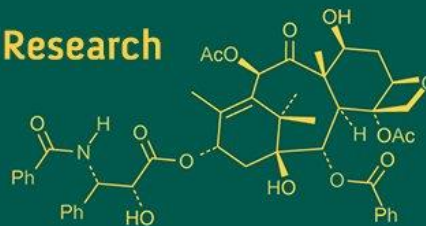
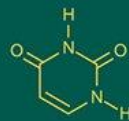
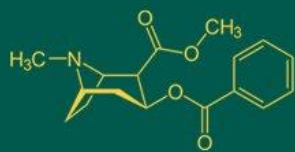


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Studies on genetic variability in coriander (*Coriandrum sativum*)

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Abstract

The present investigation was conducted during the summer season of the academic year 2025-26 at the Instructional-cum-Research Farm, Horticulture Section, Rajarshee Chhatrapati Shahu Maharaj Government College of Agriculture, Kolhapur. The experiment was laid out in a Randomized Block Design (RBD) comprising 25 coriander genotypes with two replications. The recorded observations were subjected to statistical analysis to estimate the extent of genetic variability, heritability and genetic advance among the evaluated genotypes. High values of GCV and PCV were recorded for leaf/stem ratio, number of branches per plant, stem girth, foliage yield and fresh weight per plant, reflecting the presence of ample genetic variability and greater scope for improvement through selection. Moderate variability was observed for leaf length, number of leaves per plant, length of main stem, yield per plot, yield per hectare and chlorophyll content, whereas days to 50 per cent germination, plant height and days to harvest exhibited relatively low variability. High heritability coupled with high genetic advance as per cent of mean was observed for leaf/stem ratio, number of branches per plant, stem girth, foliage yield, fresh weight per plant, leaf length, number of leaves per plant, length of main stem, yield per plot, yield per hectare and chlorophyll content, indicating the predominance of additive gene action and the effectiveness of direct phenotypic selection. Genotype ACKCO-6 emerged as the most promising for major vegetative and yield traits, while ACKCO-15, ACKCO-21, ACKCO-24 and ACKCO-18 also exhibited desirable performance. recognized as desirable genotypes for utilization in future breeding programmes.

Keywords: Coriander, genetic variability, heritability, genetic advance, GCV, PCV, genotypes, selection

Introduction

Coriandrum sativum L., commonly known as “Dhania”, is an important medicinal, aromatic and seed spice crop belonging to the family Apiaceae (Umbelliferae), with a chromosome number of $2n = 22$. It is considered native to the Mediterranean and Near Eastern regions (Bhandari and Gupta, 1993) and is known by different names in India, including “Kothimbir” or “Dhana” in Marathi. The crop is cultivated mainly for its tender green foliage and fruits, which have wide culinary, nutritional and medicinal uses. Coriander leaves and fruits contain several nutrients, while the fruits are also a source of fatty oil and essential oil, with linalool as the major aromatic constituent (Nimish *et al.*, 2011; Beyzi *et al.*, 2017). Its essential oil is utilized in food, flavour, perfume and cosmetic industries, and the crop has also been traditionally valued for its medicinal properties (Asolkar *et al.*, 1992; Mathias *et al.*, 1994; Kumar s., 1977). Coriander is additionally recognized as an important melliferous crop with potential for honey production (Bhalchandra *et al.*, 2014; Abou-Shaara, 2015) [1, 3, 4, 5, 10, 13, 15]. The availability of adequate genetic variability is a fundamental requirement for the genetic improvement of any crop. In coriander, the presence of diverse genotypes provides opportunities for identifying superior plant types and suitable parents for breeding programmes aimed at improving yield and other economically important characters (Rekha, 1994; Chauhan, 2019) [7, 19]. The magnitude of genetic variability can be assessed through genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability and genetic advance, which help in understanding the relative contribution of genetic

and environmental factors and in formulating effective selection strategies (Mangesha and Alemaw, 2010; Pooja and Singh, 2018; Acharya *et al.*, 2020) [2, 12, 16].

Heritability indicates the proportion of phenotypic variation attributable to genetic differences, while genetic advance estimates the expected improvement through selection. The combined consideration of heritability and genetic advance provides useful information regarding the nature of inheritance and the effectiveness of selection for quantitative characters (Rajput and Singh, 2003) [18]. Therefore, systematic evaluation of coriander genotypes for variability and inheritance parameters is essential for identifying promising genotypes and traits with greater breeding potential. Hence, the present investigation was undertaken to

assess the genetic variability, heritability and genetic advance for various growth and yield characters in coriander.

Materials and methods

A field experiment was conducted during the summer season of 2025 at the Instructional-cum-Research Farm, Horticulture Section, Rajarshree Chhatrapati Shahu Maharaj Government College of Agriculture, Kolhapur. The study included 25 genotypes of coriander laid out in a Randomized Block Design (RBD) with two replications. Seeds were sown by the line sowing method and observations on 15 characters were recorded from five randomly selected plants in each treatment.

Table 1: Detail of genotypes and check cultivar used in the experiment

Sr.No	Genotype No.	Source	Sr.No	Genotype No.	Source
1	ACKCO -1	Solapur Local	14	ACKCO-14	Shrirampur Local
2	ACKCO -2	Ahilyanagar Local	15	ACKCO-15	Kolhapur Local
3	ACKCO-3	Ghodegaon, Pune	16	ACKCO-16	Phaltan, Satara
4	ACKCO-4	Khed, pune	17	ACKCO-17	Mol, Satara
5	ACKCO-5	Kolar Karnataka	18	ACKCO-18	Bhilawadi Sangli
6	ACKCO-6	Radhanagari, kolhapur	19	ACKCO-19	Karad, Satara
7	ACKCO-7	Bagalkot, Karnataka	20	ACKCO-20	Sangamner Local
8	ACKCO-8	Rajasthan	21	ACKCO-21	Junner, pune
9	ACKCO-9	Dharur, Beed	22	ACKCO-22	Hupari, Kolhapur
10	ACKCO-10	Shirala, Sangali	23	ACKCO-23	Nashik, local
11	ACKCO-11	Songaon, Rahuri	24	ACKCO-24	Solapur Local
12	ACKCO-12	Dahiwadi, Satara	25	Kokan Kasturi	BSKKV, Dapoli
13	ACKCO-13	Dhule Local			

Result and discussion

The results of the present experiment carried out with 25 genotypes of coriander (*Coriandrum sativum*) to assess the genetic variability among yield and its component traits are presented under the following headings.

Analysis of Variance

The significance of variation was tested using the F-test. The results of the ANOVA, including mean sum of squares due to replication, treatment and error for all 15 characters, are presented in Table 2. The analysis of variance (ANOVA) showed highly significant variation amongst the 25

genotypes of the Coriander on all characters evaluated. There was highly significant variation for characters like yield per hectare (123.98), followed by number of leaves at harvest (26.83), days to harvest (22.29), length of main stem (17.57), plant height at harvest (13.60), number of branches per plant (12.15), days to germination (2.15), leaf length (1.16), stem girth (0.96), leaf/stem ratio (0.94), fresh weight at harvest (0.77), yield per plot (0.45), foliage yield (0.34), and chlorophyll content (0.10). The significant differences observed among the genotypes for all the traits indicate ample scope for effective selection and genetic improvement in coriander.

Table 2: Analysis of variance for different parameters in Coriander genotypes

Sr. No.	Parameters	Mean sum of square		
		Replication df=1	Treatment df=24	Error df =24
1	Days to 50% germination	2.8800	2.1467**	0.7967
2	Total plant height (at harvest) (cm)	36.6900**	13.6050**	4.3148
3	Length of main stem (cm)	2.7051	17.5700***	2.6492
4	Leaf length (cm)	0.3872	1.1620***	0.1043
5	No. of leaves (at harvest)	0.3698	26.8373***	1.7973
6	No. of branches per plant (at harvest)	1.9960	12.1577***	0.5185
7	Stem girth (mm)	0.0029	0.9621***	0.0473
8	Leaf/Stem ratio	0.0110	0.9376***	0.0320
9	Days to harvest	5.1200	22.2917***	5.5783
10	Foliage yield (gm)	0.1590*	0.3408***	0.0245
11	Fresh weight at harvest (gm)	0.0001	0.7753***	0.0770
12	Yield per plot (kg)	0.3117	0.4463***	0.0751
13	Yield per hectare (q)	86.5930	123.9820***	20.8698
14	Chlorophyll content (%)	0.0005	0.1021***	0.0033
15	Moisture (%)	0.1458	0.0067	3.7908

*:-Significant at 5% level ($P \leq 0.05$) **:-Highly significant at 1% level ($P \leq 0.01$)

Parameters of Genetic Variability

Various genetic variability parameters, including the range of variation, variance components, estimates of genotypic coefficients of variation (GCV) and phenotypic coefficients of variation (PCV), broad-sense heritability, genetic advance (GA) and expected genetic advance as a percentage of the mean, were estimated and are summarized in Table 3. Assessment of variability forms the basis of a successful breeding programme aimed at improving yield and quality attributes. Hence, estimation of genotypic and phenotypic coefficients of variation is necessary to understand the nature and magnitude of variation.

Coefficients of Variation

Genotypic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV) are important measures used to assess the magnitude of variability present in a population. Estimates of PCV, GCV and heritability help predict the effectiveness of selection and the expected genetic improvement in a trait.

High values of both the genotypic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV) were observed for leaf/stem ratio (GCV = 42.10% and PCV = 43.56%), number of branches (GCV = 29.84% and PCV = 31.14%), stem girth (GCV = 26.22% and PCV = 27.54%), foliage yield (GCV = 21.50% and PCV = 23.11%), and fresh weight at harvest (GCV = 20.65% and PCV = 22.82%). The high estimates of GCV and PCV for these traits reflect the presence of considerable genetic variability among the genotypes, indicating ample scope for their improvement through effective selection in a breeding programme. The present findings are consistent with the reports of Shiwangi *et al.* (2020) for leaf/stem ratio, number of branches, and fresh weight at harvest; Meena *et al.* (2023) Kharat *et al.* (2019) for number of branches; Thanusha and Mohanakshmi (2026), Chandrakala *et al.* (2024) and Thakur *et al.* (2018) for fresh weight at harvest, leaf/stem ratio [6, 9, 14, 20, 21, 22].

Moderate estimates of both the genotypic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV) were recorded for leaf length (GCV = 19.10% and PCV = 20.89%), number of leaves at harvest (GCV = 16.00% and PCV = 17.11%), yield per plot (GCV = 15.27% and PCV = 18.10%), yield per hectare (GCV = 15.27% and PCV = 18.10%), length of main stem (GCV = 12.80% and PCV = 14.91%), and chlorophyll content (GCV = 11.11% and PCV = 11.48%). The moderate magnitude of variation observed for these traits indicates the presence of appreciable genetic variability, suggesting that improvement through selection is possible, although the selection response may be comparatively less pronounced than that of traits exhibiting high GCV and PCV values.

In the present investigation, PCV values were higher than the corresponding GCV values for all the traits studied, indicating the influence of both genetic and environmental factors on trait expression. The findings of the present

investigation are in close agreement with those reported by Dhakad *et al.* (2017) and Meena *et al.* (2014) for chlorophyll content; Thanusha and Mohanakshmi (2026) for number of leaves at harvest and foliage yield; Chandrakala *et al.* (2024) for number of leaves at harvest and fresh weight at harvest; Thakur *et al.* (2018) for foliage yield; and Kharat *et al.* (2019) for leaf length, number of leaves at harvest, foliage yield, chlorophyll content, and length of main stem, indicating the presence of substantial genetic variability and greater scope for effective selection [6, 8, 9, 14, 21].

Heritability (Broad Sense)

The coefficient of variation indicates the extent of variability among genotypes, whereas heritability assesses the effectiveness of selection. When considered together with genetic advance, heritability provides a reliable estimate of the potential for genetic improvement through selection. Broad-sense heritability is particularly useful for identifying superior genotypes in breeding.

High broad-sense heritability was recorded for chlorophyll content (93.74%), leaf/stem ratio (93.40%), number of branches per plant at harvest (91.82%), stem girth (90.63%), number of leaves at harvest (87.45%), foliage yield (86.59%), leaf length (83.53%), fresh weight at harvest (81.93%), length of main stem (73.80%), yield per plot (71.19%) and yield per hectare (71.19%). The high heritability estimates observed for these traits indicate that their expression was predominantly controlled by genetic factors, with relatively less influence of the environment. Consequently, these characters are expected to respond effectively to selection and can be utilized efficiently in crop improvement programmes. Moderate heritability was observed for days to harvest (59.97%), total plant height at harvest (51.84%), and days to 50 per cent germination (45.87%).

The findings of the present investigation are in close agreement with those reported by Kharat *et al.* (2019) for days to 50 per cent germination, plant height, leaf length, number of branches per plant at harvest, and foliage yield; Chandrakala *et al.* (2024) for number of leaves at harvest, chlorophyll content, days to harvest, and fresh weight at harvest; Thakur *et al.* (2018) for stem girth, number of leaves at harvest, fresh weight at harvest, leaf/stem ratio, yield per plot, and yield per hectare; Shiwangi *et al.* (2020) for number of branches per plant at harvest, number of leaves at harvest, fresh weight at harvest, foliage yield, yield per plot, and chlorophyll content; Thanusha and Mohanakshmi (2026) for number of branches per plant at harvest, number of leaves at harvest, foliage yield, and fresh weight at harvest; and Rajamanickam *et al.* (2022) for days to 50 per cent germination, number of branches per plant at harvest, number of leaves at harvest, and fresh weight at harvest. These authors also reported low to high estimates of heritability in coriander, which supports the findings of the present investigation [6, 9, 17, 20, 21, 22].

Table 3: Different Parameters of Variability in Coriander

Sr. No	Characters	Mean	Range		GCV (%)	PCV (%)	Heritability (B. S.) %	Genetic advance	Genetic advance as% of mean
			Min	Max					
1	Days to 50% germination	11.64	9.00	15.00	7.0583	10.4221	45.87	1.1462	9.8471
2	Total plant height (at harvest) (cm)	24.2890	19.09	31.90	8.8736	12.3239	51.84	3.1969	13.1619

3	Length of main stem (cm)	21.3314	16.90	28.80	12.8045	14.9055	73.80	4.8335	22.6591
4	Leaf length (cm)	3.8080	2.00	5.40	19.0963	20.8948	83.53	1.3691	35.9530
5	No. of leaves (at harvest)	22.1140	11.80	31.10	16.0005	17.1105	87.45	6.8162	30.8230
6	No. of branches per plant (at harvest)	8.0838	4.60	13.60	29.8422	31.1433	91.82	4.7619	58.9067
7	Stem girth (mm)	2.5796	1.20	3.90	26.2178	27.5400	90.63	1.3263	51.4149
8	Leaf/Stem ratio	1.5984	0.80	4.61	42.0986	43.5608	93.40	1.3397	83.8151
9	Days to harvest	39.2000	30.00	45.00	7.3745	9.5229	59.97	4.6116	11.7643
10	Foliage yield (gm)	1.8496	0.90	2.95	21.5043	23.1095	86.59	0.7624	41.2197
11	Fresh weight at harvest (gm)	2.8608	1.27	4.44	20.6532	22.8175	81.93	1.1017	38.5102
12	Yield per plot (kg)	2.8207	1.7900	4.2130	15.2734	18.1016	71.19	0.7488	26.5468
13	Yield per hectare (q)	47.0113	29.8333	70.2167	15.2734	18.1016	71.19	0.7488	26.5468
14	Chlorophyll content (%)	1.9999	1.6650	2.4550	11.1136	11.4788	93.74	0.4433	22.1661
15	Moisture (%)	86.48	85.05	87.93	0.0000*	1.5934	0.00*	0.0000*	0.0000*

GCV - Genotypic Coefficient of Variation PCV - Phenotypic Coefficient of Variation

Genetic Advance as Per cent of mean

Genetic advance represents the expected improvement in the mean performance of a population following selection. While heritability indicates the proportion of variation attributable to genetic factors, it alone does not predict the magnitude of genetic gain. Therefore, heritability, when considered along with genetic advance, provides a more reliable measure of the effectiveness of selection. Estimation of genetic advance helps in assessing the potential improvement achievable for different traits. According to Johnson *et al.* (1955), genetic advance as per cent of mean is classified as low (below 10%), moderate (10-20%) and high (above 20%).

Genetic advance as per cent of mean ranged in low to high range from 0.00% to 83.82% for moisture content and leaf/stem ratio. High estimates of genetic advance as a percentage of the mean were recorded for leaf/stem ratio (83.82%), number of branches per plant at harvest (58.91%), stem girth (51.41%), foliage yield (41.22%), fresh weight at harvest (38.51%), leaf length (35.95%), number of leaves at harvest (30.82%), yield per plot (26.55%), yield per hectare (26.55%), length of main stem (22.66%), and chlorophyll content (22.17%). The high genetic advance observed for these characters, together with their high heritability estimates, indicates the predominance of additive gene action and suggests that substantial improvement can be achieved through simple phenotypic selection.

The findings of the present investigation are in close agreement with those reported by Meena *et al.* (2014) for chlorophyll content; Kharat *et al.* (2019) for number of leaves at harvest, leaf length, length of main stem, number of branches per plant at harvest, and foliage yield; Chandrakala *et al.* (2024) for number of leaves at harvest, number of branches per plant at harvest, and fresh weight at harvest; Thakur *et al.* (2018) for stem girth, number of leaves at harvest, fresh weight at harvest, foliage yield, and leaf/stem ratio; Shiwangi *et al.* (2020) for number of branches per plant at harvest, stem diameter, fresh weight at harvest, leaf weight, and leaf/stem ratio; and Thanusha and Mohanalakshmi (2026) for number of leaves at harvest, fresh weight at harvest, fresh plant weight, and herbage yield^[9, 14, 20, 21].

Moderate estimates of genetic advance as a percentage of the mean were observed for total plant height at harvest (13.16%) and days to harvest (11.76%). These traits are likely to be influenced by both additive and non-additive gene effects; therefore, moderate progress may be expected through selection. The findings of the present investigation are in close agreement with those reported by Kharat *et al.* (2019) for plant height; Thanusha and Mohanalakshmi (2026) for plant height and days to harvest; Lokesh *et al.* (2026) for plant height; and Rajamanickam *et al.* (2022)^[9, 11, 17, 22] for days to germination and number of branches per plant at harvest.

Table 4: Mean Performance of different growth and yield parameters in Coriander

Characters/Genotypes	Days to 50% Germination	Plant Height (cm)	Length of main stem (cm)	Leaf Length (cm)	No. of Leaves (at harvest)	No. of Branches	Stem Girth (mm)	Leaf Stem Ratio
ACKCO-1	12.50	23.58	19.65	3.70	22.60	6.80	2.45	1.24
ACKCO-2	11.50	23.33	21.29	4.10	21.50	9.03	2.60	1.37
ACKCO-3	14.00	23.58	19.60	3.40	21.00	6.20	2.60	1.23
ACKCO-4	11.50	23.65	20.35	3.20	20.50	7.60	2.45	0.99
ACKCO-5	13.00	23.23	19.55	3.80	20.50	8.50	3.05	1.55
ACKCO-6	11.50	30.63	28.20	5.30	30.00	12.50	3.60	1.76
ACKCO-7	10.50	22.29	21.20	3.00	22.30	5.50	2.45	1.97
ACKCO-8	10.00	22.79	18.10	3.50	19.40	6.60	1.35	1.70
ACKCO-9	10.50	21.51	17.10	3.50	18.75	4.95	1.45	1.63
ACKCO-10	11.00	21.82	20.05	3.50	12.10	6.60	2.60	1.27
ACKCO-11	11.50	24.90	22.95	4.80	23.95	12.05	3.25	2.17
ACKCO-12	10.00	23.17	17.40	3.50	21.20	8.20	1.70	2.05

ACKCO-13	12.50	23.85	21.90	4.55	23.65	9.10	3.10	1.54
ACKCO-14	11.00	22.51	18.65	3.40	23.00	5.70	1.30	1.31
ACKCO-15	12.00	29.78	26.70	5.25	28.05	12.60	3.60	0.86
ACKCO-16	12.00	23.43	19.55	3.90	20.50	5.60	2.05	1.33
ACKCO-17	12.00	22.48	20.50	3.55	21.50	6.55	2.80	1.02
ACKCO-18	12.50	20.65	19.18	3.40	22.50	8.20	3.00	2.10
ACKCO-19	11.00	25.01	22.18	3.95	18.20	6.50	2.30	4.30
ACKCO-20	10.00	24.28	22.20	2.75	23.50	5.60	2.35	1.49
ACKCO-21	13.50	29.13	26.88	4.90	27.80	12.50	3.55	2.24
ACKCO-22	12.00	23.24	20.85	3.45	19.70	8.20	1.84	0.90
ACKCO-23	11.50	23.82	20.55	3.80	20.70	7.55	2.40	1.37
ACKCO-24	11.50	28.65	26.53	4.80	27.65	12.35	3.35	1.27
Konkan Kasturi (C)	12.00	25.98	22.20	2.20	22.30	7.12	3.30	1.30
Mean	11.64	24.29	21.33	3.81	22.11	8.08	2.58	1.60
SE(m) ±	0.63	1.47	1.15	0.23	0.95	0.51	0.15	0.13
C.D. @5%	1.84	4.29	3.36	0.67	2.77	1.49	0.45	0.37
C.V. (%)	7.67	8.55	7.63	8.48	6.06	8.91	8.43	11.18

Characters/Genotypes	Days to Harvest	Foliage Yield (g)	Fresh Weight / Plant (g)	Yield / Plot (kg)	Yield / Ha (q)	Moisture (%)	Chlorophyll content Mg /g
ACKCO-1	37.00	1.56	2.58	3.06	50.97	86.40	1.70
ACKCO-2	41.50	1.69	2.81	2.41	40.22	86.48	1.91
ACKCO-3	44.00	1.77	2.77	2.67	44.50	86.44	1.78
ACKCO-4	43.50	1.66	2.73	2.90	48.25	86.46	1.82
ACKCO-5	43.50	1.71	2.62	3.09	51.47	86.48	1.86
ACKCO-6	36.50	2.85	4.16	2.71	45.10	86.50	1.90
ACKCO-7	41.50	1.74	2.47	2.58	42.97	86.52	1.94
ACKCO-8	40.50	1.69	2.51	2.75	45.75	86.54	1.98
ACKCO-9	36.50	0.95	1.35	2.21	36.80	86.56	2.02
ACKCO-10	42.50	2.25	3.05	1.93	32.15	86.58	2.06
ACKCO-11	35.00	1.84	3.48	2.51	41.75	86.40	2.10
ACKCO-12	41.00	1.72	2.33	3.51	58.45	86.42	2.14
ACKCO-13	44.00	1.88	3.12	2.85	47.52	86.44	2.18
ACKCO-14	36.50	1.65	2.52	3.26	54.25	86.46	2.22
ACKCO-15	37.00	2.78	3.96	3.00	49.97	86.48	2.26
ACKCO-16	43.00	1.72	2.79	2.40	40.00	86.50	2.30
ACKCO-17	37.00	2.39	2.92	3.26	54.30	86.52	2.34
ACKCO-18	39.50	1.83	2.23	3.93	65.50	86.54	2.38
ACKCO-19	36.00	1.53	2.26	2.15	35.83	86.56	2.42
ACKCO-20	33.00	1.73	2.69	2.92	48.65	86.58	1.71
ACKCO-21	39.50	2.52	3.72	3.44	57.27	86.40	1.75
ACKCO-22	37.50	1.85	2.58	2.71	45.13	86.42	1.79
ACKCO-23	41.50	1.75	2.64	2.18	36.32	86.44	1.83
ACKCO-24	39.00	1.62	3.60	3.15	52.42	86.46	1.87
Konkan Kasturi (C)	33.50	1.59	3.63	2.99	49.77	86.42	1.74
Mean	39.20	1.85	2.86	2.82	47.01	86.48	2.00
SE(m) ±	1.67	0.11	0.20	0.19	3.23	1.38	0.04
C.D. @5%	4.88	0.32	0.57	0.57	9.43	4.02	0.12
C.V. (%)	6.03	8.45	9.70	9.72	9.72	2.25	2.89

Conclusion: The present investigation revealed substantial genetic variability among the 25 coriander genotypes evaluated, indicating considerable scope for genetic improvement through selection. Genotype ACKCO-6 emerged as the most promising for major vegetative and yield traits, while ACKCO-15, ACKCO-21, ACKCO-24 and ACKCO-18 also exhibited desirable performance. High estimates of variability, heritability and genetic advance for leaf/stem ratio, number of branches, stem girth, foliage yield, fresh weight per plant, leaf length, number of leaves, main stem length, yield per plot, yield per hectare and chlorophyll content indicated the effectiveness of direct selection for these traits.

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