

Evaluation of coriander (*Coriandrum sativum* L.) cultivars for yield and yield contributing characters in Gujarat

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Abstract

Nineteen cultivars of coriander (*Coriandrum sativum* L.) from diverse sources were evaluated in semi-arid conditions of Gujarat for observing the various morphological and yield characters. The highest plant height was found in *Pant Haritama* (97.27 cm) which was at par with RCr 435, ACr 209, JD 1, Co 4, RCr 20 and *Sadhana*. There were no significant differences in number of primary and secondary branches in all the cultivars. Highest seed yield plant⁻¹ were observed in JD 1 (10.78 g) which was at par with *Sudha*, *Sindhu* and RCr 41. The lowest yield plant⁻¹ were observed in RCr 20 (1.81gm). The minimum time taken for 50% flowering was observed in *Sudha* and RCr 41 (42.67 days) which were at par with that of *Sindhu*. The maximum time taken for 50% flowering was by RCr 20 (68.67 days). It was also observed that the time taken for days to full flowering in an umbel ranges between 8-14 days and the days to complete complete fruit formation in an umbel ranges from 14-20 days. It might be concluded from the study that the cultivars differed significantly in most of the parameters and offer a good scope of selection of cultivars for desired traits.

Keywords: coriander, *Coriandrum sativum*, cultivars, seed yield

Introduction

Coriander (*Coriandrum sativum* L.) is an important spice crop grown throughout the country for its leaves as well as seeds. It occupies an area of about 5.43 lakh ha with a production of 5.24 lakh t (NHB 2013). The aromatic odour in coriander is due to the presence of essential oil, which has been reported to range from 0.1–1.0% in dry seed of varieties of different origin. In spite of its wide cultivation in India, the

average seed yield of coriander is rather low because of lack of attention given to this crop. Use of improved varieties/cultivars is one of the strategies for increasing the production and productivity of the crop. A germplasm collection with a good variability for the desirable characters is the basic requirement of any crop improvement programme (Singhania *et al.* 2006). In addition, crop improvement is primarily based on extensive evaluation of

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germplasm (Ghafoor *et al.* 2001). As coriander is an important spice crop, it needs a great deal of critical evaluation of the available types for selection of the improved types with high yield potential. Therefore, the present investigation was undertaken in order to evaluate the morphological traits of the collected coriander cultivars to select the promising genotype(s) for higher seed yield and morphological characters.

Materials and methods

The experiment was conducted at the ICAR-Directorate of Medicinal and Aromatic Plants Research, Boriavi, Anand, Gujarat under the DUS testing programme of PPVFRA during 2008–2010. Experimental site is situated at 22.5° N latitude, 73° E longitude at an altitude of about 45.1 meters above the mean sea level (msl). The relative humidity all around the year is quite low except during rainy season (~ 65%). The experimental soil is sandy loam in nature. Nineteen cultivars of coriander were included in this study. The cultivars were collected from ICAR-National Research Centre on Seed Spices, Ajmer. The experiment was laid out in a randomized complete block (RCB) design with three replications. The land was ploughed well and plots were prepared as 15 cm raised seedbed. The crop was raised under proper irrigation with a spacing of 10 cm × 60 cm.

The seeds (fruits) were rubbed for separating the two mericarps (seeds) and used for sowing. Seeds were treated with Bavistin at 2 g kg⁻¹ of seeds before sowing. The seeds were sown in rows 60 cm apart by hand @30 kg ha⁻¹. To allow uniform sowing in rows, seeds were mixed with some loose soil (about four to five times of weight of seeds). The seeds were covered with good pulverized soil just after sowing and gently pressed by hands. The sowing was done on the first week of November every year. Seeds were harvested when half of the green seeds on the plant changed from green to brown colour as suggested by Singhania *et al.* (2006). To avoid shattering of fruits, harvesting was done in the early morning by cutting the plant at the base by sickles. Then the stalks with seeds were dried in the sun to loosen moisture. Fruits

were separated by beating with sticks and cleaned by winnowing and dried properly (10% moisture of seed). Data were collected from the inner rows of each plot to avoid the border effect. In each unit plot, 10 plants were selected randomly for recording data on different morphological and yield contributing characters for fruit. The data were recorded on different growth and yield contributing characters. At first, the plot yield was recorded and then this yield was converted to hectare yield (t ha⁻¹). All the data were compiled properly and the pooled data was analyzed statistically by MSTAT-C programme.

Results and discussion

Pigmentation

The leaves, stem, peduncle, rachis had different shades of pigmentation of purple, green and combination of both in all the 19 cultivars. The vegetative leaves were green in colour but it changed to purple and various combinations of green and purple at later stages. The details are given in Table 1.

Plant height

The plant height of different cultivars at harvest differed significantly (Table 2). The highest plant height was found in *Pant Haritama* (97.27 cm) which was at par with RCr 435, ACr 209, JD 1, Co 4, RCr 20 and *Sadhana* (Table 2). The lowest plant height was observed in RCr 436 (59.47 cm). The results regarding plant height at different stages are more or less in consonance with the results of Rahman (2000).

Primary branches plant⁻¹

No significant differences were found in primary branches plant⁻¹ in all the 19 varieties. Number of primary branches plant⁻¹ ranged from 9.4 to 11.4. Datta & Choudhuri (2006) obtained primary branches plant⁻¹ in the range of 5.37–8.23 among 17 genotypes. Bhandari & Gupta (1993) reported that the primary branches plant⁻¹ ranged from 1.4–8.6 among 200 genotypes. Rahman (2000) reported primary branches plant⁻¹ ranging from 6.10–8.02.

Table 1. Pigmentation of leaves, stem, peduncle and rachis of the 19 cultivars

Cultivar	Stem colour	Peduncle colour		Leaf colour			Rachis colour	
		Upper	Lower	Veg.	Reprod.	Upper	Lower	
<i>Rajender Swathi</i>	Purple	Purple	Green Tinged Purple	Green	Green	Green	Green	Green
GCr 1	Purple	Purple	Green Tinged Purple	Green	Purple Green	Green	Green	Green
RCr 436	Purple	Purple	Green Tinged Purple	Green	Green	Green	Green	Green
GCr 2	Purple	Purple	Green Tinged Purple	Green	Green	Green	Green	Green
<i>Swathi</i>	Purple/Greenish Purple	Light Purple	Green Tinged Purple	Green	Green	Green	Green	Green
<i>Azad Dhanian 1</i>	Purple/ Greenish Purple	Light Purple	Green Tinged Purple	Green	Purple Green	Green	Green	Green
<i>Sudha</i>	Purple	Purple	Green Tinged Purple	Green	Green	Green	Green	Green
RCr 435	Purple/Light Purple	Purple	Green Tinged Purple	Green	Purple Green	Green	Green	Green
<i>Pant Haritama</i>	Purple	Purple	Green Tinged Purple	Green	Purple Green	Green	Green	Green
<i>Hisar Anand</i>	Purple	Purple	Green Tinged Purple	Green	Purple green/Green	Purple Green	Green	Green
<i>Hisar Sugandh</i>	Purple	Purple	Green Tinged Purple	Green	Purple green/Green	Green	Green	Green
<i>Sindhu</i>	Purple	Purple	Green Tinged Purple	Green	Green	Green	Green	Green
ACr 209	Purple	Purple	Green Tinged Purple	Green	Purple green/Green	Green	Green	Green
JD 1	Purple	Purple	Green Tinged Purple	Green	Green	Green	Green	Green
Co 4	Purple/Light Purple	Purple	Green Tinged Purple	Green	Purple green/Green	Light Green	Green	Green
RCr 20	Purple/Light Purple	Light Purple	Green Tinged Purple	Green	Purple Green	Green	Green	Green
RCr 41	Purple	Purple	Green Tinged Purple	Green	Green	Green	Green	Green
<i>Sadhana</i>	Purple/Light Purple	Purple	Green Tinged Purple	Green	Purple green/Green	Green	Green	Green
RCr 684	Purple Light Purple	Purple	Green Tinged Purple	Green	Purple green/Green	Green	Green	Green

Table 2. Vegetative and fruiting characteristics of 19 coriander cultivars

Cultivar	Plant height (cm)	No. of primary branches	No. of secondary branches
<i>Rajender Swathi</i>	78.13	9.67	21.13
GCr 1	79.60	10.13	21.93
RCr 436	59.47	9.87	23.47
GCr 2	84.40	10.13	20.40
<i>Swathi</i>	68.60	9.67	24.73
<i>Azad Dhanian</i> 1	85.60	9.40	19.60
<i>Sudha</i>	72.87	9.93	25.20
RCr 435	86.80	11.40	24.13
<i>Pant Haritama</i>	97.27	10.67	23.33
<i>Hisar Anand</i>	86.27	10.73	23.93
<i>Hisar Sugandh</i>	86.00	11.00	24.80
<i>Sindh</i>	82.27	10.60	27.93
ACr 209	93.40	10.93	23.53
JD 1	88.20	11.27	30.00
Co 4	86.67	10.93	22.80
RCr 20	94.53	9.67	18.60
RCr 41	75.00	9.73	22.67
<i>Sadhana</i>	87.20	10.93	23.67
RCr 684	86.20	9.47	17.20
LSD (P<0.05)	10.95	NS	NS
CV %	7.96	10.74	26.92

Table 3. Yield contributing characters of 19 coriander cultivars

Cultivars	No. of umbels plant ⁻¹	Yield plant ⁻¹ (g)	Yield (t ha ⁻¹)	50% flowering (DAS)
<i>Rajender Swathi</i>	33.40	4.41	1.10	58.33
GCr 1	24.53	5.25	1.37	52.00
RCr 436	21.33	5.79	1.47	45.00
GCr 2	26.40	4.72	1.18	53.33
<i>Swathi</i>	39.20	7.03	1.46	43.67
<i>Azad Dhanian</i> 1	18.00	2.65	0.78	62.00
<i>Sudha</i>	33.80	8.10	1.70	42.33
RCr 435	25.87	5.01	1.07	55.00
<i>Pant Haritama</i>	25.40	3.79	0.99	65.00
<i>Hisar Anand</i>	26.40	5.18	0.98	59.33
<i>Hisar Sugandh</i>	30.27	5.74	1.32	58.33
<i>Sindh</i>	30.53	10.36	2.15	42.67
ACr 209	27.73	6.15	1.76	53.00
JD 1	33.27	10.78	2.49	48.00
Co 4	31.13	4.49	1.05	53.67
RCr 20	14.67	1.81	0.55	68.67
RCr 41	26.47	7.52	1.46	42.33
<i>Sadhana</i>	26.73	5.11	1.21	57.00
RCr 684	24.27	5.15	1.29	54.33
LSD (P<0.05)	NS	3.39	0.73	3.74
CV %	27.69	35.65	32.91	4.23

Secondary branches plant⁻¹

No significant differences were found in the number of secondary branches plant⁻¹ in all the 19 varieties. Number of secondary branches plant⁻¹ ranged from 17.2–30.0. Rahman (2000) obtained secondary branches plant⁻¹ ranging from 15.85–25.50 which was higher than the present investigation due to the fact that he used plant spacing of 30 × 10 cm. Datta & Choudhuri (2006) obtained secondary branches plant⁻¹ in the range of 10.10–16.75.

Umbels plant⁻¹

No significant differences were found in the number of umbels plant⁻¹ in all the 19 varieties and it ranged from 14.67 to 39.2. Maurya (1989) obtained umbels plant⁻¹ in the range of 17.00–41.67, while Datta & Choudhuri (2006) obtained 20.83 to 34.67 umbels plant⁻¹.

Days to 50% flowering

The cultivars differed significantly for days to 50% flowering (Table 3). The minimum time taken for 50% flowering was observed in *Sudha* and RCr 41 (42.67 days) which was at par with that of *Sindh*. The longest time taken for 50% flowering was by RCr 20 (68.67 days).

Days to full flowering and days to complete fruit formation in an umbel

The minimum days taken for complete flowering in an umbel were in GCr 2 (8 days) followed by *Azad Dhan* 1, *Pant Haritama* and JD 1 (9 days each). The maximum days was taken by *Rajender Swathi* and *Sindhu* (14 days). The minimum days taken for complete fruit formation in an umbel were in RCr 436 (14 days) and the maximum days were observed in *Rajender Swathi*, *Swathi*, *Sudha*, *Sindh* and ACr 209 (20 days) (Fig. 1).

Seed yield plant⁻¹

The maximum yield of seeds plant⁻¹ was obtained from JD 1 (10.78 g), which was at par with those of *Sindh* (10.36 g), *Sudha* (8.1 gm) and RCr 41 (7.52 g). The lowest seed was observed in RCr 20 (1.81 g) closely followed by *Azad Dhan* 1 (2.65 g) (Table 3). The high CV may be due to the change in the field conditions in the different years of experiment. Islam *et al.* (2004) obtained seed yield plant⁻¹ in the range of 7.30 to 11.30 g, which is in corroboration with the result of the present study. Maurya (1989) obtained seed yield plant⁻¹ ranging from 7.93 to 15.08 g, while Bhandari & Gupta (1993)

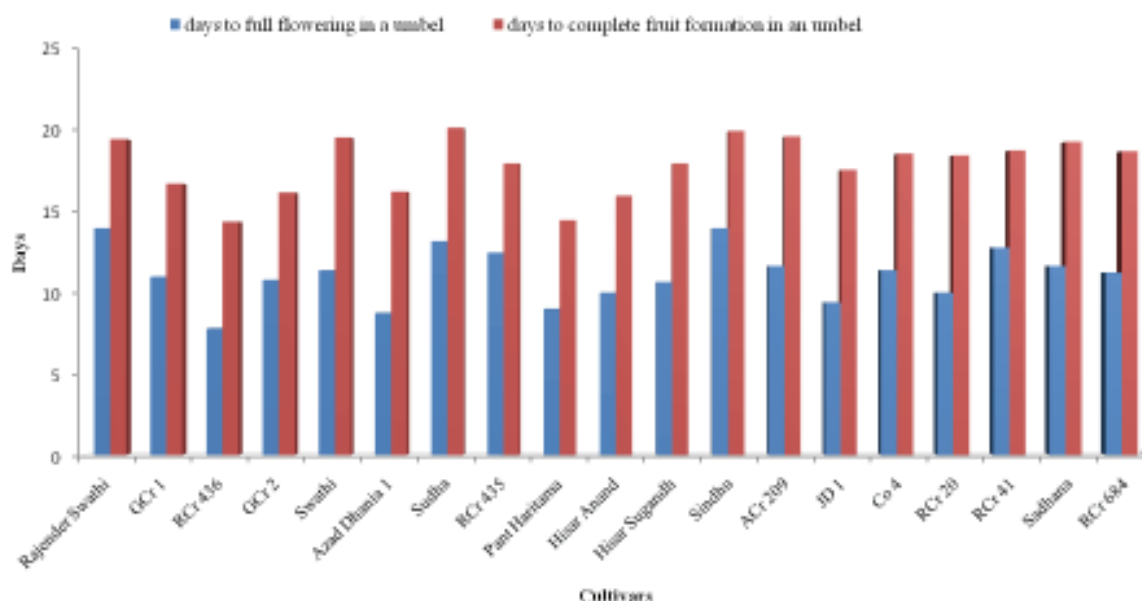


Fig. 1. Days taken for full flowering in an umbel and days to complete fruit formation in an umbel

obtained seed yield plant⁻¹ in the range of 0.20–7.80 g. The difference in yield at different locations might be due to the genotypic differences and ecological variations.

Seed yield ha⁻¹

Cultivars of coriander under investigation showed a wide range of variability among themselves in respect of seed yield ha⁻¹ (Table 3). It ranged from 0.55 to 2.49 t ha⁻¹. The maximum seed yield was obtained from JD 1 (2.49 t ha⁻¹) which was at par with *Sindhu* (2.15 t ha⁻¹) and ACr 209 (1.76 t ha⁻¹) (Table 3). The lowest seed yield was found in RCr 20 (0.55 t ha⁻¹). Rajagopalan *et al.* (1996) obtained seed yield of 13 coriander cultivars/accessions in the range of 0.36–0.68 t ha⁻¹. Carubba *et al.* (2002) obtained seed yield in the range of 0.58–0.97 t ha⁻¹. Datta & Choudhuri (2006) reported that seed yields of 17 germplasm lines were in the range of 0.69–1.51 t ha⁻¹. Moniruzzaman *et al.* (2013) reported that the genotypes CS011 and CS007 gave the highest seed yield plant⁻¹ (5.79 and 5.57 g) as well as seed yield ha⁻¹ (1.34–1.05 t). It is concluded that cultivars differed significantly in most of the parameters and offer a good scope of selection of cultivars for desired traits.

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