	5.66	5.77	5.72	12.01	12.45	12.23
T_2	$FeSO_4$ 5 kg/ha (Soil application)	4.57	4.76	4.67	6.98	7.07	7.03	16.55	16.70	16.63
T_3	$FeSO_4$ 7.5 kg/ha (Soil application)	4.59	4.80	4.70	6.99	7.08	7.03	16.71	16.80	16.76
T_4	$FeSO_4$ 10 kg/ha (Soil application)	4.96	5.08	5.02	7.07	7.25	7.16	16.79	16.92	16.86
T_5	$ZnSO_4$ 3 kg/ha (Soil application)	4.36	4.52	4.44	6.92	7.04	6.98	15.92	16.17	16.05
T_6	$ZnSO_4$ 4 kg/ha (Soil application)	5.00	5.16	5.08	7.61	7.71	7.66	17.01	17.12	17.07
T_7	$ZnSO_4$ 5 kg/ha (Soil application)	5.01	5.18	5.10	7.64	7.80	7.72	17.54	17.83	17.69
T_8	H_3BO_3 2 kg/ha (Soil application)	4.15	4.32	4.24	6.86	6.94	6.90	15.12	15.57	15.35
T_9	H_3BO_3 3 kg/ha (Soil application)	4.21	4.35	4.28	6.89	6.94	6.91	15.27	15.61	15.44
T_{10}	H_3BO_3 4 kg/ha (Soil application)	4.31	4.48	4.40	6.91	6.99	6.95	15.34	15.66	15.50
T_{11}	Water spray	3.07	3.21	3.14	5.69	5.86	5.78	12.46	12.88	12.67
T_{12}	$FeSO_4$ 0.4 % (Foliar spray)	3.51	3.67	3.59	6.32	6.46	6.39	14.16	14.58	14.37
T_{13}	$FeSO_4$ 0.5 % (Foliar spray)	3.68	3.81	3.75	6.49	6.54	6.52	14.28	14.74	14.51
T_{14}	$FeSO_4$ 0.6 % (Foliar spray)	3.85	3.96	3.91	6.66	6.74	6.70	14.43	14.79	14.61
T_{15}	$ZnSO_4$ 0.4 % (Foliar spray)	3.88	4.03	3.96	6.67	6.75	6.71	14.66	14.98	14.82
T_{16}	$ZnSO_4$ 0.5 % (Foliar spray)	4.06	4.19	4.13	6.70	6.86	6.78	14.87	15.12	15.00
T_{17}	$ZnSO_4$ 0.6 %(Foliar spray)	4.13	4.26	4.20	6.72	6.87	6.80	15.01	15.22	15.12
T_{18}	H_3BO_3 0.2 % (Foliar spray)	3.22	3.33	3.28	5.79	5.98	5.89	13.01	13.40	13.21
T_{19}	H_3BO_3 0.3 % (Foliar spray)	3.29	3.46	3.38	5.87	6.01	5.94	13.22	13.65	13.44
T_{20}	H_3BO_3 0.4 % (Foliar spray)	3.36	3.54	3.45	6.07	6.38	6.23	14.02	14.46	14.24
SE(m)		0.04	0.04	0.03	0.07	0.07	0.05	0.16	0.16	0.12
C.D. (p=0.05)		0.13	0.10	0.09	0.19	0.20	0.15	0.46	0.45	0.33

Table 3: Effect of Micronutrients on Number of Branches Per Plant and Plant Height at Harvest (Cm) of Coriander Cv. Hisar Bhoomit

Treatments		Number of branches per plant			Plant height at harvest (cm)		
		2017-18	2018-19	Pooled	2017-18	2018-19	Pooled
T_1	Control (RDF)	7.01	7.56	7.29	120.78	121.13	120.96
T_2	$FeSO_4$ 5 kg/ha (Soil application)	9.45	9.81	9.63	127.60	128.43	128.02
T_3	$FeSO_4$ 7.5 kg/ha (Soil application)	9.62	9.91	9.77	128.60	129.88	129.24
T_4	$FeSO_4$ 10 kg/ha (Soil application)	10.01	10.12	10.07	129.28	130.24	129.76
T_5	$ZnSO_4$ 3 kg/ha (Soil application)	9.53	9.85	9.69	127.89	129.13	128.51
T_6	$ZnSO_4$ 4 kg/ha (Soil application)	10.12	10.31	10.22	129.74	130.95	130.35
T_7	$ZnSO_4$ 5 kg/ha (Soil application)	10.16	10.41	10.29	130.03	131.22	130.63
T_8	H_3BO_3 2 kg/ha (Soil application)	9.32	9.65	9.49	126.23	127.13	126.68
T_9	H_3BO_3 3 kg/ha (Soil application)	9.39	9.71	9.55	126.44	127.65	127.05
T_{10}	H_3BO_3 4 kg/ha (Soil application)	9.41	9.72	9.57	127.03	128.24	127.64
T_{11}	Water spray	7.11	7.74	7.43	120.78	121.96	121.37
T_{12}	$FeSO_4$ 0.4 % (Foliar spray)	8.61	8.81	8.71	123.34	124.19	123.77
T_{13}	$FeSO_4$ 0.5 % (Foliar spray)	8.66	8.83	8.75	123.67	124.87	124.27
T_{14}	$FeSO_4$ 0.6 % (Foliar spray)	9.06	9.45	9.26	124.48	125.93	125.21
T_{15}	$ZnSO_4$ 0.4 % (Foliar spray)	8.71	9.41	9.06	124.24	125.06	124.65
T_{16}	$ZnSO_4$ 0.5 % (Foliar spray)	9.13	9.61	9.37	125.26	126.41	125.84
T_{17}	$ZnSO_4$ 0.6 %(Foliar spray)	9.16	9.62	9.39	125.80	126.97	126.39
T_{18}	H_3BO_3 0.2 % (Foliar spray)	7.21	7.83	7.52	121.46	122.65	122.06
T_{19}	H_3BO_3 0.3 % (Foliar spray)	7.91	8.43	8.17	122.17	123.54	122.86
T_{20}	H_3BO_3 0.4 % (Foliar spray)	8.07	8.63	8.35	122.95	123.97	123.46
SE(m)		0.08	0.08	0.06	1.69	1.49	1.09
C.D. (p=0.05)		0.25	0.23	0.17	3.41	3.00	2.18

CONCLUSION

Present study revealed that different plant growth parameters were significantly influenced with the soil and foliar application of micronutrients. More macro and micronutrients related experiments may be under taken in future research work.

Acknowledgements

The authors thank to CCS Haryana Agricultural University, Hisar and Department of Seed Science and Technology for providing all the facilities to perform the study.

REFERENCES

Amjad, A., Sajida, P., Syed, N., Muhammad, S., Zengqiang, Z., Fazli, W., Mohib, S., Shahida, B. and Abdul, M. (2014). Effect of foliar application of micronutrients on fruit quality of peach. *Am. J. Plant Sci*. *5*, 1258- 1264.

Carrubba, A. (2009). Nitrogen fertilization in coriander (*Coriandrum sativum* L.): A review and meta-analysis. *Journal of the Science of Food and Agriculture*, *89*, 921- 926.

Gaffar, A., Ehsanullah, N.E., & Sultan, H.K. (2011). Influence of zinc and iron on yield and quality of sugarcane planted under various trench spacing. *Pakistan Journal of Agriculture Science 192*, 181-189.

Hassan, F.A.S., & Ali, E.F. (2013). Impact of different water regimes based on class-A pan on growth, yield and oil content of *Coriandrum sativum* L. plant. *Journal of the Saudi Society of Agricultural Sciences*, *13*, 155-161

Lal G., Singh B., Mehta R.S., & Maheria S.P. (2015). Performance of fenugreek (*Trigonella foenum-graecum* L.) as influenced by sulphur and zinc. *Int. J. Seed Spices*, *5*(1), 29-33.

Lal, G., Mehta, R.S., Maheria, S.P., & Sharma, Y. (2014). Influence of sulphur and zinc on growth and yield of coriander (*Coriandrum sativum* L.). *Int. J. Seed Spices*, *4*(2), 32-35.

Luayza G., Brevedan R., & Palomo R. (1996). Coriander under irrigation in Argentina. In: Progress in new crops, *Janick J. (ed.). ASHS Press, Arlington*, pp590–594.

Mounika, Y., Sivaram, G. T., Reddy, P. S. S., & Ramaiah, M. (2018). Influence of biofertilizers and micronutrients on growth, seed yield and quality of Coriander (*Coriandrum sativum* L.) cv. Sadhana. *Int. J. Curr. Microbiol. App. Sci*, *7*(1), 2099-2107.

Naga, S.K., Swain, S.K., Sandeep, V.V., & Raju, B. (2013). Effect of foliar application of micronutrients on growth parameters in tomato (*Lycopersicon esculentum*). *J. Agric. Food Sci. 1*, 146-151.

Singh, D., & Gupta, V.K. (1986). Effect of micronutrient fertilization on chickpea. *Fertilizer News, 8*, 213-218.