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Effect of Different Plant Growth Regulators and Methods of Application on Economics of Coriander (*Coriandrum sativum* L.)

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A B S T R A C T

The experiment was conducted to study the effect of different plant growth regulators and methods of application on economics of coriander (*Coriandrum sativum* L.). In the present experiment there were two factors main factor being methods of application of PGRs (seed soaked, foliar spray and seed soaked + foliar spray) and another sub factor was concentration of plant growth regulators (GA_3 @ 50, 75 and 100 ppm and CCC@ 200, 250 and 300 ppm). The experiment conducted in factorial randomized block design with three replication and eighteen treatment combinations. Based on the experimental results, it was concluded that application of CCC improved the benefit: cost ratio of coriander. The treatment combination M_3P_6 showed highest (4.08) benefit cost ratio as compared to other treatment combinations.

Introduction

India popularly known as 'Land of Spices' or 'Spice Basket'. Coriander is one of the earliest and most important seed spices known to mankind and is acclaimed throughout the globe for its enormous uses for seeds as well as for leaf purpose (Hnamte *et al.*, 2013). Coriander is an herbaceous plant which popularly known as "Dhaniya". In India, it is grown in Andra Pradesh, Tamil Nadu, Karnataka, Rajasthan and Madhya Pradesh. The young plant as well as the leaves are used in the preparation of chutney and are also used as seasoning in curries, soups and sauces. Botanically coriander is known as *Coriandrum sativum* L. which belongs to family Apiaceae with chromosome number 2n=22. it is native of the Mediterranean region. The mature plant bears small white color flowers that subsequently turn into globular or oval-shape fruits (seed). Inflorescence is a compound umbel and usually comprises about five smaller umbellets. The fruits consist of two halves, the single seeded mericarps (Pruthi, 1997). The odour and taste are due to the compound containing d- linalool or coriandrol. The seed contains 16.15% fatty oils 14.1% protein, 21.6 % carbohydrates, 32.6 % fibers, 11.2%

moistures and 4.4% mineral matters and coriander leaves are very rich in vitamin A and Vitamin C. Total area under cultivation of coriander in Maharashtra in 2017-2018 was 0.0193 lakh hectare with production of 0.0439 lakh tonnes. The productivity of coriander was highest in Meghalaya (4.25 MT/Ha) followed by Uttarakhand (4.20 MT/Ha) and Maharashtra (2.27 MT/Ha) respectively (Anon, 2018).

The demand of spice crops increases day by day. Short duration crops like coriander will be beneficial for growers to get more profit per unit area with higher marketable demand along with high yielding traits. At the time of seed production of coriander, various problems are being faced by cultivators. Boosting of its production is of prime importance and needs consideration. Considering that, the seeds of *C. sativum* are a global commodity and because it will continue to be cultivated around the world areas for research in the future include risk assessment.

Plant growth regulators mainly imparts in increasing production, productivity and less time consuming. Mishra (1989) indicated that there is tremendous scope for PGR-induced potentiation of yield in various crops. It is well known that, all the PGRs regulate the physiological functions or processes of plant. Effectiveness of PGRs depends upon several factors *viz*. different concentration of PGRs, methods and time of application of PGRs etc. Different methods of application of PGRs (seed soaked, foliar spray, seed soaked + foliar spray, soil application and stem injection etc.) alter the physiology of plant in different ways.

Materials and Methods

An experiment entitled Effect of different plant growth regulators and methods of application on economics of coriander (*Coriandrum sativum* L.) was carried out during *rabi* season of academic year 2018-19 at Instructional Farm, Department of Vegetable Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (M.S.). Eighteen treatment combinations of three methods of application and six concentrations of plant growth regulators with factorial randomized block design with three replications. The experimental data was analysed statistically by the method of analysis of variance as out lined by Panse and Sukhatme (1995).

Taking into consideration the various inputs used in the present investigation, cost of cultivation was worked out by the addition of all the incurred towards purchasing of inputs, costs incurred towards mechanical operations and the cost incurred as labour charges. For ploughing, harrowing, stubble collection, cost of purchase of seed kg per hectare, cost of seed treatment, chemical fertilizers viz. cost of urea per kg, cost of MOP per kg, cost of SSP per kg, cost of fertilizer, labour, gap filling and thinning, hand weeding, hoeing, plant protection measure spray i.e. diamethoate, mancozeb and sulphur application, cost of plant growth regulators viz. GA_3 and CCC Spraying cost and spraying labour cost, cost of harvesting etc.

The total value of produce i.e. seed yield of coriander was estimated treatment wise as per prevailing market rates and gross monetary returns (Rs ha^{-1}) were calculated by multiplication of values of produced (q ha^{-1})and market rates (Rs. q). Net monetary returns were calculated by subtracting the cost of cultivation from gross monetary return, treatment wise. Since this represent the net income. The benefit cost ratio was worked out by following formula.

$$\text{B:C Ratio} = \frac{\text{Gross monetary return (Rs. ha}^{-1}\text{)}}{\text{Cost of cultivation (Rs. ha}^{-1}\text{).}}$$

Results and Discussion

Benefit: cost ratio

The data from Table 13 showed that highest net monitory return (Rs 180600ha $^{-1}$) obtained from treatment combination M_3P_6 i.e. (CCC @ 300 ppm as seed soaked + foliar spray) with highest benefit: cost ratio (4.08) followed by treatment combination M_3P_5 i.e. (CCC @ 250 ppm as seed soaked + foliar spray) with net monitory return (Rs 160555 ha $^{-1}$) and (3.75) benefit: cost ratio. While, lowest net monitory return (Rs 88248ha $^{-1}$) from treatment combination M_1P_1 i.e. (GA_3 @ 50 ppm as seed soaked) with benefit: cost ratio (2.53). The similar results in this regard were reported by Parmar *et al*., (2018). in coriander.

Table.1 Different treatment combinations use in the experiment

Treatments	Treatment combinations	Treatment Details
T_1	M_1P_1	GA_3 50 ppm seed soaked
T_2	M_1P_2	GA_3 75 ppm seed soaked
T_3	M_1P_3	GA_3 100 ppm seed soaked
T_4	M_1P_4	CCC 200 ppm seed soaked
T_5	M_1P_5	CCC 250 ppm seed soaked
T_6	M_1P_6	CCC 300 ppm seed soaked
T_7	M_2P_1	GA_3 50 ppm foliar spray
T_8	M_2P_2	GA_3 75 ppm foliar spray
T_9	M_2P_3	GA_3 100 ppm foliar spray
T_{10}	M_2P_4	CCC 200 ppm foliar spray
T_{11}	M_2P_5	CCC 250 ppm foliar spray
T_{12}	M_2P_6	CCC 300 ppm foliar spray
T_{13}	M_3P_1	GA_3 50 ppm seed soaked + foliar spray
T_{14}	M_3P_2	GA_3 75 ppm seed soaked + foliar spray
T_{15}	M_3P_3	GA_3 100 ppm seed soaked + foliar spray
T_{16}	M_3P_4	CCC 200 ppm seed soaked + foliar spray
T_{17}	M_3P_5	CCC 250 ppm seed soaked + foliar spray
T_{18}	M_3P_6	CCC 300 ppm seed soaked + foliar spray

Fig.1 Effect of different concentration of PGRs and methods of application on B:C ratio

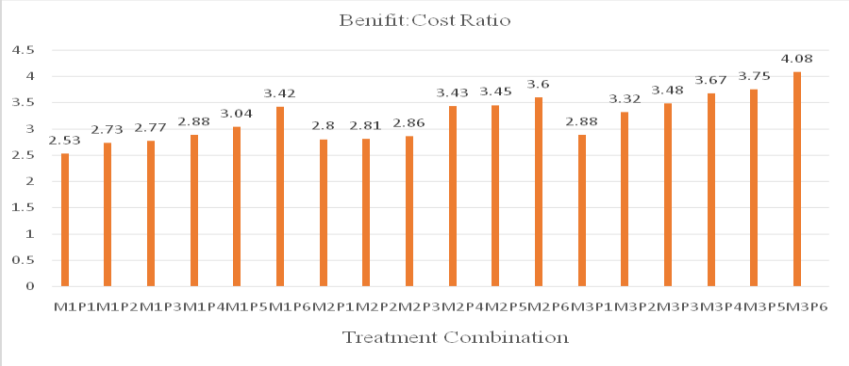

Table.2 Effect of different concentration of PGRs and methods of application on B:C ratio

Treat No.	Treatments	Yield (q)	Cost of cultivation on (Rs. ha^{-1})	GMR (Rs. ha^{-1})	NMR (Rs. ha^{-1})	B:C Ratio
T1	GA3 50 ppm seed soaked	12.17	57793	146040	88248	2.53
T2	GA3 75 ppm seed soaked	13.16	57834	157920	100086	2.73
T3	GA3 100 ppm seed soaked	13.34	57875	160080	102205	2.77
T4	CCC 200 ppm seed soaked	13.86	57770	166320	108550	2.88
T5	CCC 250 ppm seed soaked	14.65	57785	175800	118015	3.04
T6	CCC 300 ppm seed soaked	16.49	57800	197880	140080	3.42
T7	GA3 50 ppm foliar spray	13.58	58260	162960	104700	2.80
T8	GA3 75 ppm foliar spray	13.73	58535	164760	106225	2.81
T9	GA3 100 ppm foliar spray	14.01	58810	168120	109310	2.86
T10	CCC 200 ppm foliar spray	16.67	58310	201600	141730	3.43
T11	CCC 250 ppm foliar spray	16.80	58410	201600	143190	3.45
T12	CCC 300 ppm foliar spray	17.55	58510	210600	152090	3.60
T13	GA3 50 ppm seed soaked + foliar spray	14.05	58543	168600	110058	2.88
T14	GA3 75 ppm seed soaked + foliar spray	16.26	58859	195120	136261	3.32
T15	GA3 100 ppm seed soaked + foliar spray	17.16	59175	205920	146745	3.48
T16	CCC 200 ppm seed soaked + foliar spray	17.87	58370	214440	156070	3.67
T17	CCC 250 ppm seed soaked + foliar spray	18.25	58445	219000	160555	3.75
T18	CCC 300 ppm seed soaked + foliar spray	19.93	58560	239160	180600	4.08

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