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Research article

CORRELATION COEFFICIENT AND PATH ANALYSIS IN CORIANDER (*CORIANDRUM SATIVUM* L.) GENOTYPES

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ABSTRACT: Twenty-five coriander (*Coriandrum sativum* L.) genotypes were evaluated to estimate the correlation coefficient and path analysis in Randomized Complete Block Design with three replications. Seed yield per plant exhibited positive and significant correlation with plant height, plant spread, fresh and dry weight of plant, days to 50 per cent flowering, number of umbels per plant, number of seeds per umbellet, days to seed maturity and harvest index. The perusal of path analysis revealed that the traits viz., dry weight of plant and harvest index had higher direct and positive contribution towards seed yield. Therefore, great emphasis should be given for aforesaid characters while selecting for growth and yield related traits.

Key words: correlation coefficient, path analysis, coriander genotypes.

INTRODUCTION

Coriander is one of the most important spice crop grown in India and throughout the world. In India it is mainly grown in Rajasthan, Madhya Pradesh, Andhra Pradesh and Tamil Nadu. In India coriander is cultivated in an area of about 2940 thousand hectares with a production of about 5350 thousand metric tonnes and productivity is 1.8 metric tonnes per hectare (Anon, 2011). Coriander is an important spices and annual herb, which is botanically known as *Coriandrum sativum* L. and belong to the family Apiaceae, indigenous to Southern Europe and the Mediterranean region, is one of oldest consumed spices in India. Coriander leaves is used for preparing chutneys, sauces and for curries and soups. The seeds are extensively used as condiments and medicine. The coriander oil is used as valuable ingredient in perfumes and food industries. The coriander seeds are used as spices in the preparation of curry powder and pickling spice. They are used for flavouring pastry, cookies-cakes, tobacco, bakery product, meat fish, soda, syrups, candy, preserve and liquour. Correlation and path analysis will establishes the extent of association between yield and its component and also bring out the relative importance of their direct and indirect effects and thus, gives a clear understanding of their association with yield. Keeping this in view, the present investigation was done to know the association among characters and path analysis in coriander.

MATERIALS AND METHODS

The present investigation was carried out at Post Graduate Centre, University of Horticultural Sciences Campus, GKVK, Bangalore. Twenty-five coriander genotypes were evaluated in a Randomized Complete Block Design with three replications during *rabi* 2012-2013. Sowing was carried out during second week of October at a spacing of 30 cm × 10 cm. All the recommended cultural practices were followed to raise good crop. Observations were recorded from the five randomly selected plants in each experimental plot. Correlation coefficient for all possible pairs and path analysis for seed yield were also computed.

RESULTS AND DISCUSSION

Yield of a crop is the result of interaction of a number of inter-related characters. Therefore, selection should be done based on these component characters after assessing their correlation with the yield. Character association revealed that mutual relationship between two characters and it is important for taking a decision regarding the nature of selection to be followed for improvement in the crop under study. The phenotypic and genotypic correlation among the yield and yield components in coriander are presented in Table 1. The genotypic coefficient of correlation in general was high in magnitude than the phenotypic correlation coefficients indicating a strong inherent association among various characters.

Table 1. Estimates of genotypic and phenotypic correlation coefficient among different characters in coriander

	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	X_{15}
X_1 G	0.615**	0.713**	-0.046	0.605**	0.605**	0.454**	0.578**	0.596**	0.346**	0.157	0.434**	0.02	-0.121	0.529**
P	0.522**	0.248*	0.041	0.436**	0.436**	0.371**	0.437**	0.340**	0.275*	0.022	0.295**	-0.015	-0.067	0.402**
X_2 G		0.665**	0.119	0.580**	0.580**	0.150	0.311**	0.613**	0.558**	0.199	0.276*	0.029	-0.088	0.517**
P		0.316**	0.055	0.459**	0.459**	0.108	0.219	0.370**	0.376**	0.112	0.223	0.035	-0.076	0.457**
X_3 G			-0.163	0.458**	0.458**	0.284*	0.334**	0.173	0.631**	-0.176	0.231*	-0.084	-0.065	.518**
P			0.780**	0.271*	0.271*	0.038	0.123	0.696**	0.239*	-0.003	0.208	0.009	-0.066	.276*
X_4 G				-0.474**	-0.474**	-0.509**	-0.601**	-0.960**	0.327**	-0.779**	-0.775**	0.064	0.088	-0.195
P				0.005	0.005	-0.184	-0.097	0.626**	0.114	-0.089	0.003	0.006	-0.005	0.011
X_5 G					0.976**	0.293**	0.325**	0.414**	0.377**	0.475**	0.590**	0.18	-0.421**	0.664**
P					0.912**	0.174	0.174	0.289*	0.259*	0.364**	0.379**	0.166	-0.573**	0.632**
X_6 G						0.293**	0.325**	0.414**	0.377**	0.475**	0.590**	0.18	-0.421**	0.664**
P						0.174	0.174	0.289*	0.259*	0.364**	0.379**	0.166	-0.573**	0.632**
X_7 G							0.989**	0.342**	0.225*	-0.067	0.827**	0.024	0.088	0.387**
P							0.903**	0.092	0.054	-0.082	0.546**	0.035	0.016	0.219
X_8 G								0.370**	0.285*	-0.019	0.908**	-0.001	0.215	0.508**
P								0.173	0.030	-0.115	0.621**	0.066	0.047	0.256*
X_9 G									0.578**	0.455**	0.020	0.298**	0.191	0.562**
P									0.313**	0.218	0.121	0.148	0.060	0.356**
X_{10} G										-0.038	0.279*	0.152	-0.121	0.379**
P										-0.011	0.010	0.076	-0.027	0.278*
X_{11} G											-0.094	0.669**	-0.216	0.244*
P											-0.102	0.296**	-0.199	0.222
X_{12} G												0.010	0.027	0.638**
P												0.018	-0.073	0.410**
X_{13} G													-0.147	0.077
P													-0.135	0.058
X_{14} G														0.405**
P														0.229*

X1- Plant height (cm) X2- Plant spread (cm^2) X3- Number of primary branches X4- Number of secondary branches
X5- Fresh weight of plant (g) X6- Dry weight of plant (g) X7-Days to first flowering X8- Days to fifty flowering
X9- Number of umbels per plant X10- Number of umbellets per umbel X11- Number of seeds per umbellet
X12- Days to seed maturity X13- 1000 seed weight (g) X14- Harvest index (%) X15- Seed yield per plant (g)

Table 2: Direct and indirect effect of different characters on seed yield of coriander

Characters	Plant height (cm)	Plant spread (cm^2)	Number of primary branches	Number of secondary branches	Fresh weight of plant (g)	Dry weight of plant (g)	Days to first flowering	Days to 50 per cent flowering	Number of umbels per plant	Number of umbellets per umbel	Number of seeds per umbellet	Days to seed maturity	1000 seed weight (g)	Harvest index (%)	Correlation value
Plant height (cm)	**-0.026**	-0.052	0.035	-0.003	-0.123	0.851	0.086	0.003	-0.084	0.048	0.002	-0.094	0.001	-0.112	0.529**
Plant spread (cm^2)	-0.016	**-0.085**	0.033	0.008	-0.118	0.815	0.028	0.002	-0.086	0.078	0.002	-0.060	0.001	-0.082	0.517**
Number of primary branches	-0.019	-0.057	**0.049**	-0.011	-0.093	0.644	0.054	0.002	-0.024	0.088	-0.002	-0.050	-0.001	-0.001	0.518**
Number of secondary branches	0.001	-0.010	-0.008	**0.066**	0.096	-0.667	-0.097	-0.003	0.135	0.046	-0.008	0.169	0.001	0.082	-0.195
Fresh weight of plant (g)	-0.016	-0.049	0.023	-0.031	**-0.203**	1.406	0.056	0.002	-0.058	0.053	0.005	-0.128	0.002	-0.392	0.664**
Dry weight of plant (g)	-0.016	-0.049	0.023	-0.031	-0.203	**1.406**	0.056	0.002	-0.058	0.053	0.005	-0.128	0.002	-0.392	0.664**
Days to first flowering	-0.012	-0.013	0.014	-0.034	-0.060	0.412	**0.190**	0.005	-0.048	0.031	-0.001	-0.180	0.001	0.082	0.387**
Days to 50 per cent flowering	-0.015	-0.026	0.016	-0.040	-0.066	0.457	0.188	**0.005**	-0.052	0.040	0.001	-0.197	0.001	0.200	0.508**
Number of umbels per plant	-0.016	-0.052	0.009	-0.064	-0.084	0.582	0.065	0.002	**-0.141**	0.081	0.005	-0.004	0.004	0.178	0.562**
Number of umbellets per umbel	-0.009	-0.048	0.031	0.022	-0.077	0.530	0.043	0.002	-0.081	**0.139**	0.001	-0.061	0.002	-0.113	0.379**
Number of seeds per umbellet	-0.004	-0.017	-0.009	-0.052	-0.096	0.668	-0.013	0.001	-0.064	-0.005	**0.010**	0.021	0.008	-0.201	0.244*
Days to seed maturity	-0.011	-0.024	0.011	-0.051	-0.120	0.830	0.157	0.005	-0.003	0.039	-0.001	**-0.217**	0.001	0.025	0.638**
1000 seed weight (g)	-0.001	-0.002	-0.004	0.004	-0.037	0.253	0.005	0.001	-0.042	0.021	0.007	-0.002	**0.013**	-0.137	0.077
Harvest index (%)	0.003	0.007	-0.003	0.006	0.085	-0.592	0.017	0.001	-0.027	-0.017	-0.002	-0.006	-0.002	**0.932**	0.405**

Residual effect: 0.04820: diagonal values are direct effects; above and below diagonal are indirect effects.

In the present investigation, seed yield had significant positive correlation with plant height, plant spread, fresh and dry weight of plant, days to 50 per cent flowering, number of umbels per plant, number of umbellets per umbel, number of seeds per umbellet, days to seed maturity and harvest index. Similar results were reported by Vijayalatha and Cheriyan (2002), Shah *et al*. (2003) and Singh and Rajendra Prasad (2005). Hence, seed yield per plant can be improved by selecting the lines with these characters. The association between characters is a complicated interaction pathway. Path analysis is a standardised partial regression coefficient as it measures the direct influence of one variable upon other and permits the separation of correlation coefficient into components of direct and indirect effects of a set of independent variables on a dependent variable. In this study, trait seed yield was considered as dependent variable and all other characters were considered as casual variables. The perusal data (Table 2) revealed that the trait, dry weight of plant and harvest index which had higher positive association with seed yield per plant was also had the highest direct positive path. The days to first flowering, number of umbellets per umbel, number of secondary branches per plant, number of primary branches per plant, 1000 seed weight, number of seeds per umbellet and days to 50 per cent flowering were the other characters which had direct positive contribution towards seed yield per plant. On the other hand, character viz., number of umbels per plant had negative direct effect. Similarly, it had indirect positive effect through dry weight of plant, harvest index and number of umbellets per umbel. Similar results were reported by Vedamuthu and Rajan (1990) and Singh and Prasad (2006). From the above study it is concluded that dry weight of plant, harvest index and number of umbels per plant should be given more emphasis in the selection aimed at improving seed yield per plant in coriander.

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