Environment and Ecology 42 (3B) : 1382—1387, July—September 2024
Article DOI: https://doi.org/10.60151/envec/BXLG9793
ISSN 0970-0420

Qualitative and Yield Characters in Coriander Genotypes

Eshwar Singh, D.K. Rana, K.N. Shah, Vivek Singh, Maneesh Kumar

Received 21 February 2024, Accepted 15 July 2024, Published on 4 September 2024

ABSTRACT

The present research was conducted at the experimental field of Vegetable Research Center GB Pant University of Agriculture and Technology, Pantnagar during the crop season of 2020–2021. The experiment was laid out in Randomized Block Design comprising 20 genotypes with three replications. The observations were meticulously recorded, focusing on various growth and yield-related parameters of coriander. These parameters encompassed important traits such as the number of fruits per umbel, seed yield per plant and per plot, and other relevant characteristics that contribute to the overall performance and productivity of the crop. The analysis of variance conducted on the collected data revealed highly significant variations among the genotypes for all 17 characters studied. The results of the analysis indicated that the genotype COR-178 stood out as the most suitable option when considering the growth and yield-related characters of coriander. This genotype exhibited superior performance and demonstrated favorable attributes compared to all other genotypes evaluated in the study.

Keywords Coriander, Variability, Genotypes, ANOVA, Yield parameters.

INTRODUCTION

The cultivation and utilization of spices hold an exceptionally captivating narrative, making it a profoundly intriguing aspect among vegetable products. Since time has passed, natural spices have been used for cooking purposes, therefore, in order to improve the appearance, flavor, texture and appetite of the spices are identified as products of vegetable origin. Coriander (*Coriandrum sativum* L.) an herbaceous plant, completes its life cycle within a year as an annual herb, belongs to the family Apiaceae/Umbelliferae and having chromosome number 2n = 22. Coriander originates between the eastern Mediterranean region from where it was spread to the world. It is now widely grown in India and around the world due to the demand for both the leaves and the seeds as a spice and herb. Coriander is one of the most commonly used spices, with a nutritional benefit and high consumption rates. Both the leaves and seeds of the coriander plant are used in various culinary dishes around the world. The leaves, commonly referred to as cilantro, have a fresh and citrusy flavor and are often used

Eshwar Singh[1]*, D.K. Rana[2], K.N. Shah[3], Vivek Singh[4], Maneesh Kumar[5]

[1,5]PhD Scholar, [2]Assistant Professor and Head, [3]Assistant Professor, [4]Lecturer
[1,2,3,4]Department of Horticulture, School of Agriculture and Allied Science HNB Garhwal University (A Central University) Srinagar 246174, Garhwal, Uttarakhand, India

[5]Department of Horticulture, GB Pant University of Agriculture and Technology, Pantnagar, India

Email: eshunegi15023@gmail.com
*Corresponding author

as a garnish or ingredient in salads, salsas, curries, soups and many other dishes. Cilantro is particularly popular in Mexican, Indian, and Southeast Asian cuisines. Coriander seeds, on the other hand, have a warm, nutty flavor and are used as a spice. They can be used whole or ground and are commonly found in spice blends, marinades, pickles, curries, and baked goods. In some cuisines, such as Indian and Middle Eastern, coriander seeds are toasted before use to enhance their flavor. The chemical composition of coriander is responsible for its distinct flavor and therapeutic properties. The plant contains essential oils, such as linalool, geranyl acetate, and α-pinene, which contribute to its characteristic aroma. It also contains flavonoids, phenolic acids and other bioactive compounds, which have been studied for their potential health benefits. The Egyptians recognized the plant's initial therapeutic benefits and its therapeutic properties have also been described in Sanskrit and Greek sources. Coriander is well-known in India for its anti-inflammatory quality. Diabetes patients, including those with higher cholesterol, also benefit from use of this herbal medicine. In breeding programs aiming with enhancing seed yield, a survey of genetic variability is required using relevant genetic measures such as genotypic and phenotypic coefficients of diversity, heredity estimates, and genetic advance as a mean percentage. Heredity weighs the contribution of genes to overall variability, which in any given quantitative trait is a phenotype variation that has been measured. Therefore, the performance of coriander genotypes in terms of growth and yields has been studied in this investigation.

MATERIALS AND METHODS

Present experiment has been conducted in the *rabi* season 2020 to 2021, at the Vegetable Research Center GB Pant University of Agriculture and Technology, Pantnagar. Twenty genotypes of coriander were used in the experiment. The experiment consisted of Randomized Block Design with 20 treatments and 3 replications. Each genotype was planted in plot size of 3 × 2.4 m. All the recommended package of practices was adopted for raising a healthy crop. Five randomly selected plants, from each plot of all the three replications were tagged and used for recording the observations. The crop was harvested when 60% of seeds in main umbels turn yellowish brown in color.

RESULTS AND DISCUSSION

The intention of the current study is to investigate the nature of variability in several coriander germplasm characteristics. The analysis of variance conducted for all the characters studied, as presented in Table 1, revealed a substantial variation among the genotypes. The results demonstrated a significant difference between the genotypes indicating diverse performance across the evaluated traits. The results of the present study were nearly identical to Chandrakala *et al.* (2024) and Kumar *et al.* (2018).

Table 1. Analysis of variance for seventeen characters of coriander. (*) Significant at 5% probability level, (**) Significant at 1% probability.

Sl. No.	Characters	Mean sum of square		
		Replication	Genotype	Error
		Df		
		2	19	38
1	Number days to germination	0.15	11.27**	2.18
2	Number of basal leaf	2.51	0.56**	0.14
3	Number of days to stem initiation	0.61	69.20**	2.58
4	Number of days to 1st flowering	7.01	118.95**	3.96
5	Number of days to 50% flowering	0.31	67.77**	2.54
6	Plant height up to top of the plant	11.44	1387.05**	1.80
7	Plant height up to main umbel	5.92	1364.14**	1.52
8	Number of primary branches	0.01	0.57**	0.10
9	Number of secondary branches	0.55	5.55**	0.26
10	Number of umbel per plant	0.29	135.24**	1.69
11	Number of umbellate per umbel	0.78	0.56**	0.15
12	Number of fruit per umbel	2.00	113.76**	3.38
13	Number of fruit per umbellate	0.15	7.43**	0.37
14	Seed yield per plant	0.000082	0.41**	0.02
15	Seedy yield per plot	0.001	0.061**	0.001
16	Seed yield per hectare	4884.46	118573.22**	2248.60
17	1000-seed weight	0.042	16.22**	0.14

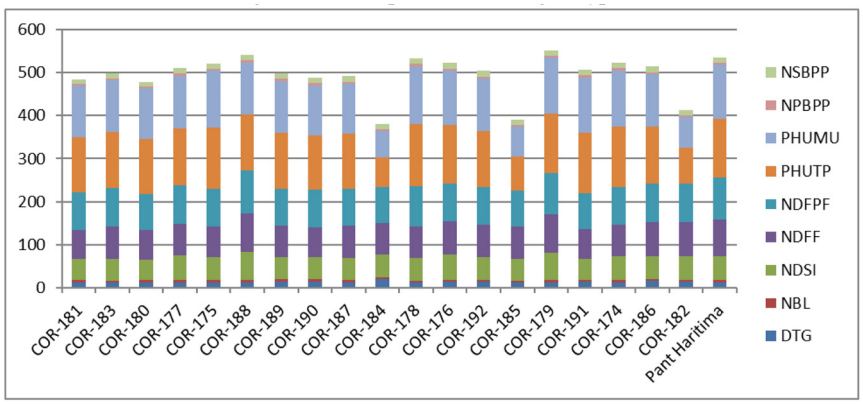

Fig. 1. Mean performance of genotypes.

In the present finding the growth parameters viz., Number of days to germination, Number of basal leaf, Number of days to stem initiation, Number of days to 1st flowering, Number of days to 50% flowering, Plant height up to top of the plant, Plant height up to main umbel, Number of primary branches, Number of secondary branches of various genotypes differed significantly at several growth stages are given in Table 2.

The lowest number of days to germination was recorded in three genotypes viz., COR-183, COR-178 and COR-185 (11 days), whereas genotype COR-184 took highest number of days (19.67 days) to germi-

Table 2. Growth parameters of coriander of genotypes.

Genotypes	Number of days to germination	Number of basal leaf	Number of days to stem initiation	Number of days to 1st flowering	Number of days to 50% flowering	Plant height up to top of the plant	Plant height up to main umbel	Number of primary branches	Number of secondary branches
COR-181	11.67	5.67	49.33	67.67	86.33	128.33	120.27	4.58	10.27
COR-183	11.00	5.00	51.00	75.33	89.67	129.00	121.27	4.73	11.93
COR-180	12.00	5.00	48.33	68.00	83.00	128.43	119.67	4.42	10.13
COR-177	12.33	5.33	56.33	73.33	91.00	132.53	122.27	5.29	12.57
COR-175	12.33	5.33	53.33	71.00	87.67	142.47	131.53	5.55	13.18
COR-188	11.67	5.33	65.67	90.67	99.00	129.67	120.70	5.28	11.30
COR-189	14.33	6.33	49.00	73.33	85.67	130.67	121.73	4.73	10.13
COR-190	14.33	5.33	50.00	71.00	87.33	126.47	116.27	5.13	10.47
COR-187	12.33	5.67	50.33	75.00	86.00	128.00	117.13	4.55	11.20
COR-184	19.67	5.00	51.33	73.33	83.67	69.47	61.50	4.05	8.17
COR-178	11.00	5.67	52.33	73.67	94.00	143.13	134.13	5.88	13.43
COR-176	13.00	4.67	59.00	77.33	87.33	136.33	126.33	5.47	12.53
COR-192	12.67	5.00	52.00	75.67	87.67	131.13	121.93	5.15	11.93
COR-185	11.00	4.67	51.67	74.67	84.00	78.40	69.47	4.93	9.40
COR-179	12.33	5.00	64.00	89.00	96.00	138.07	129.80	5.13	12.27
COR-191	13.00	5.33	47.67	69.00	85.33	139.20	129.40	5.33	12.60
COR-174	12.00	5.67	55.00	74.33	86.33	140.33	130.80	5.27	12.20
COR-186	15.00	5.00	53.00	78.67	91.00	131.73	121.73	5.07	12.27
COR-182	13.00	5.67	54.33	79.00	89.67	82.60	72.07	4.83	11.13
Pant haritima	12.33	6.00	54.00	85.33	99.00	135.87	125.33	5.40	12.53
CV	11.50	7.21	3.01	2.62	1.79	1.07	1.06	6.36	4.46
SE	0.85	0.22	0.92	1.14	0.92	0.77	0.71	0.18	0.29
CD 5%	2.44	0.63	2.65	3.29	2.63	2.22	2.22	0.53	0.84

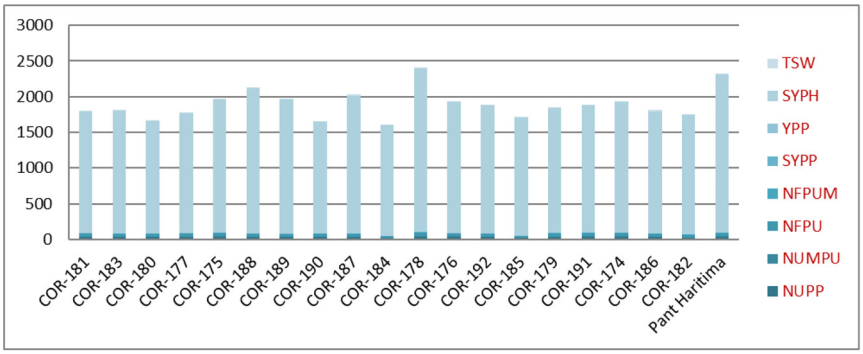

Fig. 2. Mean performance of genotypes. NOTE: DTG – Number of days to germination, NBL- Number of basal leaf, NDSI- No. of days to stem initiation, NDFF- Number of days to 1st flowering, NDFPF- Number of days to 50 % flowering, PHUTP-Plant height up to top of the plant, PHUMU- Plant height up to main umbel, NPBPP- Number of primary branches, NSBPP- Number of secondary branches, NUPP- Number of umbel per plant, NUMPU- Number of umbellate per umbel, NFPU- Number of fruit per umbel, NFPUM- Number of fruit per umbellate, SYPP- Seed yield per plant, YPP- Yield per plot, SYPH- Seed yield per hectare,TSW-1000 seed weight,

nation. The results of the present study were nearly identical to Kumar *et al.* (2017) and Devi *et al.* (2019) findings. Maximum number of basal leaves recorded in genotype COR-189 (6.33), while minimum number of basal leaves recorded in genotypes COR-176 and COR-185 (4.67). Minimum days to stem initiation were recorded in COR-191 (47.67 days), while maximum number of days to stem initiation was recorded in COR-188 (65.67 days). Minimum days to 1st flowering were reported in genotype COR-181 (67.67 days) and maximum days to taken 1st flowering reported in COR-188 (90.67 days). Maximum days to

Table 3. Yield parameters of coriander of genotypes.

Genotypes	Number of umbel per plant	Number of umbellate per umbel	Number of fruit per umbel	Number of fruits per umbellate	Seed yield per plant (g)	Yield per plot (kg)	Seed yield per ha (kg)	1000 seed weight (g)
COR-181	33.33	5.93	40.43	6.00	3.85	1.22	1694.4	10.83
COR-183	35.20	6.13	33.37	6.27	3.90	1.24	1722.2	9.85
COR-180	32.63	5.73	34.43	6.33	3.75	1.13	1569.4	15.82
COR-177	31.53	6.20	40.50	7.47	3.81	1.21	1680.6	12.57
COR-175	37.20	6.47	39.53	8.07	4.21	1.34	1861.1	9.35
COR-188	33.67	6.07	37.17	6.40	4.53	1.46	2027.8	11.23
COR-189	30.60	6.07	32.97	6.00	4.20	1.35	1875.0	16.47
COR-190	33.93	5.47	34.07	8.70	3.60	1.12	1555.6	10.95
COR-187	32.87	5.20	30.63	9.33	4.46	1.39	1930.6	16.24
COR-184	15.33	5.13	21.13	4.73	3.75	1.11	1541.7	13.57
COR-178	41.13	6.53	43.53	10.07	5.20	1.65	2291.7	12.34
COR-176	37.50	6.13	35.40	6.33	3.89	1.32	1833.3	14.87
COR-192	34.70	5.93	32.73	7.47	3.65	1.29	1791.7	12.75
COR-185	18.57	4.87	19.37	5.67	4.01	1.19	1652.8	11.25
COR-179	35.73	5.53	38.27	7.07	4.12	1.26	1750.0	9.17
COR-191	37.27	6.00	39.53	10.80	4.21	1.28	1777.8	12.56
COR-174	38.60	5.67	39.63	6.40	4.37	1.32	1833.3	12.43
COR-186	33.40	5.93	36.43	6.07	4.10	1.23	1708.3	15.25
COR-182	21.67	5.73	34.00	5.87	3.86	1.20	1666.7	10.21
Pant haritima	38.60	6.13	41.23	6.53	3.95	1.59	2208.3	10.03
CV	3.98	6.70	5.22	8.64	3.50	2.89	2.6365	3.09
SE	0.75	0.22	1.06	0.35	0.08	0.02	27.37	0.22
CD 5%	2.15	0.64	3.04	1.01	0.23	0.06	78.38	0.63

50% flowering were taken by genotype COR-188 and Pant Haritima (99 days), while minimum days were taken by genotype COR-180 (83 days). Maximum height up to top of the plant were recorded in genotype COR-178 (143.13 cm) followed by COR-175 (142.47 cm), while minimum height was recorded in genotype COR-184 (69.47 cm). Their mean value graph is presented in (Fig. 1).

Maximum height up to main umbel was recorded in genotype COR-178 (134.13 cm), while minimum height was recorded in genotype COR-184 (61.50 cm). Maximum number of primary branches recorded in COR-178 (5.88) followed by COR-176 (5.47), whereas minimum number of primary branches found in COR-184 (4.05) followed by COR-180 (4.42). The similar variations in number of primary branches per plant among different coriander varieties have reported by (Meena and Sharma 2014). Maximum number of secondary branches was recorded in genotype COR-178 (13.43) followed by COR-175 (13.18), while minimum branches were recorded in COR 184 (8.17) followed by COR-185 (9.40). Table 3 presents the data indicating significant differences in yield parameters among various genotypes at different growth stages.

The maximum numbers of umbels per plant was recorded in COR 178 (41.13), whereas minimum umbels recorded in genotype COR-184 (15.33). Maximum number of umbellates per umbel counted in genotype COR-178 (6.53) and minimum number of umbellates counted in genotype COR-185 (4.87). Similar results were obtained by (Bajad *et al*. 2017) in coriander, which supported the present findings. Their mean values graph is presented in (Fig. 2).

Maximum number of fruits per umbel reported in genotype COR-178 (43.53) and minimum number of fruits reported in genotype COR-187 (19.37). Genotypes COR-191 exhibited the highest number of fruits per umbel (10.80), followed by COR-178 (10.07), while COR-184 recorded the lowest number of fruits per umbel (4.73). Among all the genotypes studied, the highest seed yield per plant was observed in genotype COR-178 (5.20 g), whereas the lowest seed yield was reported in COR-184 (3.65 g). Genotype COR-178 also displayed the highest seed yield per plot (1.65 kg), while COR-184 had the minimum seed yield per plot (1.11 kg). These results align closely with the findings of (Saroj *et al.* 2021) and (Katar *et al.* 2016). The genotype COR-189 had the maximum 1000-seed weight (16.47 g), whereas COR-179 had the minimum 1000-seed weight (9.17 g). These findings are consistent with the results reported by (Farooq *et al.* 2017) and (Acharya *et al.* 2020). The observed ranges in various traits indicate a significant level of variability in growth and yield characteristics. This wide variation can be utilized effectively in future breeding programs.

CONCLUSION

On the basis of present study, it is concluded that the genotype COR-178 was found to be the most suitable over all the other genotypes in relation to growth and yield related character of coriander. These results suggest that COR-178 possesses favorable traits and attributes that contribute to its superior performance in terms of growth and yield.

ACKNOWLEDGMENT

Author is highly grateful to the advisory committee members and Officer-in-charge VRC, GBPUA and T, Pantnagar for providing the necessary facilities for conducting this research work smoothly. Financial assistance as graduate teaching assistantship rendered by the university is also duly acknowledged.

REFERENCES

Acharya VR, Singh M, Patel RK, Goyal L (2020) Genetic diversity of coriander for yield and its attributing characters. *International Journal of Current Microbiology and Applied Sciences* 9 (2) : 222—228. doi: https://doi.org/10.20546/ijcmas.2020.902.028.

Bajad GB, Dahale MH, Nandeshwar VN (2017) Performance of different coriander varieties for seed yield. *Journal of Krishi Vigyan* 5 (2) : 132—137. doi:10.5958/2349-4433.2017.00029.0.

Chandrakala R, Venkatesan K, Selvi BS, Senthil N, Karthikeyan G (2024) Understanding the genetic variability for growth and leaf yield of coriander (*Coriandrum sativum* L.). *Agricultural Science Digest* 4 (2) : In press. doi. 10.18805/ag.D-5817.

Devi AR, Sharangi AB, Haokip MC (2019) Genetic variability studies of coriander (*Coriandrum sativum* L.) genotypes. *Journal of Pharmacognosy and Phytochemistry* 8 (4) : 419—421.

Farooq M, Hegde RV, Imamsaheb SJ (2017) Variability, heritability and genetic advance in coriander genotypes. *Plant Archives* 17(1) : 519—522.

Katar D, Kara N, Katar N (2016) Yields and quality performances of coriander (*Coriandrum sativum* L.) genotypes under different ecological conditions. *Turkish Journal of Field Crops* 21(1) : 79—87.
doi: https://doi.org/10.17557/tjfc.77478.

Kumar A, Umesha K, Shivapriya M, Halesh GK, Kumar VC (2018) Genetic variability, heritability and genetic advance studies in coriander (*Coriandrum sativum* L.). *International Journal of Pure Applied Bioscience* 6 (3) : 426—430.
doi: http://dx.doi.org/10.18782/2320-7051.6565.

Kumar S, Singh JP, Singh D, Mohan C, Sarkar M, Sah H (2017) Character association and path analysis in coriander (*Coriandrum sativum* L.) for yield and its attributes. *International Journal of Pure Applied Bioscience* 5 (1) : 812—818.

Meena BL, Sharma KC (2014) Genetic variability, heritability and genetic advance in coriander (*Coriandrum sativum* L.). *Journal of Plant Development Sciences* 6 (1) : 109—111.

Saroj R, Mishra DP, Ram CN, Nath S (2021) Assessment of genetic variability in coriander (*Coriandrum sativum* L.). *International Journal of Horticulture and Food Science* 3 (2) : 31—32.