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Herbage yield and growth characters association studies in coriander (*Coriandrum sativum* L)

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Abstract
Coriander is a crop of significant nutritional as well as medicinal value, due to its wide adoptability it could be cultivated under a wide range of environmental conditions. The existence of wide range of genetic variability in a coriander population for economically important characters enables the improvement of crop in the desirable direction. Correlation coefficient studies reveals the relationship between various characters and also provides the way to know the association prevailing between highly heritable characters with most economic characters. In this line the present study was undertaken in coriander to understand the relationship between the herbage yield and it component characters. A field experimentation was laid out at Horticulture Research Station, Devihosur, Haveri District, Karnataka, in Randomized Complete Block Design (RCBD) for sixty one Devihosuru Coriander Collections (DCC) -1 to DCC-61 including DWR-1 and Ajjampura in two replication. Observation on herbage yield and its associated parameters were studied viz Plant height (cm), Number of primary branches, Number of secondary branches, Number of leaves, Fresh weight of the plant (g) Dry weight of the plant (g), Herbage yield (g), Days to 50% flowering, Number of umbels per plant, Number of umbellets per umbel, Number of seeds per umbellet, 1000 seed weight (g), Seed yield per plant (g), Days to maturity, Harvest index (%). were recorded. The analysis of variance revealed highly significant difference among genotypes for twenty eight characters. Genotypic correlations were higher than phenotypic correlations indicating highly heritable nature of the character like seed yield per plant showed highly significant and positive correlation with number of leaves at 60 DAS, fresh weight of the plant at 60 DAS, number of umbels per plant at 60 DAS, number of seeds per umbellet at 60 DAS, thousand seed weight and crop duration both at genotypic and phenotypic level whereas, number of primary branches at 60 DAS, showed significant and positive correlation at genotypic level only, Since, these association characters are in the desirable direction, selection for these traits may improve the yield per plant.

Keywords: coriander, genotypes, heritability, herbage yield, correlation studies

Introduction
Coriander commonly known as "Dhania" (*Coriandrum sativum* L.) belongs to family Apiaceae. Coriander fruits are an important spice of many countries of Europe, Northern Africa, West, Central and South Asia. In the Mediterranean region, coriander cultivation dates back to ancient Egypt; In Europe, coriander is known since the Middle Ages. It has got acclimatized and accumulated considerable diversity and variation in vegetative, reproductive characters over the years but still the average yield of coriander is less due to non availability of region specific genotypes. As our knowledge the phenotypic variability is a measure of variability arises due to genotype, environment and their interaction. The determination of genetic variability and partitioning it into heritable and non-heritable components is necessary to have an insight on genetic nature of yield and its yield components. Therefore the effective selection and utilization of genotypes in the breeding programme, with knowledge of genetic variability, heritability and genetic advance and character association is very important. Heritability refers to the degree to which variability for a character is transmitted to the progeny. The heritable variation is masked by non-heritable components. Hence, it is necessary to split the overall variability into heritable and non-heritable variation using genetic parameters. Thus, heritability is the heritable proportion of phenotypic variance. Genetic advance under selection is the improvement in the mean genotypic value of selected plants over parental population which depends upon the genetic variability present in the population, heritability of the characters and the intensity of selection. Heritability estimates may not provide clear predictability of the breeding value. Therefore, estimation of heritability accompanied with genetic advance are generally more useful than heritability alone in

prediction of the resultant effect, for selecting the best individuals. This is due to the fact that a character having high heritability may have very less phenotypic variation thus, leading to low genetic advance but, in the presence of additive gene effects high genetic advance can be expected. Very limited scientific information is available on all these aspects in the crop coriander even though the crop has great potential for commercial production. Therefore the present investigation was carried out to understand the extent of variability, character association, heritability, genetic advance present in the coriander crop.

Material and Methods

In the present investigation the field experiment was carried out at Horticulture Research Station, Devihosur, Haveri District, Karnataka, in Randomized Complete Block Design (RCBD) for 61 Genotypes in 2 replications. The experimental materials were collected from Horticulture Research Station Devihosur, Haveri District. viz DCC-1 (Devihosuru Coriander Collections) to DCC-61 including DWR-1 and Ajjampura and which were subjected for evaluation by following the recommended package of practices of UHS, Bagalkot. Observation on various growth an herbage yield related parameters viz Plant height (cm), Number of primary branches, Number of secondary branches, Number of leaves, Fresh weight of the plant (g) Dry weight of the plant (g), Herbage yield (g), Days to 50% flowering, Number of umbels per plant, Number of umbellets per umbel, Number of seeds per umbellet, 1000 seed weight (g), Seed yield per plant (g), Days to maturity, Harvest index (%). were recorded and subjected for analysis as per the Fishers method of ANOVA for drawing the conclusion.

Results and Discussion

In the present investigation, the genotypic correlation is higher than phenotypic correlations for all the characters, indicating little influence of environment and the presence of inherent association between various characters. Similar results are reported by Singh *et al.* (2005) [13], Abhay *et al.* (2011) [1] in coriander and fenugreek. Yield is a complex character governed by a large number of genes. The influence of each character on yield could be known through correlation studies with a view to determinate the extent and nature of relationships prevailing among yield and yield attributing characters. In all the instances however, more reliance may be placed on the genotypic correlations. Seed yield per plant showed highly significant and positive correlation with plant height, number of primary and secondary branches, number of leaves, fresh weight of the plant, days to fifty per cent flowering, number of umbels per plant and thousand seed weight at both genotypic and phenotypic levels. Since, these association characters are in the desirable direction, selection for these traits may improve the yield per plant. Similar results are reported by Dhirendra singh *et al.* (2006) [3], Kole and Mishra (2006).

Plant height showed positive significant correlation with number of primary branches per plant and number of umbels per plant. These findings were reported earlier by Sharma and Bhati, (1988) [11] and Giridhar and Sarada (2005) [5] in coriander. The trait number of primary and secondary branches at 60 DAS was observed to have positive significant correlation with number of leaves at 60 DAS, fresh weight of the plant at 60 DAS, dry weight of the plant at 60 DAS, number of umbels per plant, number of umbellets per umbel, days to crop maturity. Similar results were reported by Eshwarareddy *et al.* (1988) [4], Dhirendra Singh *et al.* (2006) [3], Vedamuthu and Rajan (1990) [15] and Vijayalatha and Chezhiyan (2002) [17] in coriander. Further, fresh and dry weight of the plant at 60 DAS showed highly significant and positive correlation with, number of umbels per plant at 60 DAS, herbage yield, harvest index, seed yield per plant and seed yield per hectare at both genotypic and phenotypic levels. Whereas, highly significant and positive association was noticed with thousand seed weight at genotypic level only. Similar results were reported in coriander by Singh *et al.* (2008) [14], Singh *et al.* (2005) [13] and Palanikumar *et al.* (2012) [9].

Number of umbels per plant showed highly significant and positive association with crop duration and seed yield per hectare and also seed yield per plant. Whereas, number of umbellet per umbel recorded high significant and positive association with crop duration of the plant and number of seeds per umbellet. Number of umbellets per umbel showed highly significant and positive correlation with thousand seed weight and seed yield per plant at both genotypic and phenotypic levels. Similar effects were explained by Prabhu and Balakrishnamurthy (2006) [10], Giridhar and sarada (2005) [5], vedamuthu and Rajan (1990) [15], Beement mengesha and Getinealemaus (2010) [2], Singh *et al.* (2008) [14], Kailashchandra *et al.* (2000) [6] in coriander and fenugreek. Days to fifty per cent flowering showed highly significant and negative correlation with number of umbellets per at 60 DAS and number of seeds per umbellet at 60 DAS at both genotypic and phenotypic levels. Similar results were reported in coriander by Dhirendra singh *et al.* (2006) [3] and Singh *et al.* (2005) [13]. Days taken to seed maturity showed significant and positive association with seed yield per plant and seed yield per hectare. Whereas, harvest index showed positive significant correlation with seed yield per plant and seed yield per hectare. Since, there is a positive correlation among these component traits, the selection aimed for improvement of any traits shall automatically influence other character in desirable direction. Similar results in coriander reported by Vedamuthu and Rajan (1990) [15], Maurya (1989) [8], Shridhar (1989) and Velayudham (2004).

Number of seeds per umbellet showed highly significant and positive correlation with thousand seed weight at both genotypic and phenotypic levels. Similar results are reported by Singh *et al.* (2005) [13] in coriander. Thousand seed weight showed highly significant and positive correlation with seed yield per plant and seed yield per hectare at both genotypic and phenotypic levels. Similar results are reported by Singh *et al.* (2008) [14] in coriander. Crop duration showed highly significant and positive correlation with harvest index at both genotypic and phenotypic level. Whereas seed yield per hectare showed highly significant and positive association with seed yield per plant at both phenotypic and genotypic levels. Similar results are reported by Singh *et al.* (2008) [14], Abhay *et al.* (2011) [1] in coriander and fenugreek.

Table 1: ANOVA for morphometric traits and yield attributes in coriander genotypes

S. No.	Source of variance	Replication	Treatment	Error
1	Plant height (30 DAS)	0.26	0.11NS	0.21
2	Plant height (45 DAS)	0.60	0.27**	0.23
3	Plant height (60 DAS)	0.21	0.85**	0.23
4	Number of primary branches (30 DAS)	0.23	0.20NS	0.27
5	Number of primary branches (45 DAS)	0.72	0.15**	0.20
6	Number of primary branches (60 DAS)	0.51	0.31**	0.25
7	Number of secondary branches (30 DAS)	0.16	0.30NS	0.33
8	Number of secondary branches (45 DAS)	0.19	0.92**	0.20
9	Number of secondary branches (60 DAS)	0.20	0.22**	0.55
10	Number of leaves (30 DAS)	0.62	0.16**	0.59
11	Number of leaves (45 DAS)	0.10	0.25**	0.91
12	Number of leaves (60 DAS)	0.53	0.36**	0.14
13	Fresh weight of the plant (45 DAS)	0.14	0.10**	0.49
14	Fresh weight of the plant (60 DAS)	0.17	0.10**	0.57
15	Fresh weight of the plant (at harvest)	0.40	0.70**	0.26
16	Dry weight of the plant (45 DAS)	0.49	0.28**	0.23
17	Dry weight of the plant (60 DAS)	0.20	0.34**	0.28
18	Dry weight of the plant (at harvest)	0.61	0.56**	0.25
19	Herbage yield	0.23	0.12**	0.81
20	Days to 50% flowering	0.51	0.81**	0.35
21	Number of umbels per plant (60 DAS)	0.13	0.98**	0.56
22	Number of umbels per plant (at harvest)	0.63	0.60**	0.12
23	Number of umbellets per umbel (60 DAS)	0.29	0.13**	0.14
24	Number of umbellets per umbel(at harvest)	0.14	0.97**	0.45
25	Number of seeds per umbellet (60 DAS)	0.47	0.15**	0.26
26	Number of seeds per umbellet (at harvest)	0.59	0.49**	0.37
27	1000 seed weight	0.22	0.62**	0.64
28	Seed yield per plant	0.11	0.31**	0.10
29	Seed yield per ha	0.11	0.42**	0.22
30	Days to maturity	0.85	0.22**	0.97
31	Harvest index	0.76	0.20**	0.87

*-Significant at 5% level, **- Significant at 1% level
NS=Non significant, DAS =Days after sowing

Table 2: Phenotypic correlation coefficients among quantitative characters in coriander genotypes

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0.044	-0.143	0.064	0.062	-0.195*	0.077	0.109	0.064	-0.074	-0.077	-0.100	0.083	0.089	0.084	0.074
2		1	-0.192*	0.280**	0.279**	-0.251**	-0.099	0.154	0.068	-0.093	-0.029	-0.169*	0.134	0.144	0.026	-0.031
3			1	-0.406**	-0.292**	0.554**	0.119	-0.443**	-0.202*	0.340**	0.283**	0.432**	-0.386**	-0.376**	-0.160	-0.268**
4				1	0.522**	-0.642**	-0.175*	0.579**	0.460**	-0.243**	-0.260**	-0.573**	0.427**	0.393**	0.227**	0.302**
5					1	-0.611**	-0.130	0.561**	0.350**	-0.196*	-0.188*	-0.590**	0.473**	0.517**	0.311**	0.443**
6						1	0.248**	-0.717**	-0.485**	0.305**	0.304**	0.677**	-0.553**	-0.554**	-0.368**	-0.446**
7							1	-0.104	-0.125	0.117	0.254**	0.099	-0.007	-0.040	0.004	0.073
8								1	0.586**	-0.313**	-0.295**	-0.831**	0.681**	0.697**	0.453**	0.506**
9									1	-0.242**	-0.112	-0.642**	0.472**	0.463**	0.305**	0.380**
10										1	0.184*	0.242**	-0.210*	-0.185*	-0.122	-0.087
11											1	0.260**	-0.185*	-0.133	-0.089	-0.066
12												1	-0.793**	-0.789**	0.545**	0.625**
13													1	0.859**	0.605**	0.668**
14														1	0.660**	0.672**
15															1	0.605**
16																1

*Significant at 5 per cent **Significant at 1 per cent, ±Table 'r' at 5% 0.171 at 1% 0.223

1. Plant height (60 DAS), 7. Herbage yield (green), 13. Crop duration
2. No. of primary branches/ plant (60 DAS) 8. Days to fifty per cent flowering, 14. Harvest index
3. No. of secondary branches/ plant (60 DAS), 9. No. of umbels per plant (60 DAS), 15. Seed yield /ha
4. No. of leaves/plant (60 DAS), 10. No. of umbellets per umbel (60 DAS), 16. Seed yield /plant
5. Fresh weight of the plant (60 DAS), 11. No. of seeds per umbellet (60 DAS)
6. Dry weight of the plant (60 DAS), 12. 1000 seed weight

Table 3: Genotypic correlation coefficients among quantitative characters in coriander genotypes

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0.936**	-0.574**	0.999**	0.002	-0.562**	0.915**	0.421**	0.189*	-0.367**	-0.513**	-0.346**	0.269**	0.096	0.262**	-0.117
2		1	0.519**	0.681**	0.785**	-0.977**	-0.081	0.779**	0.440**	0.612**	0.213*	-0.613**	0.485**	0.277**	0.486**	0.392**
3			1	-0.679**	-0.494**	0.696**	0.528**	-0.642**	-0.277**	0.646**	0.377**	0.525**	-0.459**	-0.540**	-0.228**	-0.415**
4				1	0.950**	-0.943**	-0.991**	0.951**	0.679**	-0.908**	-0.412**	-0.810**	0.633**	0.728**	0.530**	0.646**

5				1	-0.784**	-0.839**	0.801**	0.529**	-0.489**	-0.386**	-0.769**	0.626**	0.720**	0.714**	0.566**
6					1	0.720**	-0.854**	-0.505**	0.659**	0.387**	0.685**	-0.575**	-0.632**	-0.479**	-0.577**
7						1	-0.493**	-0.247**	0.421**	0.624**	0.275**	-0.013	0.035	0.408**	0.010
8							1	0.762**	-0.903**	-0.495**	-0.985**	0.842**	0.875**	0.643**	0.827**
9								1	-0.361**	-0.142	-0.672**	0.502**	0.563**	0.345**	0.549**
10									1	0.790**	0.486**	-0.358**	-0.440**	-0.301**	-0.435**
11										1	0.328**	-0.288**	-0.232**	-0.064	-0.238**
12											1	-0.812**	-0.903**	0.672**	0.828**
13												1	0.902**	0.758**	0.928**
14													1	0.934**	0.922**
15														1	0.977**
16															1

*Significant at 5 per cent, **Significant at 1 per cent, ±Table 'r' at 5% 0.171 at 1% 0.223

1. Plant height (60 DAS) 7. Herbage yield (green) 13. Crop duration
2. No. of primary branches/ plant (60 DAS) 8. Days to fifty per cent flowering 14. Harvest index
3. No. of secondary branches/ plant (60 DAS) 9. No. of umbels per plant (60 DAS) 15. Seed yield/ha
4. No. of leaves/ plant (60 DAS) 10. No. of umbellets per umbel (60 DAS) 16. Seed yield/plant
5. Fresh weight of the plant (60 DAS) 11. No. of seeds per umbellet (60 DAS)
6. Dry weight of the plant (60 DAS) 12. 1000 seed weight

Summary

Genotypic correlations were higher than phenotypic correlations indicating highly heritable nature of the character like seed yield per plant showed highly significant and positive correlation with number of leaves at 60 DAS, fresh weight of the plant at 60 DAS, number of umbels per plant at 60 DAS, number of seeds per umbellet at 60 DAS, thousand seed weight and crop duration both at genotypic and phenotypic level whereas, number of primary branches at 60 DAS, showed significant and positive correlation at genotypic level only, Since, these association characters are in the desirable direction, selection for these traits may improve the yield per plant. Among 61 genotypes evaluated for different growth and yield contributing traits, the genotypes DCC 28, DCC 38, DCC 42, DCC 47, DCC 57 and DCC 5 were found promising in both herbage and seed yield under transitional zone of Karnataka. These were found to be best genotypes for multiple traits so these can be used as parents for future breeding programme.

References

1. Abhay Dashora, Maloo SR, Dashora LK. Variability, correlation and path coefficient analysis in fenugreek (*Trigonella foenum graecum* L.) under water limited conditions. J Spices and Arom. Crops. 2011; 20(1):38-42.
2. Beement Mengesha, Getine Alemaus. Variability in ethiopian coriander accessions for agronomic quality traits. African Crop Science J. 2010; 18(2):43-49.
3. Dhirendra Singh, Jain SK, Rajput SS, Khandewal V, Shiva KN. Genetic variation for seed yield and its components and their association in coriander (*Coriandrum sativum* L.) germplasm. J Spice and Aromatic Crops. 2006; 15(1):25-29.
4. Easwarareddy S, Venkateswarlu K, Narayanareddy Y. Studies on the sowing time and efficacy of certain coriander cultivars in biomass production. Indian Cocoa, Arecanut and Spices J. 1988; 11(3):110-112.
5. Giridhar K, Sarada C. Identification of coriander (*Coriandrum sativum* L.) genotypes for vertisols of Andhra Pradesh. Nat. Symp. Cur. Trends in Onion, Garlic, Chillies and Seed Spices-Production, Marketing and Utilization, SYMSAC-II, 25-27 November, NRCOG, Rajgurunagar, 2005, 92.
6. Kailashchandra DSEV, Singh D. Genetic variation and character association of seed yield and its component characters in fenugreek. Agri. Sci. Digest. 2000; 20(2):93-95.
7. Kole ABPC. Genetic variability, correlation and path analysis in fenugreek (*Trigonella foenum-graecum* L.). J Spices and Arom. Crops. 2004; 13(1):44-48.
8. Maurya KR. Growth, yield and quality component in coriander genotypes. Indian J Hort. 1989; 46(1):107-110.
9. Palanikumar M, Rajamani K, Muthaiah AR. Correlation studies in coriander (*Coriandrum sativum* L.) genotypes for fresh biomass yield and oil content under different seasons. Crop Res. 2012; 44(1-2):217-221.
10. Prabhu T, Balakrishnamurthy G. Evaluation of coriander (*Coriandrum sativum* L.) accessions under irrigated conditions for growth, yield and quality. Proc. Nat. Sem. Emerging Trends in Production, Quality, Processing and Export of Spices, 28-29 March, Coimbatore, 2006, 13.
11. Sharma RK, Bhati DS. Performance of coriander varieties under irrigated condition. Indian Cocoa, Arecanut and Spices J. 1988; 11(3):96-97.
12. Shridar Sulikeri GS, Madalageri BB. Genetic variability in coriander (*Coriandrum sativum* L.). Karnataka Journal of Agricultural Sciences. 1990; 3(3-4):266-269.
13. Singh SP, Rajendra Prasad, Singh SK. Path co-efficient analysis of seed yield in coriander. International Journal of Agricultural Sciences. 2005; 1(1):58-61.
14. Singh SP, Katiyar RS, Rai SK, Yadav HK, Tripathi SM, Nigam HK *et al*. Studies on genetic variability and character association in coriander (*Coriandrum sativum* L.) grown on sodic soil. J Medicinal and Aromatic Plant Science. 2008; 30(2):164-167.
15. Vedamuthu GB, Rajan FS. Yield components in coriander (*Coriandrum sativum* L.). South Indian Hort. 1990; 37(5):287-290.
16. Velayudham A, Hanamshetti SI, Madalgeri MB, Wali MC. Evaluation of coriander genotypes during 2003-04 kharif and rabi seasons. Proc. Nat. Sem. Emerging Trends in Production, Quality, Processing and Export of Spices, 28-29 March, Coimbatore, 2006, 11.
17. Vijayalatha KR, Chezhiyan N. Correlation and path analysis studies in coriander (*Coriandrum sativum* L.). South Indian Hort. 2002; 52(1-6):248-251.