Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.7376

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **7 (2):** 113-118 (2019)

International Journal of Pure & Applied Bioscience

Research Article

OPEN ACCESS

Correlation Study and Path Analysis of Coriander (*Coriandrum sativum* L.) for Yield and Its Attributes in Mid Hills of Uttarakhand

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Received: 20.02.2019 | Revised: 24.03.2019 | Accepted: 1.04.2019

ABSTRACT

Twenty four genotypes of coriander were evaluated in Kharif season 2016 for different horticultural traits. The phenotypic and genotypic coefficients of variation were found moderate for plant height and secondary branches per plant. The moderate genetic gain was observed for primary branches per plant, umbel diameter and fruits per umbel. The phenotypic and genotypic correlation coefficients among different characters showed that seed yield per plant had positive and significant association with test weight, no. of umbel per plant, plant height, no. of fruits per umbel, no. of umbellates per umbel and no. of fruits per umbellate. The path coefficient analysis revealed that maximum positive direct effect towards seed yield per plant was contributed by towards fruits per umbel, umbel per plant, days to 50% flowering, days to first umbel unfolding, test weight and primary branches thereby indicating the importance of these traits for yield improvement in coriander through direct or indirect selection.

Key words: *Coriander, Correlation, Path analysis, Indirect selection and Seed yield.*

INTRODUCTION

Coriander (*Coriandrum sativum* L.) belongs to family Umbelliferae originated from the Mediterranean region. Coriander is a minor seed spice which is grown from temperate to tropical regions of the world. It is one of the important seed spice. Coriander is useful as spice, in a form of curry powder, as in confectionary and in flavouring gin. Economic returns to seed spice growers are high due to more yields per unit area in short growing period. The role of genetic variability in a crop is of paramount importance in selecting the best genotypes for making rapid improvement in yield and related characters as well as to select most potential parents for making the hybridization programme successful. The success of breeding programme depends on the availability of genetic variability present in the available germplasm.

Cite this article: Chauhan, J., Purohit, V.K. and Paliwal, A., Correlation Study and Path Analysis of Coriander (*Coriandrum sativum* L.) for Yield and Its Attributes in Mid Hills of Uttarakhand, *Int. J. Pure App. Biosci.* **7(2):** 113-118 (2019). doi: http://dx.doi.org/10.18782/2320-7051.7376

Since most of the plant characters of economic importance are polygenic in nature and are highly influenced by environment. It is necessary to work out whether the observed. Variability is heritable or due to environment. This suggests the imperative need to work out the phenotypic variation into heritable and non heritable components. The extent of transmission of quantitative characters from parent to off-spring depends upon the heritability of the particular character.

MATERIAL AND METHODS

Field research was conducted at Medicinal and Aromatic Block, Department of Spices, Plantation, Medicinal and Aromatic Plants, College of Horticulture, Bharsar, VCSG Uttarakhand University of Horticulture and Forestry, Bharsar, Pauri Garhwal. The soil of research field was of medium sandy loam with pH of 6.5. Which is located between 29^0 20'-29^0 75' N Latitude and 78^0 10'-78^0 80' E Longitude. the climate of the Bharsar represents the mild summer, higher precipitation and colder or severe cold prolonged winter. The climate factors *i.e.* precipitation, temperature, relative humidity and wind, in association with proximity to Great Himalaya, slope aspects, drainage, vegetation etc. are responsible for the unique micro-climate of this area. A major form of precipitation is rainfall, besides occasional occurrence of dew, hailstorm, fog, frost, snowfall etc. During winter, snowfall is common in this region. During summer months, the valley has hot climate prevailing for few hours in a day. The maximum temperature during May-June is recorded between 30°C-35°C however, nights are cool. December and January are the coldest months; the minimum temperature reaches to 1°C to -4°C. Relative humidity is normally highest during rainy season (July - August), often recorded near to saturation point (92-97%) and it gradually decreases towards December. The healthy seeds of twenty four germplasm lines and one check of coriander seeds directly sown by splitting them in field at row to row distance 30 cm and plant to plant 15 cm in second week of February,2016 where observations on different traits such as Plant height (cm), Number of primary branches per plant, Number of secondary branches per plant, Umbel Diameter (mm), Number of umbels per plant, Number of umbellates per umbel, Number of fruits per umbel, Number of fruits per umbellate, Days to first umbel unfolding, Days to 50 per cent flowering, Maturity duration, Seed yield per plot (g), Seed per plant (g) and Test weight (g) were recorded at different stages of crop. The observation was recorded on 5 plants which were selected at random. The data were analyzed statistically using Principal Component Analysis based on Euclidean Distances. The computation were done by using computer software.

RESULT AND DISCUSSION

The correlation coefficients studies in *Kharif* season among the different traits were worked out at phenotypic and genotypic levels and presented in Table 1.1 and 1.2. In general, the genotypic correlation coefficients were higher in magnitude than phenotypic correlation coefficients. The information on nature and magnitude of correlation coefficients helps breeders to determine the selection criteria for concurrent progress of various characters along with economic yield. **Phenotypic correlations**

In *Kharif* season, phenotypic correlation coefficients (Table 1.1) showed that seed yield per plant had positively strong significant association with test weight (0.9455), umbel per plant (0.8501), plant height (0.8600) while moderately positive and significant with, number of fruits per umbel (0.5888) fruits per umbellate (0.4583) and number of umbellates per umbel (0.4446).

Seed yield per plant showed negative and significant correlation between maturity duration (-0.5336), days to first umbel unfolding (-0.2248) and number of days for 50% flowering (-0.2297).

Genotypic correlations Seed yield per plant showed positive correlation (Table 1.2) at genotypic level with test weight (0.9678), umbels per plant (0.9391) and plant height (0.9231) while moderately favourable correlation with fruits per umbel (0.6282) number of umbellates per umbel (0.5794) and fruits per umbellate (0.5146).

Seed yield per plant showed negative and significant correlation between maturity duration (-0.4536), number of days to first umbel unfolding (-0.3301) and number of days to 50% flowering (-0.3064). The phenotypic and genotypic correlation coefficients among different characters showed that seed yield per plant had positive and significant association with test weight, plant height, umbel per plant, number of umbellates per umbel and number of fruits per umbel. The similar result was reported by Garg *et al.*[7], Jain, *et al.*[9], Beemnet *et al.*[2], Singh, *et al.*[12], Dutta[6]. and Bhandari and Gupta[3]. They reported that yield per plant were highly significant and positively correlated with number of grain per umbel, number of primary branches and plant height. The present study too suggested that plant height, number of fruits per umbel, seed yield per plot and seed yield per plant may be selected for seed yield improvement of the coriander.

Path Coefficient Analysis-Direct Effect

Path coefficient analysis was carried out by taking seed yield per plant as dependent variable to partition correlation coefficients into direct and indirect effects in order to determine the contribution of different characters towards the seed yield per plant (Table 2.1). Direct and indirect effects of various characters on seed yield per plant indicated that there is an agreement between direction and magnitude of direct effect of various character and correlation with seed yield per plant. Thus, a significant improvement in seed yield per plant can be expected through selection in the component traits with high positive direct effects. This may contribute to account for the residual effect.

Highly direct positive effect on the seed yield/ plant was contributed by plant height, umbel per plant, umbellate per umbel, fruits per umbel and test weight at both genotypic and phenotypic levels. This indicates that these are major yield contributing trait for enhancing yield of coriander. The fruits per umbellates show highest negative and direct effect on seed yield per plant at both genotypic and phenotypic levels respectively. Regarding indirect effects, it was observed that the plant height had the highest positive indirect effect via number of umbels per plant, number of fruits per umbel and test weight. The similar result reported by Jain *et al.*[9]. While, the umbellates per umbel had highest positive indirect effect *via* number of fruits per umbel and number of umbels per plant. Similarly fruits per umbellate had the highest positive indirect effect *via* number of umbels per plant and number of fruits per umbel, respectively. It was observed at genotypic level while at phenotypic level the values were showing negligible effect. On the basis of the present study, it may be concluded that the characters like umbels per plant and number of fruits per umbel are important characters affecting seed yield since they had high positive direct effect.

Similarly number of fruits per umbel had the highest positive indirect effect *via* umbel per plant at genotypic level while showing negligible effect at phenotypic level. The similar finding have also reported by Arumugam and Muthurkrishnan[1], Suthanthirapandian *et al.*[13], Rao *et al.*[11], Bhandari and Gupta[3], Gurbuz[8], Choudhary and Ramkrishna[4], Kumar *et al.*[10], Davila *et al.*[5], Singh *et al.*[12], and Dutta[6].

Table- 1.1: Genotypic coefficients of correlation among different traits in coriander

Characters	1	2	3	4	5	6	7	8	9	10	11	12	13
1	**1.0000**	0.0393	0.0773	0.9777	0.6091	0.7400	0.7919	-0.1021	0.9706	-0.2989	-0.2831	1.0609	0.9339**
2		**1.0000**	0.7782	-0.0497	0.4570	0.4713	0.2709	0.4304	-0.0789	-0.0529	-0.1424	-0.1225	-0.0772
3			**1.0000**	-0.0321	0.3554	0.5210	0.4231	0.2181	-0.0873	0.0334	0.0116	-0.0291	0.0099
4				**1.0000**	0.4337	0.5238	0.6944	-0.0789	0.9593	-0.2977	-0.3358	1.0502	0.9171**
5					**1.0000**	0.9210	0.4555	0.1005	0.4771	-0.4552	-0.4197	0.5280	0.6212**
6						**1.0000**	0.6955	-0.0026	0.5734	-0.2668	-0.2631	0.5233	0.6555**
7							**1.0000**	-0.1298	0.5661	-0.1760	-0.1749	0.8425	0.5146**
8								**1.0000**	-0.0715	0.2744	0.1802	-0.2679	-0.0743*
9									**1.0000**	-0.2587	-0.2432	0.9950	0.9564**
10										**1.0000**	1.1353	-0.4888	-0.3301
11											**1.0000**	-0.5251	-0.3064
12												**1.0000**	-0.4356**
13													**1.0000**

1. Plant height (cm)
2. Number of primary branches/plant
3. Number of secondary branches/plant
4. Umbel/plant
5. Umbellate / umbel
6. Fruits /umbel
7. Fruits /umbellate
8. Umbel diameter
9. Test weight
10. Days to first umbel unfolding
11. Days to 50% flowering
12. Maturity duration
13. Seed Yield / plant

C –Correlation
* =Significant at 5 % level
**=Significant at 1 % level

Table- 1.2: Phenotypic coefficients of correlation among different traits in coriander

Characters	1	2	3	4	5	6	7	8	9	10	11	12	13
1	**1.0000**	0.0317	0.0583	0.8464**	04139**	0.5875**	0.6617**	0.0755	0.8992**	0.2448	-0.2445	0.6201**	0.8600**
2		**1.0000**	0.6907**	0.0733	0.3197**	0.3504**	0.2562*	0.2892	-0.0670	-0.0894	-0.1106	0.0333	-0.0598
3			**1.0000**	-0.0395	0.2810	0.4747**	0.3607**	0.1761	-0.0687	-0.0160	-0.0247	0.0904	0.0073
4				**1.0000**	0.2297	0.4407**	0.5772**	-0.0371	0.9020**	0.1894	-0.2102	0.5480**	0.8501**
5					**1.0000**	0.6617**	0.3425	0.0482	0.3633**	-0.2223	-0.2893	0.2058	0.4446**
6						**1.0000**	0.6139**	0.0164	0.5224**	-0.1833	-0.1452	0.3180**	0.5888**
7							**1.0000**	-0.1415	0.5015**	-0.0475	-0.1278	0.3999**	-0.4583**
8								**1.0000**	-0.0560	0.0599	0.0872	-0.0679	0.0564
9									**1.0000**	-0.1803	-0.1731	0.6008**	0.9455**
10										**1.0000**	0.7572**	-0.2645	-0.2248
11											**1.0000**	-0.2634	-0.2297
12												**1.0000**	0.5336**
13													**1.0000**

1. Plant height (cm)
2. Number of primary branches/plant
3. Number of secondary branches/plant
4. Umbel/plant
5. Umbellate / umbel
6. Fruits /umbel
7. Fruits /umbellate
8. Umbel diameter
9. Test weight
10. Days to first umbel unfolding
11. Days to 50% flowering
12. Maturity duration
13. Seed Yield / plant

C –Correlation
* =Significant at 5 % level
**=Significant at 1 % level

Table: 2.1. Phenotypic path estimates of direct and indirect effects of different traits on seed yield per plant in coriander

Characters	1	2	3	4	5	6	7	8	9	10	11	12	13
1	**0.0713**	0.0023	0.0042	0.0604	0.0295	0.0419	0.0472	-0.0054	0.0641	-0.0175	-0.0174	0.0442	0.8600**
2	0.0032	**0.1010**	0.0698	-0.0074	0.0323	0.0354	0.0259	0.0292	-0.0068	-0.0090	-0.0112	0.0034	-0.0598
3	-0.0024	-0.0280	**-0.0405**	0.0016	-0.0114	-0.0192	-0.0146	-0.0071	0.0028	0.0006	0.0010	-0.0037	0.0073
4	0.0729	-0.0063	-0.0034	**0.0861**	0.0198	0.0379	0.0497	-0.0032	0.0777	-0.0163	-0.0181	0.0472	0.8501**
5	0.0083	0.0064	0.0057	0.0046	**0.0202**	0.0133	0.0069	0.0010	0.0073	-0.0045	-0.0058	0.0042	0.4446**
6	0.0835	0.0498	0.0675	0.0627	0.0941	**0.1422**	0.0873	0.0023	0.0743	-0.0261	-0.0206	0.0452	0.5888**
7	-0.0877	-0.0339	-0.0478	-0.0765	-0.0454	-0.0813	**-0.1325**	0.0187	-0.0664	0.0063	0.0169	-0.0530	-0.4583**
8	-0.0051	0.0196	0.0120	-0.0025	0.0033	0.0011	-0.0096	**0.0679**	-0.0038	0.0041	0.0059	-0.0046	0.0564
9	0.7387	-0.0550	-0.0564	0.7410	0.2984	0.4292	0.4120	-0.0460	**0.8215**	-0.1481	-0.1422	0.4935	0.9455**
10	-0.0063	-0.0023	-0.0004	-0.0049	-0.0057	-0.0047	-0.0012	0.0015	-0.0046	**0.0257**	0.0195	-0.0068	-0.2248
11	0.0176	0.0080	0.0018	0.0151	0.0208	0.0105	0.0092	-0.0063	0.0125	-0.0546	**0.0721**	0.0190	-0.2297
12	-0.0341	-0.0018	-0.0050	-0.0302	-0.0113	-0.0175	-0.0220	0.0037	-0.0331	0.0146	0.0145	**-0.0550**	0.5336**

1. Plant height (cm)
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3. Number of secondary branches/plant
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5. Umbellate / umbel
6. Fruits /umbel
7. Fruits /umbellate
8. Umbel diameter
9. Test weight
10. Days to first umbel unfolding
11. Days to 50% flowering
12. Maturity duration
13. Seed Yield / plant

C –Correlation
* =Significant at 5 % level
**=Significant at 1 % level

REFERENCES

1. Arumugam, R. and Muthurkrishnan, C.R., Studies on the variability and association of characters in coriander. *Progressive Horticulture* **11**(**3**)**:** 29-35 (1979).
2. Beemnet, M., Getinet, A. and Bizuayehu, T., Genetic divergence in Ethiopian coriander accessions and its implication in breeding of desired plant type. *African Crop Science Journal* **19**(**1**)**:** 39-47 (2011).
3. Bhandari, M.M. and Gupta, A., Variation and association in coriander. *Euphytica* **58:** 1-4 (1991).
4. Choudhary, P. and Ramkrishna, K., An analysis of polygenic variation in the M4 families of coriander (*Coriandrum sativum* L.). *Journal of Medicinal and Aromatic Plant Sciences*. **25**(**2**)**:** 385-391 (2003).
5. Davila, J.H., Torres, V.R., Mendoza, A.B., Bracho, J.C., Villa, V.M.Z., Rivera, A.F.R., Morales, J.R. and Maiti, R.K., Regression, correlation and path analysis for predicting flowering in coriander *(Coriandrum sativum L.)*. *Crop Research* **27**(**2/3**)**:** 300-308 (2004).
6. Dutta S., Evaluation of coriander (*Coriandrum sativum* L.) genotypes for growth and yield under new alluvial zone of West Bengal. *Environment and Ecology*; 24S (Special 3): 690-692 (2006).
7. Garg, V.K., Shukla, S. and Singh, P.K., Genetic association in fennel grown on sodic soil. *Journal of Spices and Aromatic Crops* **12**(**2**)**:** 171-173 (2003).
8. Gurbuz, B., Correlation and path analysis among yield components in winter resistant coriander (*Coriandrum sativum* L.) lines. *Indian Journal of Agricultural Sciences* **71**(**11**)**:** 730-732 (2001).
9. Jain, U.K., Singh, D. and Amrita., Correlation and path analysis for certain metric traits in coriander. *Progressive Agriculture* 3(**1/2**)**:** 86-88 (2003).
10. Kumar, S., Singh, J.P., Singh, D., Chander, M., Sarkar, M., and Shah, H., Character association and path analysis in coriander (*Coriandrum sativum* L.) for yield and its attributes. *International Journal of Pure and Applied Bioscience* **5**(**1**)**:** 812-818 (2017).

11. Rao, T.R., Babu, M.K. and Bavaji, J.N., Path-coeffecient analysisof seed yield in coriander. Indian Journal of Agricultural Scieneces, **51(10):** 726-728 (1981)
12. Singh, S.P., Katiyar, R.S., Rai, S.K., Yadav, H.K. and Srivastava, J.P., Studies on genetic variability and character association in coriander (*Coriandrum sativum* L.) grown on sodic soil. Journal of Medicinal and Aromatic Plant Sciences, **30(2):** 164-167 (20008).
13. Suthanthirapandian, I.R., Shaw, H.A. and Muthuswami, S., Genetic variability in coriander (*Coriandrum sativum* L.). Madras Agriculture Journal, **67(7):** 450-452 (1980).