Journal of Pharmacognosy and Phytochemistry
Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2020; 9(4): 242-244
Received: 18-03-2020
Accepted: 20-04-2020

Abdulrazaq Bepari
Department of Plantation, Spices, Medicinal and Aromatic Crops, Rajmata Vijayaraje Scindia Krishi Vishwavidyalaya, College of Horticulture, Mandsaur, Madhya Pradesh, India

Naruka IS
Department of Plantation, Spices, Medicinal and Aromatic Crops, Rajmata Vijayaraje Scindia Krishi Vishwavidyalaya, College of Horticulture, Mandsaur, Madhya Pradesh, India

Kiran MR
Department of Plantation, Spices, Medicinal and Aromatic Crops, Rajmata Vijayaraje Scindia Krishi Vishwavidyalaya, College of Horticulture, Mandsaur, Madhya Pradesh, India

Krishna Kumar
Department of Fruit Sciences, Rajmata Vijayaraje Scindia Krishi Vishwavidyalaya, College of Horticulture, Mandsaur, Madhya Pradesh, India

Corresponding Author:
Abdulrazaq Bepari
Department of Plantation, Spices, Medicinal and Aromatic Crops, Rajmata Vijayaraje Scindia Krishi Vishwavidyalaya, College of Horticulture, Mandsaur, Madhya Pradesh, India

Interaction effect of sulphur and zinc on yield attributes and B:C ratio of coriander (*Coriandrum sativum* L.) *cv.* RCr-436

Abdulrazaq Bepari, Naruka IS, Kiran MR and Krishna Kumar

Abstract
A field experiment was conducted during *rabi* season 2017-18 at the Horticulture Research Farm, College of Horticulture, Mandsaur (M.P.) to study the response of sulphur and zinc on growth, yield and quality of Coriander. The experiment was laid out in factorial RBD with three replications including four levels of sulphur (0, 15, 30 and 45 kg S/ha) and four levels of zinc (0, 2, 4 and 6 kg Zn/ha). Results showed that sulphur application at 45 kg/ha and 6 kg Zn/ha recorded significantly increased Umbels plant^{-1} (43), biology yield (44.96 q ha^{-1}), seed yield (19.59 q ha^{-1}), gross return (Rs. 88155 ha^{-1}), net returns (Rs. 70570 ha^{-1}) and B:C ratio (4.01) over control and treatment T_5. It was concluded that independent application of 45kg sulphur as soil application during sowing and soil application of zinc at 6kg/ha is recommended as these treatments fetched significantly higher economic net return and higher yield from coriander.

Keywords: Coriander, Sulphur, B:C ratio, Net return and Zinc

Introduction
Coriander is the dried fruit of *Coriandrum sativum* L., an aromatic spice crop belong to family Umbelliferae or Apiaceae. It is a native of Mediterranean region. It is a cross pollinated. It is very old flavoring substance and its usage both for its leaves, stems as well as fruits has been mentioned in Egyptian. The plant is a smooth, erect annual herb, 30-90 cm high, with conspicuously enlarged nodes and hollow internodes. The fruit is a schizocarp, globular, yellow in colour with brown ribs. The size of the seed is about 3 mm in diameter and ripe seeds are aromatic. At dehiscence, the 2 carpels called mericarps separate, each containing a single seed with a copious endosperm and a minute embryo (Farooqi *et al*., 2004) [2]. In India, coriander is cultivated in about 582.0 thousand hectare with annual production of about 585.0 thousand MT (NHB, 2017) [8]. The average productivity of coriander in India is around 1 metric tonnes/ha. The major coriander growing states are Rajasthan, Madhya Pradesh, Andhra Pradesh, Gujarat, Bihar, Uttar Pradesh and with scattered pockets in Tamil Nadu, Odisha, Karnataka and Haryana. In Madhya Pradesh, coriander is cultivated in about 165.18 thousand hectare with annual production is about 108.49 thousand MT (NHB, 2017-18) [8].
Sulphur deficiency has been aggravated in soils due to continuous crop removal under intensive cropping system and use of sulphur free high analysis NPK fertilizers. Sulphur which has now emerged as the third most important plant nutrient for crop plays a multiple role in nutrition. It helps in chlorophyll formation and also a constituent of amino acids like cysteine, cysteine and methionine. Sulphur is also responsible for synthesis of certain vitamins (biotin and thiamine), proteins, fats and metabolism of carbohydrates (Tondon, 1991) [14]. Sulphur is essential for production of protein, fats and oils, promotes enzyme activity and helps in chlorophyll formation, improves root growth and grain filling resulting in vigorous plant growth and resistance to cold. Its deficiency causes interveinal chlorosis with a very distinct reddish color of the veins and petioles (Shanyn and Lucy, 1999) [10].
Zinc plays an important role as a constituent of alcohol dehydrogenase and carbonic anhydrase in both microorganisms a higher plant. Zinc has been suggested to play a role in regulating the auxin concentration in plant and also in the synthesis of nucleic acid and protein. It helps the utilization of phosphorus and nitrogen in plants (Singh *et al*., 2002) [13]. Thus looking to the situation, there is an urgent need to augment supplies of customised fertilisers supplying secondary and micronutrients to sufficiently support, the integrated need of nutrient in coriander production. Considering the above facts, the studies on effect of different levels of sulphur and zinc on growth, yield and quality of coriander was undertaken.

Materials and Methods

The experiment was laid out at the "Horticulture Research Field of the Department of Plantation, Spices, Medicinal and Aromatic Crops", College of Horticulture, RVSKVV, Mandsaur (M.P.) during *Rabi* season of 2017-18. The soil of the experimental field was light black loamy in texture with low nitrogen (192 kg/ha), low phosphorus (7.6 kg/ha), medium potassium (145.0 kg/ha) soil having (pH 8.36) and EC (0.18 dS/m). The field experiment comprising 16 treatment combinations with three replication was laid out in factorial randomized block design with two factors. The experiment consisted of four levels of sulphur (0, 15, 30 and 45 kg S/ha) and four levels of zinc (0, 2, 4 and 6 kg Zn/ha). The crop variety RCr-436 were sown in spacing 30x10 cm with seed rate of 15 kg/ha. Uniform dose of nitrogen (40 kg/ha) through urea and phosphorus (30 kg/ha), potassium (20 kg/ha) as per treatments through MOP, DAP and soil application of zinc and sulphur. Data was statistically analyzed using the method of analysis of variance as described by Panse and Sukhatme (1985) [9].

Result and Discussion

The data revealed that in (Table.1 and Fig.1) combined effect of sulphur and zinc levels showed significantly influenced on yield attributes and benefit cost ratio of Coriander. Due to sulphur and zinc levels in combination and maximum umbels plant^{-1} (43), biology yield (44.96 q ha^{-1}), seed yield (19.59 q ha^{-1}), grass returns (Rs. 88155 ha^{-1}), net returns (Rs. 70570 ha^{-1}) and highest benefit cost ratio (4.01) was recorded under S_3Z_3 treatment combination compared to control S_0Z_0 (32.03), (31.06 q ha^{-1}), (12.28 q ha^{-1}) (Rs.55260 ha^{-1}), (Rs.41825 ha^{-1}) and (3.11) respectively. Significantly higher net returns (Rs 100612/ha) were recorded under application of 40 kg S/ha over control and 20 kg S/ha Boori *et al.* (2017) [1]. It is obvious because increasing sulphur levels increased the yield which increased the net returns being the main component for the higher returns. Similar results were also reported by Shivran *et al.* (2017) [1], Lal *et al.* (2014) [5] and Singh *et al.* (2009) [12] in coriander and Jat *et al.* (2012) [3] and Lal *et al.* (2015) [6] in fenugreek. The increasing level of sulphur upto 40kg/ha significantly increased the net returns, B: C ratio of coriander over control and 20kg S/ha, respectively Meena *et al.* (2014) [7]. Seed yield increased significantly with the increasing level of zinc up to 20 kg ha^{-1} Significantly higher net return and C:B ratio (1:1.68) were recorded with 20 Zn ha^{-1} as compared to control. Similar results were also reported by Shivran *et al.* (2017) [1] Jat *et al.* (2013) [4] and Singh *et al.* (2009) [12] in coriander.

Table 1: Interaction effect of Sulphur and Zinc on yield attributes and B:C ratio of Coriander.

Treatments	Umbels plant^{-1}	Biological yield qha^{-1}	Yield qha^{-1}	Cost of cultivation Rs per ha (Including cost of treatment)	Gross return ha^{-1} @ Rs 4500/-	Net profit ha^{-1}	B:C ratio
S_0Z_0	32.03	31.06	12.28	13435	55260	41825	3.11
S_0Z_1	34.87	36.16	14.560	14068	65250	51182	3.64
S_0Z_2	35.40	36.34	14.63	14701	65835	51134	3.48
S_0Z_3	36.60	38.06	15.37	15335	69165	53830	3.51
S_1Z_0	35.67	32.93	13.23	14185	59535	45350	3.20
S_1Z_1	36.83	37.78	15.32	14818	68940	54122	3.65
S_1Z_2	37.65	38.76	15.74	15445	70830	55385	3.59
S_1Z_3	38.03	39.12	15.97	16085	71865	55780	3.47
S_2Z_0	36.33	36.44	14.79	14935	66555	51620	3.46
S_2Z_1	37.40	37.09	15.07	15568	67815	52247	3.36
S_2Z_2	39.10	40.52	16.54	16201	74430	58229	3.59
S_2Z_3	40.20	43.57	17.84	16835	80265	63430	3.77
S_3Z_0	36.23	36.41	14.96	15685	67320	51635	3.29
S_3Z_1	38.80	39.02	16.12	16318	72540	56222	3.45
S_3Z_2	40.63	41.02	17.05	16951	76725	59774	3.53
S_3Z_3	43.00	44.96	19.59	17585	88155	70570	4.01
S.Em ±	0.34	0.47	0.02	1.00	0.72	0.72	0.0015
CD at 5%	0.98	1.37	0.06	2.90	2.08	2.08	0.0042

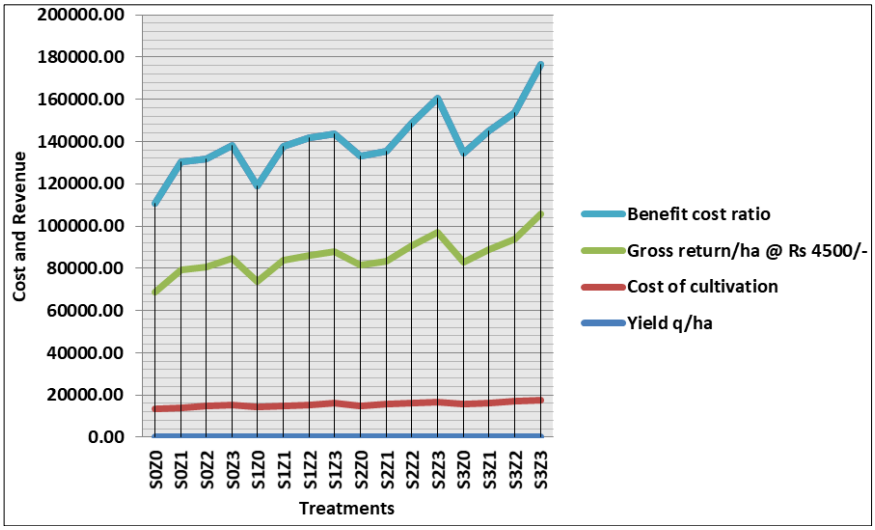

Fig 1: Interaction effect of Sulphur and Zinc on yield attributes and B:C ratio of Coriander.

Conclusion

Based on result of one year experimentation it is concluded that application of sulphur @ 45 kg/ha and Zinc@ 6 kg/ha recorded significantly higher seed yield (19.59 q/ha) net returns and benefit cost ratio (70570 /ha and 4.01) of coriander.

References

1. Boori PK, Shivran AC, Meena S, Giana GK. Growth and productivity of fennel (*Foeniculum Vulgare* Mill.) as influenced by intercropping with fenugreek (*Trigonella Foenum-Graecum* L.) and sulphur fertilization. Agricultural Science Digest. 2017; 37(1):32-36.
2. Farooqi AA, Sreeramu BS, Srinivaspa KN. Cultivation of spices crops. Universities press, 2004, 129-130.
3. Jat RL, Dashora LN, Golada SL, Choudhary R. Effect of phosphorus and sulphur levels on growth andyield of fenugreek. Annals of Plant and Soil Research. 2012; 14:116-119.
4. Jat SR, Patel BJ, Shivran AC, Kuri BR, Jat G. Effect of phosphorus and sulphur levels on growth andyield of cowpea under rainfed conditions. Annals of Plant and Soil Research. 2013; 15:114-117.
5. Lal G, Mehta RS, Maheria SP, Sharma Y. Influence of sulphur and zinc on growth and yield of coriander (*Coriandrum sativum* L.). Int. J. Seed Spices. 2014; 4(2):32-35.
6. Lal G, Singh B, Mehta RS, Singh R, Maheria SP. Performance of fenugreek (*Trigonella foenum graecum* L.) as influenced by sulphur and zinc. Int. J Seed Spices. 2015; 5(1):29-33.
7. Meena SK, Jat NL, Sharma B, Meena VS. Effect of plant growth regulators and sulphur on productivity of coriander (*Coriandrum sativum* L.) in Rajasthan. The Ecoscan. 2014; (6):69-73.
8. NHB. Indian Horticulture Data Base-2016, Ministry of Agriculture, Government of Institutional Area, 2017. *http://www.nhb.gov.in.*
9. Panse VG, Sukhatme PV. Statistical method for agriculture workers. Indian council of Agriculture Research, New Delhi, 1984, 155.
10. Shanyn Hm, Lucy B. Guide to symptoms of plant nutrient deficiencies. University of Arizona Cooperative Extension. Publication, 1999. AZ1106 5/99, extension.arizona.edu/pubs/az 1106.pd.
11. Shivran MMA, Deewan P, Verma R. Influence of sulphur and zinc fertilization on yield attributes, yield and economics of coriander varieties. Int. J. Curr. Microbio. App. Sci. 2017; 6(3):1768-1774.
12. Singh SK, Yadav JR, Sachan CP. Effect of nitrogen and zinc levels on yield of coriander. Annals of Horticulture. 2009; 2(2):230-231.
13. Singh Satpal, Jat NL, Singh S. Effect of zinc fertilizer on growth and yield of coriander. Ann. of Agri. Res. 2002; 23(4):734-736.
14. Tondon HLS. Sulphur research and agricultural production in India, 1991, 4775.