

Performance of Coriander (*Coriandrum sativum* L.) cultivars on Phenology, yield and Quality under Protected condition

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ABSTRACT

An investigation was carried out during 2017-2018 in the naturally ventilated arched saw teeth type polyhouse in the Faculty of Horticulture, BCKV, Mohanpur, Nadia, WB, India. The main objective of the investigation is to find out the suitable Cultivar of Coriander for getting maximum yield as well as the quality parameters under protected condition of new alluvial zone of West Bengal. The Experiment was laid out in RBD with six replications and four cultivars (i.e. Debcore-88, Surabhi, Khusboo, Jyoti) as treatments in 1.5 m × 1.2 m plot size with spacing of 30 cm × 15 cm. Overnight soaked seeds were sown on 5th of October. It was revealed from the investigation that cultivar Khusboo seeds have maximum number of umbels/ plant (43.36), number of umbellates/ umbel (6.00), number of seeds/ umbel (21.55), seed yield/ plot (342.01 g) and projected seed yield (1075.62 kg/ ha) than other cultivars. In case of quality parameters, total chlorophyll content of leaves found to be maximum (7.28 mg/ 100g) under Debcore-88 cultivar. The highest β-carotene content (10.60mg/ 100g) and ascorbic acid content (126.56 mg/ 100g) was observed from the leaves of Debcore-88. Seeds of cultivar Surabhi showed the highest oleoresin percentage of 0.20. Cultivar Khusboo gave the highest net return of Rs. 59,937.60/ ha with a maximum benefit cost ratio of 3.30. From the above investigation it may be concluded that for maximization of yield of coriander under protected condition, the suitable cultivar is suggested as Khusboo followed by Surabhi and Debcore-88 under the new alluvial tracts of West Bengal.

Key words: coriander, cultivar, protected condition, umbel, yield, β-carotene, total chlorophyll, oleoresin

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INTRODUCTION

Coriander (*Coriandrum sativum* L., Family Apiaceae) is mainly cultivated from its seeds throughout the year [5]. India is the biggest producer, consumer and exporter of coriander in the world. During 2016-17, area under coriander cultivation was 674 thousand hectare with a production of 923 thousand MT [7]. Coriander is native to regions spanning from southern Europe and northern Africa to south western Asia. It is a soft plant growing about 50 cm height. The leaves are variable in shape, broadly lobed at the base of the plant and slender and feathery higher on the flowering stems. It contains an essential oil of 0.03 to 2.6 % [6]. All parts of this herb are in use as flavoring agent and/or as traditional remedies for the treatment of different disorders in the folk medicine systems of different civilizations [12]. Coriander is a tropical crop and generally sown in the winter season for seed production. West Bengal is not too far behind the traditional coriander growing states like Rajasthan, Gujarat and Andhra Pradesh. Time of sowing is crucial for crop for the vegetative growth and ultimate expressions of yield. Any early or late sowing may hamper

the growth, yield as well as quality of the crop. The production of horticultural crops are higher in protected condition than the open field condition due to congenial inside microclimate and that provided better price. Isaac S.R. [3] revealed that coriander establishes and grow well with higher biomass production in naturally ventilated polyhouse. Keeping in view the above, the present experiment was undertaken to study the suitable cultivar for getting maximum yield as well as the quality parameters under protected condition of new alluvial zone of West Bengal.

MATERIAL AND METHODS

The experiment was conducted at the naturally ventilated arched saw teeth type polyhouse in the Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, India during 2017 to 2018. The experimental site was on a high land with assured irrigation facilities as well as good drainage facilities. The soil of the experimental site was Gangetic alluvial soil with sandy clay loam texture, good water holding capacity and soil pH of 6.75. The experiment was laid out in Randomized Block Design (RBD) with six replications and four cultivars (*i.e.* Debcore-88, Surabhi, Khusboo, Jyoti) as treatments in 1.5 m × 1.2 m plot size with spacing of 30 cm × 15 cm. Well rotten FYM @ 12 t/ ha was applied and mixed thoroughly at the time of land preparation and inorganic fertilizers in the form of Urea (46% N), SSP (16% P₂O₅) and MOP (60% K₂O) were applied @ 15 kg N, 40 kg P₂O₅ and 20 kg K₂O / ha as basal dose. Another 15 kg N/ ha was applied 60 days after sowing. Seeds were soaked overnight in water to facilitate the quick and uniform germination. Seeds were sown in the 15 cm raised plots on 5th October. All the cultural and management practices like weeding, irrigation, plant protection measures, etc. were carried out uniformly for all the treatments. Data on time taken for germination from the days after sowing (DAS), plant height (cm), time taken for flowering, seed setting, physiological maturity (DAS), number of branches/ plant, number of umbels/ plant, number of umbelletes/ umbel, number of seeds/ umbel, 1000 seed weight (g), Seed yield/ plot (g), projected seed yield (kg/ ha) and economics were recorded. The chlorophyll content of leaves (mg/ 100g) and β-carotene content of leaves (mg/ 100g) was determined as per Sadasivam and Manickam [11]. The ascorbic acid content of leaves (mg/100g) was estimated as per Ranganna [10] and oleoresin content of seeds (%) as per A.S.T.A. [1]. The data collected from the experimental field were subjected to statistical analysis, appropriated to RBD as suggested by Gomez and Gomez [2] and Panse and Sukhatme [8].

RESULTS AND DISCUSSION

Plant phenology and flowering

Time taken for germination of coriander was influenced significantly within the different cultivars (Table 1). Amongst the cultivars, Surabhi has taken maximum time for germination of 10.97 DAS followed by Debcore-88 (10.85 DAS), Jyoti (9.93 DAS) and Khusboo (9.68 DAS). Some cultivars required long time for germination that might be due to the fact that each cultivar has different characteristics, which employed within their genetic inheritance. Taking into account the performance of cultivars on plant height of coriander had a significant impact. The cultivar Debcore-88 is found to produce the highest plant height (5.16 cm) as compared to the other cultivars at 30 DAS. At 60 DAS, highest plant height (27.11 cm) recorded in Jyoti. In case of 90 DAS, maximum plant height was observed in Khusboo (101.26 cm) and minimum plant height of 95.34 cm was recorded under Surabhi. The highest plant height produced by Khusboo might be the reason of inheritance characters of the cultivars as well as the environmental factors also plays a vital role to produce the better plant height with respect to other cultivars. Cultivars and time taken for flowering has also significant effect. Early flowering was noticed in Jyoti with the shortest time period of about 73.39 DAS, delay in flowering was associated with Surabhi (85.79 DAS). From the same table, it was revealed that the cultivars on time taken for seed setting were found non-significant. Early seed setting was noticed in Khusboo with the shortest time period of about 90.33 DAS whereas, delay in seed setting was recorded under Surabhi (95.18 DAS). Time taken for physiological maturity was significant with different cultivars (Table 1). Early physiological maturity was observed with Khusboo (126.96 DAS). However, delayed in physiological maturity was recorded under Surabhi (133.61 DAS). The

variation in time taken for physiological maturity within the cultivars might be the reason of their specific time required for maturity.

Yield attributing, yield and economics

Data presented in Table 2 showed significant variations in number of branches/ plant, number of umbels/ plant, number of umbelletes/ umbel, number of seeds/ umbel, thousand seed weight (test weight), seed yield/ plot and projected seed yield/ ha. Highest number of branches/ plant was observed in Khusboo (13.68) followed by Surabhi (12.67). However, lowest number of branches was noticed under Debcore-88 and Jyoti (12.33). The maximum number of umbels/ plant (43.36) was recorded with Khusboo and the minimum was associated with Debcore-88 (40.00). Highest number of umbelletes/ umbel (6.00) was found in Khusboo and lowest was under Debcore-88 (5.33). Highest number of seeds/ umbel was associated with Khusboo (21.55). However, lowest number of seeds per umbel was noticed in Jyoti (19.33). Variation in various yield attributing characters was reported by Prabhu and Balakrishnamurthy [9]. Highest test weight was observed in Khusboo which was found to be 9.13g, whereas, lowest test weight was noticed in Jyoti (8.11g). Highest seed yield/ plot was observed in Khusboo which was found to be 342.01g/ 1.8m². However, lowest seed yield/ plot (255.47g/1.8m²) was noticed in Jyoti. Highest seed yield was observed in Khusboo (1075.62 kg/ha). Highest test weight would definitely lead to greater seed yield/ plot which in turn govern corresponding top rank of a cultivar (Khusboo) in seed yield/ plot and projected yield/ ha. Similar trend was also noted by Meena *et al.*, [4] in coriander. From an assessment of the economics of different local coriander cultivars on 5th October sowing, highest net return of Rs. 59937.60/ ha with a benefit cost ratio of 3.30 was obtained from Khusboo and lowest net return of Rs. 38326.80/ ha with a benefit cost ratio of 2.48 was obtained from Jyoti.

Quality parameters of coriander

Perusal of the data presented in Table 3, showed that the higher chlorophyll-a content of leaves was obtained from Khusboo (2.71 mg/ 100g) and the lowest value was noted from Jyoti (2.41 mg/ 100g). Similarly, chlorophyll-b content was found to be maximum (4.60 mg/ 100g) from Debcore-88 whereas, cultivar Jyoti recorded the minimum chlorophyll-b (4.02 mg/ 100g) content. In case of total chlorophyll content of leaves, cultivar Debcore-88 was found to be maximum (7.28 mg/ 100g). Cultivars had no significant effect on β -carotene content of coriander leaves. The highest β -carotene content (10.60 mg/ 100g) and lowest β -carotene content (10.23 mg/ 100g) was recorded in the leaves of Debcore-88 and Surabhi respectively. Like β -carotene content of coriander leaves cultivars had no significant effect on ascorbic acid content. The highest ascorbic acid content (126.56 mg/ 100g) was observed from the leaves of Debcore-88 while the lowest ascorbic acid content (124.14 mg/ 100g) was noticed from Surabhi. Oleoresin content was found significant with different cultivars. Negligible variation on oleoresin content with the different sowing dates was recorded. The maximum content of 0.20% of oleoresin with seeds of coriander has been exhibited from the seeds of Surabhi whereas, the lowest oleoresin content of 0.17% was associated from the seeds of Jyoti.

Table 1: Performance of coriander cultivars on plant phenology and flowering

Treatment	Time taken for germination (DAS)	Plant Height (cm)			Time taken for flowering (DAS)	Time taken for seed setting (DAS)	Time taken for physiological maturity (DAS)
		30 DAS	60 DAS	90 DAS			
Debcore 88	10.85	5.16	23.93	97.60	84.40	93.31	128.48
Surabhi	10.97	4.40	22.51	95.34	85.79	95.18	133.61
Khusboo	9.68	4.83	26.44	101.26	81.22	90.33	126.96
Jyoti	9.93	4.50	27.11	97.25	73.39	92.72	129.82
Mean	10.36	4.72	25.00	97.86	81.20	92.88	129.72
SEm (\pm)	0.07	0.03	0.20	0.73	1.15	1.37	0.07
CD (P=0.05)	0.25	0.12	0.70	2.58	4.06	NS	0.25

Table 2: Performance of coriander cultivars on yield parameters and economics

Treatment	No. of branches/ plant	No. of umbels/ plant	No. of umbelletes / umbel	No. of seeds/ umbel	Test weight (g)	Seed yield/ plot (g)	Projected seed yield (kg/ ha)	Net return (Rs/ha)	B : C ratio
Debcore 88	12.33	40.00	5.33	19.53	8.26	258.12	811.78	39282.40	2.53
Surabhi	12.67	41.34	5.67	19.89	8.55	281.40	884.99	45337.20	2.78
Khusboo	13.68	43.36	6.00	21.55	9.13	342.01	1075.62	59937.60	3.30
Jyoti	12.33	40.68	5.68	19.33	8.11	255.47	803.46	38326.80	2.48
Mean	12.75	41.35	5.67	20.07	8.51	284.25	893.96		
SEm (±)	0.10	0.31	0.04	0.15	0.06	7.23	22.73		
CD (P=0.05)	0.34	1.10	0.15	0.54	0.23	25.51	80.20		

Table 3: Performance of coriander cultivars on quality parameters

Treatment	Chlorophyll content of leaves (mg/ 100g)			β -carotene content of leaves (mg/ 100g)	Ascorbic acid content of leaves (mg/ 100g)	Oleoresin content of seeds (%)
	Chl. a	Chl. b	Total Chl.			
Debcore 88	2.69	4.60	7.28	10.60	126.56	0.19
Surabhi	2.67	4.55	7.21	10.23	124.14	0.20
Khusboo	2.71	4.47	7.17	10.41	125.75	0.18
Jyoti	2.41	4.02	6.41	10.49	125.79	0.17
Mean	2.62	4.41	7.02	10.43	125.56	0.19
SEm (±)	0.04	0.06	0.10	0.10	0.92	0.003
CD (P=0.05)	0.13	0.21	0.34	NS	NS	0.01

(DAS - Days After Sowing, NS - Non Significant)

CONCLUSION

From the above experiment, it was observed that different cultivars have significant influence on some growth parameters like height of plant, time taken for germination, time taken for flowering, etc. It is apparent from the study that cultivar Khusboo was found to produce highest seed yield of 342.01 g/ plot and projected seed yield of 1075.62 kg/ ha with highest net return of Rs. 59937.60/ ha and benefit cost ratio of 3.30. On the other hand, yield attributing characters like number of branches/ plant, number of umbels/ plant, number of umbelletes/ umbel, number of seeds/ umbel, 1000 seed weight were influenced significantly on the different cultivars. The cultivar Khusboo produced the maximum number of branches (13.68), number of umbels/ plant (43.36), number of umbelletes/ umbel (6.00), and number of seeds/ umbel (21.55) over the other cultivars. In case of quality parameters, total chlorophyll content of leaves found to be maximum (7.28mg/ 100g) under the cultivar Debcore-88, the highest β -carotene content (10.60 mg/ 100g) and ascorbic acid content (126.56 mg/ 100g) was observed from the leaves of Debcore-88 cultivars and the highest oleoresin percentage of 0.20 from the seeds of Surabhi.

Almost all the growth and yield attributing parameters had shown boosting effect with cultivar Khusboo. Considering the overall performance in relation to the cultivars, thus it lead to a conclusion that for obtaining higher yield of coriander, Khusboo cultivar may be suggested on 5th October sowing in the new alluvial tracts of West Bengal. However, the experiment should be carried out for at least 2-3 years to confirm the results.

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