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VK Parmar
Department of Agronomy, College of Agriculture, Junagadh Agricultural University, Junagadh, Gujarat, India

PD Vekariya
Department of Agronomy, College of Agriculture, Junagadh Agricultural University, Junagadh, Gujarat, India

YA Der
Department of Agronomy, College of Agriculture, Junagadh Agricultural University, Junagadh, Gujarat, India

VM Thummar
Department of Agronomy, College of Agriculture, Junagadh Agricultural University, Junagadh, Gujarat, India

Correspondence
VK Parmar
Department of Agronomy, College of Agriculture, Junagadh Agricultural University, Junagadh, Gujarat, India

Effect of plant growth regulators on growth and yield of coriander (*Coriandrum sativum* L.)

VK Parmar, PD Vekariya, YA Der and VM Thummar

Abstract
A field experiment was conducted on clayey soil at the instructional farm, College of Agriculture, Junagadh Agricultural University, Junagadh (Gujarat) during the *rabi* season of 2016-17 in randomized block design with three replications, comprised with 11 treatments of five plant growth regulators each of two level *viz.*, GA_3 (50 and 100 ppm), NAA (50 and 100 ppm) and cycocel (500 and 1000 ppm), triacontanol (100 and 150 ppm), vermiwash (1 and 2 L ha^{-1}) foliar spray at 25 & 50 DAS and control (water spray).
The results revealed that foliar application of GA_3 100 ppm at 25 and 50 DAS recorded significantly higher values of growth parameters *viz.*, plant height, primary and secondary branches per plant and yield attributes *viz.*, number of umbels per plant, number of umbellates per umbel, number of seeds per umbel, number of seeds per plant and seed index along with seed and stover yields and biological yield over control (water spray), which was comparable and significantly not different from foliar application of GA_3 50 ppm and NAA 50 ppm in respect of seed and stover yields. Considerable improvement in nutrient content (N, P and K) and their uptake by seed and stover of coriander were also noticed with foliar application of GA_3 100 ppm at 25 and 50 DAS followed by GA_3 100 ppm as compared to control (water spray). The economics of plant growth regulator treatments also indicates that foliar application of GA3 100 ppm at 25 and 50 DAS was more profitable in terms of net returns (₹ 64337 ha^{-1}) and B: C ratio (2.83) in comparison to rest of the treatments.
In general, better crop yield and higher net returns per hectare could be obtained from coriander by foliar application of GA_3 100 ppm at 25 and 50 DAS.

Keywords: Plant growth regulators, coriander, GA_3, NAA, Cycocel, yield

Introduction
Coriander (*Coriandrum sativum* L.) is an annual herb, which belongs to the family Apiaceae (Umbelliferae) and possess 2n=22 chromosomes with cross-pollination as mode of reproduction. This spice is used by man as common flavoring substances. It is not only added flavor and taste to our food but also enhance keeping quality of food. Coriander seed have aromatic odour and taste of coriander fruits due to an essential oil. The seed contains 16.15% fatty oil, 14.1% protein, 21.6% carbohydrate, 32.6% fibers, 11.2% moistures and 4.4% mineral matters and coriander leaves are very rich in Vitamin A and Vitamin C. (Singh, 2014) [2]. Plant growth substances have key role in different physiological processes related to growth and development of crops. It is obvious that changes in the level of endogenous hormones due to biotic and abiotic stress alter the crop growth and any sort of manipulation including exogenous application of growth substances would help for yield improvement or at least sustenance of the crop. Plant growth hormones are organic substances produced naturally in the higher plants, controlling growth or other physiological functions at a site remote from its place of production, and active in minute amounts. In coriander crop to apply the plant growth regulators in 25 and 50 days after sowing intrinsic and extrinsic factors effect on growth, development and secondary metabolites biosynthesis of medicinal and aromatic plant. Photosynthesis and plant growth regulators (PGR's) have been defined as one of the main factors influences plants growth and their primary and secondary metabolites pool. The use of PGR's in the field of agriculture has become commercialized. Plant growth regulators (PGR's) have emerged as magic chemical that could increase agricultural production at an unprecedented rate and help in removing or circumventing many of barrier imposed by genetic and environment.

Methodology

A field experiment was conducted during the *Rabi* season of 2016-17 at the Instructional farm, Department of Agronomy, College of Agriculture, Junagadh Agricultural University, Junagadh. The soil of experimental field was clayey in texture having pH 7.9 and EC 0.49 dS m^{-1}. The soil was medium in available nitrogen (242 kg/ha), available phosphorus (34 kg/ha) and available potash (269 kg/ha). Eleven plant growth regulators treatments comprising of T_1 (GA_3 50 ppm), T_2 (GA_3 100 ppm), T_3 (NAA 50 ppm), T_4 (NAA 100 ppm), T_5 (Cycocel 500 ppm), T_6 (Cycocel 1000 ppm), T_7 (Triacontanol 100 ppm), T_8 (Triacontanol 150 ppm), T_9 (Vermiwash 1 L/ha), T_{10} (Vermiwash 2 L/ha) and T_{11} (Control) were tried under randomized block design with three replications. Gross and net plot size was 5.0 m X 2.1 m and 4.0 m X 1.5 m, respectively. Data on growth, yield performance and economic were recorded and statistically analyzed.

Results

The application of GA_3 100 ppm recorded significantly higher plant height, number of umbels per plant, seed and stover yield and maximum net return as compared to control and Vermiwash 2 L/ha, but it was remained at par with GA3 50 ppm, NAA 50 ppm, NAA 100 ppm and Triacontanol in respect of seed and stover yield in descending order. The increase in plant height has been thought to be due to increased plasticity of the cell wall followed by hydrolysis of starch to sugars which lowers the water potential of cell there by resulting in the entry of water into the cell causing elongation. The increase in number of umbels per plant could be attributed due to the increase in the number of both primary and secondary branches per plant with gibberellic acid. Seed and stover yield are increased by improved vegetative growth due to plant growth regulators application coupled with increased photosynthesis on one hand and greater mobilization of photosynthesis towards reproductive sites on the other might have been found to increase in the growth and yield attributes. Thus, the cumulative effect of all these yield attributes, resulted in significant increase in seed and stover yield. The improvement in vegetative growth led to increased stover yield. The results are in confirmative with the earlier findings of Yugandhar *et al.* (2016) [3] and Haokip *et al.* (2016) [1]. Whereas maximum B: C ratio was obtained through application of GA_3 50 ppm.

Table 1: Effect of plant growth regulators on growth, yield and economics of coriander

Treatments	Plant height at harvest (cm)	No. of umbels per plant	Seed yield (kg/ha)	Stover yield (kg/ha)	Net return (₹ /ha)	B: C ratio
1. GA_3 50 ppm	68.04	13.36	1502	1608	60333	2.83
2. GA_3 100 ppm	69.73	14.22	1601	1716	63620	2.77
3. NAA 50 ppm	66.85	11.67	1401	1544	54692	2.68
4. NAA 100 ppm	58.00	11.63	1357	1429	49499	2.42
5. Cycocel 500 ppm	60.58	12.39	1300	1379	48257	2.48
6. Cycocel 1000 ppm	59.89	12.33	1203	1373	40058	2.15
7. Triacontanol 100 ppm	64.69	12.96	1130	1273	39688	2.29
8. Triacontanol 150 ppm	57.11	12.91	1078	1262	36273	2.17
9. Vermiwash 1 L/ha	58.62	12.28	1172	1304	42635	2.41
10.Vermiwash 2 L/ha	57.08	11.14	1036	1259	34225	2.12
11.Control	56.84	11.08	1013	1250	33146	2.10
S. Em. +	2.97	0.59	82	94	-	-
C. D. at 5%	8.76	1.76	242	278	-	-

Conclusion

On the basis of present one year experiment, it can be concluded that the foliar spray of GA_3 50 ppm at 25 and 50 days after sowing was found effective for securing higher growth and yield of coriander (GC-2) along with the maximum B: C ratio in medium black clayey soil under South Saurashtra Agro-climatic Zone of Gujarat.

References

1. Haokip CM, Sharangi AB, Debbarma K, Devi AKR, Karthik CS. Role of plant growth regulators on the growth and yield of coriander (*Coriandrum sativum* L.). Journal of Crop and Weed. 2016; 12(3):33-35.
2. Singh P. Effect of foliage cutting and growth regulators on seed yield and quality in coriander (*Coriandrum sativum* L.). Unpublished M.Sc. (Agri.) thesis submitted to Department of Seed Science and Technology, College of Agriculture, Chaudhary Charan Singh Haryana Agricultural University, Haryana, 2014.
3. Yugandhar V, Reddy PSS, Sivaram GGT, Reddy DS. Influence of plant growth regulators on growth, seed yield, quality and economics of coriander (*Coriandrum sativum* L.) cv. Sudha. Journal Spices and Aromatic Crops. 2016; 25(1):13-17.