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Research Note

Correlation coefficient and path analysis for yield traits in coriander (*Coriandrum sativum* L.) genotypes

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Abstract
The experiment was conducted to evaluate 24 coriander (*Coriandrum sativum* L.) genotypes during the *rabi* 2018- 19 season for yield and yield related traits to assess the correlation and path analysis. Seed yield per plant was positively and significantly correlated with umbels per plant, harvest index and seed per umbellate at both phenotypic as well as genotypic level. The characters namely umbels per plant, harvest index, branches per plant and days to maturity showed positive direct effect on seed yield per plant at both phenotypic as well as genotypic level. Therefore, greater emphasis should be given on these characters while selecting for higher seed yield and related traits.

Keywords: Coriander, Correlation Coefficient, Path analysis and Yield

Coriander (*Coriandrum sativum* L.) is an annual herbaceous plant belongs to the family Apiaceae. It is the one of the important seed spices occupying a prime position across the globe to add taste, flavour and pungency in various food items. Further, it is a common element in Ayurvedic and popular home remedies for various diseases like rheumatism, joint pain, gastrointestinal issues, flatulence (Said *et al.,* 1996), indigestion, insomnia, convulsions, anxiety, and loss of appetite (Emamghoreishi *et al.,* 2005). Pickles, sauces, and confectionery are all flavored with the whole fruits of coriander. The seed contains 18 to 21% fatty oil, which is utilized in cosmetic manufacturing.

India is recognized as the “Home of Spices,” and a variety of species are produced throughout the country. It is mostly grown in India for both leaf and seed production. In India, coriander is cultivated in an area approximately 5.32 lakh hectares. With a production of 7.09 lakh tonnes and a productivity of 1333 kg/ha (Anonymous, 2018). Rajasthan, Gujarat, Madhya Pradesh, Assam, Andhra Pradesh, Odisha, and Uttar Pradesh are the major states which produce coriander seed in India. Among them, the states Rajasthan and Gujarat contributes more than 80% of the country’s total coriander production. In Rajasthan coriander is cultivated over 1.81 lakh hectares with production of 2.06 lakh tonnes and productivity of 1139 kg/ha (Anonymous, 2017). Jhalawar, Baran, Kota, Bundi, and Chittorgarh are the major districts in Rajasthan accounts for corander cultivation. The Kota region alone occupies 96% of the coriander crop area and production in Rajasthan. In the present study, an attempt was made to evaluate of various coriander genotypes for identification of high yielding and location specific genotypes.

The experimental material comprised of twenty four genotypes namely, RCr-20, RCr-41, RCr-435, RCr-436, RCr-446, RCr-475, RCr-480, RCr-684, RCr-728, Hissar Anand, UD-565, UD-705, UD-706, UD-717, NS-2017-1, NS-2017-2, NS-2017-3, UD-50, UD-123, UD-182, UD-220, UD-246, UD-431 and UD-433 obtained from All India Coordinated Research Project on Spices, SKN College of Agriculture, Jobner ,Rajastha). The experimental material were raised in a randomized complete block design with

three replication in horticulture Farm, S.K.N. College of Agriculture, Jobner during *Rabi season* 2018-19. The spacing adopted was 30 × 10 cm.

The standard package of practices was adapted to grow a healthy crop throughout the cropping period. Data were recorded on 10 characters *viz*., plant height (cm), number of branches per plant, days to 50 per cent flowering, number of umbels per plant, number of umbellets per umbel, number of seeds per umbellate, test weight (g), seed yield per plant (g), days to maturity and harvest index (%).The analysis of variance method given by Singh and Choudhary was used to examine the variation between treatments (1979). Burton (1952) and Johanson *et al.* (1955) provided methods for calculating phenotypic correlation coefficients. Path analysis based on phenotypic correlations was estimated according to procedure given by Dewey and Lu (1959).

The phenotypic and genotypic correlation coefficients demonstrated that there is a mutual relationship between two features, which is an important parameter to consider when deciding on the type of selection to use for crop improvement. In the present study, phenotypic and genotypic correlations between yield and yield traits in coriander are presented in **Table 1** and **Table 2**. The fact that there is a significant association between traits suggests that there is a lot of room for direct and indirect selection for advance improvement. Seed yield per plant was found to have a positive and significant relationship with umbels per plant (rg = 0.803, rp = 0.757), harvest index (rg = 0.325, rp = 0.311), and seeds per umbellate (rg = 0.291, rp = 0.281) in the current study. Similar results of significant and positive correlation with seed yield per plant have also been reported by Prasad *et al.* (2017) and Bajya *et al.* (2017). Plant height showed significant positive correlation with umbellates per umbel (r_g = 0.385,

Table 1. Phenotypic correlation coefficient among different characters of coriander genotypes

Characters	Plant height	Branches per plant	Days to 50% flowering	Umbels per plant	Umbellates per umbel	Seeds per umbellate	Test weight	Days to maturity	Harvest index	Seed yield per plant
Plant height	1.000	0.310**	0.001	0.103	0.326**	0.232*	0.234*	0.129	-0.211	-0.055
Branches per plant		1.000	0.267*	0.127	-0.195	0.251*	-0.177	0.244*	-0.329**	0.047
Days to 50% flowering			1.000	-0.254*	-0.206	-0.125	-0.035	0.094	0.171	-0.361**
Umbels per plant				1.000	-0.086	0.309**	-0.252*	0.077	0.003	0.757**
Umbellates per umbel					1.000	0.022	0.287*	-0.058	-0.366**	-0.233*
Seeds per umbellate						1.000	0.072	0.102	-0.177	0.281*
Test weight							1.000	-0.117	-0.180	-0.327*
Days to maturity								1.000	-0.148	0.081
Harvest index									1.000	0.311**
Seed yield per plant										1.000

* and ** significant at P = 0.05 and P = 0.01, respectively

Table 2. Genotypic correlation coefficient among different characters of coriander genotypes

Characters	Plant height	Branches per plant	Days to 50% flowering	Umbels per plant	Umbellates per umbel	Seeds per umbellate	Test weight	Days to maturity	Harvest index	Seed yield per plant
Plant height	1.000	0.363**	0.006	0.107	0.385**	0.245*	0.272*	0.198	-0.231	-0.057
Branches per plant		1.000	0.352**	0.121	-0.217	0.278*	-0.250*	0.320**	-0.367**	0.078
Days to 50% flowering			1.000	-0.273*	-0.253*	-0.137	0.007	0.186	0.193	-0.427**
Umbels per plant				1.000	-0.091	0.321**	-0.255*	0.121	0.005	0.803**
Umbellates per umbel					1.000	0.023	0.316**	-0.158	-0.389**	-0.271*
Seeds per umbellate						1.000	0.079	0.153	-0.182	0.291*
Test weight							1.000	-0.296*	-0.198	-0.337*
Days to maturity								1.000	-0.232	0.116
Harvest index									1.000	0.325**
Seed yield per plant										1.000

* and ** significant at P =0.05 and P =0.01, respectively

r_p = 0.326), branches per plant (r_g = 0.363, r_p = 0. 310), test weight (r_g = 0.272, r_p = 0.234). Fufa (2013) and Meena *et al.* (2014) have previously reported similar results of a strong and positive connection with plant height (2014). Days to 50% flowering (rg = 0.352, rp = 0.267), days to maturity (rg = 0.320, rp = 0.244), and seeds per umbellate (rg = 0.278, rp = 0.251) all had significant positive correlation with the number of branches per plant. Awas (2014) and Meena *et al.* (2014) observed similar findings. Seeds per umbellate (rg = 0.321, rp = 0.309) had a strong positive connection with umbels per plant (rg = 0.321, rp = 0.309). Bhandari *et al.* (1991) and Bajya *et al.* (2017) have previously found similar findings (2017). Test weight had a substantial and positive connection with umbellates per umbel (rg = 0.316, rp = 0.287). Similar results was earlier reported by Meena *et al.* (2014), Bhandari *et al.* (1991) and Bajya *et al.* (2017).

Table 3. Phenotypic path coefficient analysis showing direct (diagonal) and indirect (Non diagonal) effects of ten characters on seed yield of coriander

Characters	Plant height	Primary branches per plant	Days to 50% flowering	Umbels per plant	Umbellates per umbel	Seeds per umbellate	Test weight	Days to maturity	Harvest index	Correlation with Seed yield per plant
Plant height	**-0.099**	0.049	-0.00007	0.062	-0.004	0.026	-0.012	0.010	-0.086	-0.055
Branches per plant	-0.030	**0.158**	-0.084	0.077	0.002	0.029	0.009	0.019	-0134	0.047
Days to 50% flowering	-0.0002	0.042	**-0.317**	-0.154	0.003	-0.014	0.001	0.007	0.070	-0.361**
Umbels per plant	-0.010	0.020	0.080	**0.607**	0.001	0.035	0.013	0.006	0.001	0.757**
Umbellates per umbel	-0.032	-0.030	0.065	-0.052	**-0.014**	0.002	-0.015	-0.004	-0.150	-0.233*
Seeds per umbellate	-0.023	0.039	0.039	0.187	-0.0003	**0.116**	-0.003	0.008	-0.072	0.281*
Test weight	-0.023	-0.028	0.011	-0.153	-0.004	0.008	**-0.054**	-0.009	-0.073	-0.327*
Days to maturity	-0.012	0.038	-0.029	0.046	0.0008	0.011	0.006	**0.079**	-0.060	0.081
Harvest index	0.020	-0.052	-0.054	0.002	0.005	-0.020	0.009	-0.011	**0.410**	0.311**

Residual effect: 0.22254; *and** significant at P = 0.05 and P = 0.01, respectively

Table 4. Genotypic path coefficient analysis showing direct (diagonal) and indirect (Non diagonal) effects of ten characters on seed yield of coriander

Characters	Plant height	Branches per plant	Days to 50% flowering	Umbels per plant	Umbellates per umbel	Seeds per umbellate	Test weight	Days to maturity	Harvest index	Correlation with Seed yield per plant
Plant height	**-0.441**	0.275	-0.004	0.068	0.088	-0.011	0.095	0.071	-0.200	-0.057
Branches per plant	-0.160	**0.759**	-0.246	0.078	-0.049	-0.012	-0.087	0.115	-0.318	0.078
Days to 50% flowering	-0.002	0.267	**-0.700**	-0.176	-0.058	0.006	0.002	0.067	0.167	-0.427**
Umbels per plant	-0.047	0.092	0.191	**0.644**	-0.021	-0.014	-0.089	0.043	0.004	0.803**
Umbellates per umbel	-0169	-0.164	0.176	-0.058	**0.230**	-0.001	0.111	-0.057	-0.337	-0.271*
Seeds per umbellate	-0.108	0.211	0.095	0.206	0.005	**-0.045**	0.027	0.055	-0.157	0.291*
Test weight	-0.120	-0.190	-0.004	-0.164	0.072	-0.003	**0.351**	-0.106	-0.172	-0.337*
Days to maturity	-0.087	0.243	-0.130	0.077	-0.036	-0.007	-0.103	**0.361**	-0.201	0.116
Harvest index	0.101	-0.278	-0.134	0.003	-0.089	0.008	-0.069	-0.083	**0.868**	0.325**

Residual effect:0.03131; *and** significant at P = 0.05 and P = 0.01, respectively

Direct influence of umbels per plant on seed yield per plant was positive and high (0.607), followed by harvest index (0.410), branches per plant (0.158), seeds per umbellate (0.116), and days to maturity (0.116), according to phenotypic path analysis **(Table 3).** Similar results have been reported for umbels per plant by Anilkumar *et al.* (2019), Srivastava *et al.* (2000), Kumari *et al.* (2016), Nandakumar *et al.* (2018) and Nagappa *et al.* (2018). In comparison to other characters, the direct effect of days to 50% blooming (-0.317), plant height (-0.099), test weight (-0.054), and umbellates per umbel (-0.014) was low and negative **(Table 4)**. Bhandari and Gupta (1991), Srivastava *et al*. (2000), Kassahun *et al.* (2013), Ram *et al.* (2017) and Kumar *et al*. (2018) reported similar findings.

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