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

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Abstract

Correlation analysis is an important statistical tool for understanding the association among yield and its contributing traits in crop improvement programmes. The present investigation was conducted during *Rabi* 2023 and *Rabi* 2024 at the College of Horticulture, Bagalkot, to assess the correlation among quantitative traits in 95 coriander genotypes along with four check varieties using an Augmented Randomized Complete Block Design. The pooled phenotypic correlation analysis revealed that seed yield per plant exhibited strong positive correlations with number of seeds per umbellate (0.988), number of umbellates per umbel (0.878), number of primary branches (0.688), seed weight per umbel (0.681), number of umbels per plant (0.637) and number of secondary branches (0.614). Moderate positive associations were observed with plant height at harvest (0.292), test weight (0.152) and crop duration (0.136). Negative correlations were recorded with days to germination (-0.211), days to first flowering (-0.207) and days to 50 percent flowering (-0.204). These findings suggest that reproductive traits and branching characteristics are the major determinants of seed yield and may serve as effective selection criteria for the development of high-yielding coriander genotypes.

Keywords: Coriander, correlation coefficient, seed yield, augmented RCB, quantitative traits

Introduction

Coriander (*Coriandrum sativum* L.) is one of the most important seed spices belonging to the family Apiaceae. It is widely cultivated for its aromatic seeds and fresh leaves, which are extensively used in culinary preparations, pharmaceuticals and essential oil industries. India is one of the leading producers and exporters of coriander, contributing significantly to the global spice market. Seed yield in coriander is a complex quantitative character influenced by several interacting morphological and physiological traits. Improvement in seed yield through direct selection is often difficult due to the polygenic nature of the trait and its strong environmental influence. Therefore, understanding the correlation among yield and its contributing characters through correlation studies is essential for identifying effective selection indices.

Correlation analysis provides valuable information on the degree and direction of association between characters and helps plant breeders formulate efficient breeding strategies. Positive associations among yield-contributing traits facilitate simultaneous improvement, whereas negative correlations may require careful selection approaches. The present study was undertaken to determine the phenotypic correlation among growth, flowering and yield-related traits in coriander genotypes and to identify important traits that can be used as reliable selection criteria for yield improvement.

Materials and Methods

The present investigation was conducted at the College of Horticulture, Bagalkot, University of Horticultural Sciences, Bagalkot, during *Rabi* 2023 and *Rabi* 2024. The experimental material consisted of 95 coriander genotypes and four checks (namely, DCC-46 (Varadevi-1), DCC-81 (Varadevi-2), DWD-3 and Local-1) are collected from HREC, Devihosur, UAS Dharwad and local collection. The experiment was laid out in an Augmented Randomized Complete Block Design (RCBD) with five blocks. Each genotype was grown in plots of 2 m × 2 m with spacing of 30 cm × 20 cm.

Observations were recorded on seventeen quantitative traits, namely plant height at 30 days after sowing (DAS), plant height at 60 DAS, plant height at harvest, days to germination, number of primary branches per plant, number of secondary branches per plant, number of umbels per plant, number of seeds per umbellate, number of umbellates per umbel, days to first flowering, days to 50 percent flowering, seed weight per umbel, test weight, crop duration, seed yield per plot, seed yield per hectare and seed yield per plant. The pooled data obtained over two seasons were subjected to statistical analysis. Phenotypic correlation coefficients were estimated following standard statistical procedures to determine the magnitude and direction of association among different quantitative characters and their contribution to seed yield in coriander genotypes. The

correlation analysis helped to identify important yield-contributing traits for effective selection in coriander breeding programmes.

Results and Discussion

The correlation analysis indicated significant associations among several quantitative traits influencing seed yield in coriander. Seed yield per plant exhibited highly significant positive correlations with number of seeds per umbellate (0.988), number of umbellates per umbel (0.878), number of primary branches (0.688), seed weight per umbel (0.681), number of umbels per plant (0.637) and number of secondary branches (0.614). This indicates that reproductive efficiency and branching ability are the major contributors to yield enhancement.

Table 1: Phenotypic correlation coefficient for quantitative parameters in coriander genotypes using pooled data

	PH30	PH60	PHH	GP	NPB	NSB	NUP	NSU	NUU	DF	DF50	SWU	TW	CD	SYPl	SYHa	SYP
PH30	1.000**	0.832**	0.665**	0.096	0.016	0.107	0.113	0.12	0.144	-0.046	-0.076	-0.045	0.186	0.381**	0.156	0.156	0.143
PH60		1.000**	0.698**	0.109	0.031	0.069	0.074	0.158	0.165	-0.211*	-0.235*	0.254*	0.169	0.298**	0.170	0.170	0.167
PHH			1.000**	-0.119	0.198*	0.074	0.072	0.323**	0.232*	-0.262**	-0.218*	0.274**	0.212*	0.356**	0.294**	0.294**	0.292**
GP				1.000**	-0.204*	-0.014	-0.024	-0.230*	-0.216*	0.141	0.100	-0.278**	0.082	0.052	-0.200*	-0.200*	-0.211*
NPB					1.000**	0.831**	0.838**	0.701**	0.665**	-0.228*	-0.176	0.319**	0.128	0.196	0.651**	0.651**	0.688**
NSB						1.000**	0.990**	0.594**	0.603**	-0.178	-0.218*	0.247*	0.153	0.171	0.597**	0.597**	0.614**
NUP							1.000**	0.613**	0.610**	-0.175	-0.219*	0.270**	0.163	0.168	0.623**	0.623**	0.637**
NSU								1.000**	0.864**	-0.200*	-0.18	0.688**	0.133	0.125	0.956**	0.956**	0.988**
NUU									1.000**	-0.191	-0.142	0.564**	0.211*	0.184	0.846**	0.846**	0.878**
DF										1.000**	0.914**	-0.374**	0.055	-0.123	-0.199*	-0.199*	-0.207*
DF50											1.000**	-0.358**	0.018	-0.203*	-0.207*	-0.207*	-0.204*
SWU												1.000**	0.061	-0.055	0.663**	0.663**	0.681**
TW													1.000**	0.146	0.102	0.102	0.152
CD														1.000**	0.143	0.143	0.136
SYPl															1.000**	1.000**	0.976**
SYHa																1.000**	0.976**
SYP																	1.000**

GP-Days to germination, PH30-Plant height at 30 DAS (cm), PH60-Plant height at 60 DAS (cm), PHH-Plant height at harvest (cm), NPB-No. of primary branches, NSB-No. of secondary branches, NUP-No. of umbels per plant, NSU-No. of seeds per umbellate, NUU-No. of umbellate/umbel, DF-Days to first flowering, DF50-Days to 50% flowering, SWU-Seed weight/umbel (g), TW-Test weight (g), SYP-Seed yield/plot (g), SYPl-Seed yield per plot (g), SYHa-Seed yield/ha (kg), CD-Crop duration (days)

The number of secondary branches showed a very strong positive association with number of umbels per plant (0.990), suggesting that increased branching directly contributes to more reproductive structures and enhanced yield potential. Similarly, number of seeds per umbellate had strong positive correlations with seed yield per plot (0.956) and seed yield per hectare (0.956), indicating its direct contribution to final productivity.

Plant height at different growth stages showed positive but relatively weaker correlations with seed yield. Plant height at harvest recorded a moderate positive association (0.292), suggesting that taller plants may support better assimilate production and partitioning.

Branching traits were strongly interrelated. Number of primary branches showed strong positive correlations with secondary branches (0.831) and umbels per plant (0.838), highlighting their role in increasing reproductive sink capacity.

Days to germination, days to first flowering, and days to 50 percent flowering exhibited negative correlations with seed yield, indicating that early germination and flowering favor higher productivity. Early flowering genotypes likely escape terminal moisture and temperature stress, ensuring better seed development. The days to first flowering showed a strong positive correlation with days to 50 percent flowering (0.914), reflecting close developmental synchronization.

Seed weight per umbel exhibited significant positive correlations with yield parameters, confirming its importance as a major yield-contributing trait. Test weight and crop duration also showed weak positive associations, indicating their supportive role in seed filling and overall productivity. These findings are in agreement with the earlier reports of Chandrakala *et al.* (2024) [1], Sharangi *et al.* (2024) [6], Ram *et al.* (2017) [5], Sravanthi *et al.* (2014) [7], Meena *et al.* (2010) [3], Nagappa *et al.* (2017) [4] and Kassahun *et al.* (2013) [2].

Conclusion

The present investigation revealed that seed yield in coriander is predominantly governed by reproductive traits and branching characteristics. Number of seeds per umbellate, number of umbellates per umbel, number of primary branches, number of secondary branches, number of umbels per plant, and seed weight per umbel showed strong positive associations with seed yield.

Negative correlations of flowering and germination traits with yield indicate that early-maturing genotypes are advantageous under prevailing environmental conditions. Therefore, selection based on high reproductive efficiency, better branching ability, and early flowering behavior can be effectively utilized for developing high-yielding coriander varieties in future breeding programmes.

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