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Effect of Plant Growth Regulators on Different Growth Parameters and Yield of Coriander (*Coriandrum sativum L)*

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ABSTRACT: *A field experiment was conducted to study the effect of NAA (1-Napthalan Acetic Acid), Chlormequat (2-Chloroethyl trimethyl Ammonium Chloride), Ethrel (2-Chloroethyl Phosphonic Acid) and 2,4 - D (2,4 Dichloro Phenoxy Acetic Acid) on growth and yield of coriander (Coriandrum sativum) at Horticultural College and Research Institute, Coimbatore with three concentrations and with water spray as control were applied as foliar spray after 25, 40 and 55 days after sowing. The results obtained from experiments suggested that the treatment of NAA@20ppm improved all the growth and yield parameters.*

key words*: Growth regulators, Yield, Yield Components*

INTRODUCTION

Coriander (*Coriandrum sativum* L.) is an annual herb, which belongs to the family Apiaceae it is a native of Mediterranean region. The major producers are Morocco, Canada, India, Pakisthan Romania and Russia. Other producers include Iran, Turkey, Egypt, Israel, China, Thailand, Myanmar, Poland, and Mexico. In India,Coriander is mainly cultivated in Rajasthan and Gujarat with a sizeable acreage in Madhya Pradesh, Haryana, Punjab, Uttarpradesh, Andhrapradesh ,Tamilnadu and Bihar .It is cultivated in an area of 5,91,090 ha with the production of 3,38,260 tonnes. It is grown for seed and seed oil. The fresh green herb called Cilantro or Chinese parsley, is also very popular all over the world for the usefulness in soups, salads, seasoning, and chutney. Besides, green herbs are rich in vitamin C ,A and B2.Hence, the proposed work was planned in coriander, crop with the objectives to study the effect of Ethrel, NAA, CCC and, 2,4, D on growth and yield of coriander, to find out their effective concentration in improving growth and yield parameters for coriander.

MATERIALS AND METHODS

The field experiment was carried out at College Orchard in Horticultural College and Research Institute Coimbatore. The experiment was laid out in a Randamized Block Design with three replications and thirteen treatments. The soil type of the experimental plot was clay loam with a PH of 6.8. Seeds of coriander variety CO_3 was done in lines adopting a spacing of 22.5x15cm. Growth regulators Ethrel at 50,100,150 ppm, CCC100,200,300 ppm, 2,4-D 1,2,5 ppm and NAA10,15,20 ppm were sprayed, and water spray served as the control. The observations on growth parameters like plant height, number of Primary and Productive branches per plant,. Leaf Area and Yield parameters like Grains per umbel, Umbells per plant, Umbellets per plant, Seed yield kg ha^{-1} and Thousand seed weight (g).

DETAILS OF TREATMENTS

Treatments	*Plant Growth Regulators and its Concentrations*
T_1	Ethrel 50 ppm
T_2	Ethrel 100 ppm
T_3	Ethrel 150 ppm
T_4	CCC 100 ppm
T_5	CCC 200 ppm
T_6	CCC 300 ppm
T_7	2,4,-D 1 ppm
T_8	2,4,-D 2 ppm
T_9	2,4,-D 5 ppm
T_{10}	NAA 10 ppm
T_{11}	NAA 15 ppm
T_{12}	NAA 20 ppm
T_{13}	Control (Water Spray)

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RESULTS AND DISCUSSION

Plant Height

It was observed that plant height increased as the growth advanced. Foliar application of NAA 20 ppm recorded significantly more plant height (61.73cm). This was closely followed by NAA 10 ppm (60.82cm). The Plant height was less in CCC 200ppm (47.70cm) which was on par with CCC 300 ppm. This is clear from the data that the plant height was enhanced at higher concentration of NAA. At higher concentration (20 ppm) of NAA the cell wall probably reacted favourably and high deposition of cell wall material took place due to catalyzing activities of carboxylases and pectiolases (Pandey, 1975).

Table 1
Effect of Plant growth Regulators on Plant Height, Numbers of Primary branches Productive branches Leaf area, Days to fifty percent flowering at 55 Days after sowing.

Treatments	*Plant Height (cm)*	*Number of Primary Branches*	*Numbers of Productive Branches*	*Leaf Area (cm^2)*	*Days to fifty percent flowering*
Ethrel 50 ppm	53.74	5.02	9.83	111.44	41.49
Ethrel 100 ppm	51.20	4.86	9.73	113.08	95.83
Ethrel 150 ppm	52.81	4.82	9.56	107.48	47.16
CCC 100ppm	49.73	5.40	10.57	116.14	45.16
CCC 200ppm	47.70	5.96	11.33	122.13	52.66
CCC 300ppm	48.37	5.21	10.13	114.88	53.00
2,4-D- 1ppm	54.95	4.71	9.37	102.99	52.33
2,4-D- 2ppm	58.29	4.56	9.00	100.38	54.16
2,4-D- 5ppm	56.44	4.27	8.90	99.86	54.83
NAA-10ppm	60.82	5.76	10.93	12152.	50.49
NAA-15ppm	59.49	5.68	10.80	118.35	51.66
NAA-20ppm	61.73	6.09	11.63	123.49	42.33
Control	58.78	4.11	8.63	105.97	57.66
SEd	0.522	0.215	0.124	2.244	2.052
CD (D=0.05)	1.139	0.470	0.270	4.891	4.471

NUMBERS OF PRIMARY BRANCHES

Increasing number of primary branches was observed by foliar application of NAA 20ppm (6.09). However this was on par with CCC 200ppm (5.96) and NAA 10ppm (5.76) compared to water Spray (4.11). Increased Plant height coupled with increased number branches by NAA application could probably due to better cell elongation.

NUMBERS OF PRODUCTIVE BRANCHES

Foliar application of NAA 20ppm which recorded more number of productive branches (11.63) than other treatments. Whereas water spray recorded less number of productive branches (8.63).

LEAF AREA

Superiority of foliar application of NAA 20 ppm showed more leaf area at 55 DAS (123.49 cm^2). Foliar Spray of 2,4-D 5ppm showed less leaf area (99.86cm^2). In plants, the photosynthetic efficiency is determined by the leaf area produced. It is obvious from the results that application of growth regulators specifically 20 ppm NAA brought about significant enhancement in leaf area, which could be due to leaf elongation and enlarged growth of leaf blade (Ota, 1990). These result are in confirmity with the findings of Padmavathi (1987) in black gram, Harshansingh and Gill (1985) in wheat and Sumabai *et al.* (1988) in green gram

DAYS TO FIFTY PER CENT FLOWERING

Plants which received 50 ppm Ethrel sprayed flowered earlier (41.49 days) than water spray (57.66 days).

GRAIN NUMBER PER UMBEL

Foliar application of NAA 20ppm recorded higher grains per umbel (24.67) compared to other treatments. The grain number per umbel was less in water spray (13.39). This was followed by foliar application of CCC 200 ppm (22.91).

Table 2
Effect of plant growth regulators on yield and yield components of coriander harvest stage

Treatments	*Grains Per umbel*	*Umbells per plant*	*Umbel lets per plant*	*Seed yield kgha^{-1}*	*Thousand seed weight (g)*
Ethrel 50 ppm	18.53	15.35	5.07	980.62	19.83
Ethrel 100ppm	18.15	14.73	4.92	951.09	23.38
Ethrel 150ppm	17.30	13.93	4.79	891.07	20.05
CCC 100 ppm	19.91	16.55	5.57	1108.11	18.88
CCC 200 ppm	22.91	18.70	6.27	1299.37	17.72
CCC 300 ppm	19.28	15.80	5.39	1063.93	16.77
2,4 D-1 ppm	16.53	13.39	4.39	832.23	1627
2,4,D-2 ppm	15.50	12.77	4.58	812.99	16.00
2,4,D- 5 ppm	14.13	12.27	4.23	797.04	14.31
NAA-10 ppm	21.78	17.72	5.91	1270.81	20.50
NAA – 15ppm	21.06	16.82	5.75	1192.39	22.33
NAA – 20ppm	24.67	19.21	7.17	1383.79	24.83
Control	13.39	11.72	4.01	752.62	15.16
SEd	0.841	0.269	0.144	13.084	0.560
CD(p-0.05)	1.833	0.587	0.313	27.054	1.221

UMBELS PER PLANT

Foliar application of NAA 20ppm (19.21) showed higher number of umbels.The number of umbels per plant was lower (11.72) in water spray followed by 2, 4-D 5 ppm (12.27).

UMBELLETS PER UMBEL

Foliar application of NAA 20 ppm out performed other treatments, showing higher number of umbellets per umbel (7.17).The number was lower in water spray (4.01). Increase in the number umbels and umbellets by foliar application of 20 ppm NAA might be due to the control of excessive vegetative growth and its allocation of the metabolites towards sink as suggested by(Joshi and Singh, 1982)

SEED YIELD

Foliar application of (NAA 20 ppm seed yield varied from 752.62 (water spray) to 1383.79 kgha^{-1} (N AA 20 ppm) Favourable contributions of bioregulators towards yield increase have been attributed to their influence on metabolic and cell division activities in the shoot apical meristem which could induce bud initiation leading to increased vegetative and reproductive branching. This inturn resulted in the higher production of sink tissues by Raffiue – uddin (1986).

THOUSAND SEED WEIGHT

NAA 20 ppm showed the superior performance (24.83g) followed by Ethrel 100 ppm (23.38g). Seed weight was lowest in 2,4-D 5ppm (14.3 1) as foliar spray. This findings is in agreement with the findings of Reddy and Shah (1994) in groundnut,

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