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Research Article

EFFECT OF PLANT GROWTH REGULATORS ON GROWTH AND YIELD OF CORIANDER (*CORIANDRUM SATIVUM* L.)

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Abstract

An experiment was conducted at Medicinal Unit of Department of Horticulture, Faculty of Agriculture, Annamalai University during the rabi season of 2020 - 21 in randomized block design with three replications, comprised of eleven treatments of five plant growth regulators each of two level viz., GA3 (100 and 200 ppm), NAA (100 and 200 ppm) and cycocel (250 and 500 ppm), triacontanol (50 and 100 ppm), vermiwash (1 and 2 L ha-1) foliar spray at 25 & 50 DAS and control (water spray). The results of the experiment revealed that foliar application of GA3 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 over control (water spray), which was comparable and significantly not different from foliar application of GA3 200 ppm and NAA 100 ppm in respect of seed and stover yields. 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 (Rs. 64337 ha-1) and B: C ratio (2.83) in comparison to rest of the treatments.

Keywords: Coriander, Plant growth regulators, Cycocel, triacontanol.

INTRODUCTION

Coriander (*Coriandrum sativum* L.) popularly known as "Dhania'' is one of the oldest and most widely used seed spice crop by entire mankind of the world. It is a thin-stemmed, small bushy herb, much branched and grows about 25 to 50 cm tall, with alternate and compound leaves become highly segmented and linear as they reach upper extremities. Inflorescence is a compound umbel. 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 dried ground fruits are the major ingredient of the curry powder. 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.

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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 (Parmar *et al.*, 2018).

MATERIALS AND METHODS

An experiment was conducted at Medicinal Unit of Department of Horticulture, Faculty of Agriculture, Annamalai University during the *rabi* season of 2020 - 21 in randomized block design with three replications. Eleven plant growth regulators treatments comprising of T_1 (GA_3 100 ppm), T_2 ($GA_3$200ppm), T_3(NAA100ppm),T_4(NAA200ppm),T_5 - (Cycocel 250 ppm), T_6 (Cycocel 500 ppm), T_7(Triacontanol - 50 ppm), T_8 (Triacontanol - 100 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 AND DISCUSSION

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 controland and Vermiwash 2 L/ha, but it was remained at par with GA3 200 ppm, NAA 200 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.

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(Rs. /ha)	B:C ratio
GA3 100 ppm	68.04	13.36	1502	1608	60333	2.83
GA3 200 ppm	69.73	14.22	1601	1716	63620	2.77
NAA 100 ppm	66.85	11.67	1401	1544	54692	2.68
NAA 200 ppm	58.00	11.63	1357	1429	49499	2.42
Cycocel 250 ppm	60.58	12.39	1300	1379	48257	2.48
Cycocel 500 ppm	59.89	12.33	1203	1373	40058	2.15
Triacontanol 50 ppm	64.69	12.96	1130	1273	39688	2.29
Triacontanol 100 ppm	57.11	12.91	1078	1262	36273	2.17
Vermiwash 1 L/ha	58.62	12.28	1172	1304	42635	2.41
Vermiwash 2 L/ha	57.08	11.14	1036	1259	34225	2.12
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	-	-

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) and Haokip *et al*., (2016). Whereas maximum B: C ratio was obtained through application of GA_3 100ppm. These findings are closely related to the findings of Sridhar (2003); Selvaraj *et al*., (2003); Amit kumar *et al*., (2019) and Narendhiran *et al*., (2022).

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