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Variability in coriander (*Coriandrum sativum* L.) for yield and yield components

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Abstract

Studies on variability in twenty genotypes of *Coriandrum sativum* L. indicated higher estimates of genotypic coefficient of variation, phenotypic coefficient of variation, heritability and genetic advance for seed yield, umbels plant^{-1}, seeds umbel^{-1} and plant height, suggesting probable role of additive gene effects on character expression. Superior genotypes for different traits identified in the study could be exploited for inter varietal hybridization (reciprocal recurrent selection method) for evolving a high yielding variety with other desirable traits.

Key words: *Coriandrum sativum,* genetic variation, heritability

Abbreviations: GCV: Genotypic coefficient of variation, PCV: Phenotypic coefficient of variation

Coriander (*Coriandrum sativum* L.) is an important seed spice crop mainly cultivated in the states of Rajasthan and Gujarat with a sizable acreage in Madhya Pradesh, Haryana, Punjab, Uttar Pradesh, Andhra Pradesh and Bihar. The area of coriander in the country is about 5.21 lakh ha, while production is about 3.08 lakh tonnes. The area under this crop has gone up from 0.49 lakh ha (1984-85) to 5.21 lakh ha (1998-99) but the productivity of the crop is not improved. Information on heritability, genetic advance and variability are important, since these provide basis for improving efficiency of hybridization and handling of segregating populations by selection. Such information on coriander is very limited. Hence, the present investigation was carried out to study the nature and extent of genetic variability, heritability and genetic advance for seven characters in twenty genotypes of coriander.

Twenty genetically diverse genotypes of coriander were evaluated during rabi 2001-2002 at S.K.N. College of Agriculture, Jobner (India) in a Randomized Block Design with three replications in a plot of 4.0 m x 1.2 m size accommodating four rows spaced 30 cm apart. Plant to plant distance was maintained at 10 cm by thinning at 35 days after sowing. The crop was irrigated five times at regular intervals.

Observations on 10 randomly selected plants from each treatment were recorded for yield contributing components, for seed yield plot yield was recorded and converted to yield in q ha^{-1}. Genotypic and phenotypic coefficient of variation, broad sense heritability and genetic advance were worked out following the methods of Burton & De Vane (1953) and Johnson *et al.* (1955).

Significant differences were observed among

all the genotypes for all the characters (Table 1), indicating presence of wide variability. The range of variation was maximum for plant height followed by days to flowering. It is evident that the GCV and PCV values were almost similar for all the characters suggesting that the major portion of the phenotypic variation for these characters was contributed by the genotypic component, which is in agreement with the earlier reports of Sharma & Sharma (1989), Sharma *et al.* (1996) and Jain (2001). Seed yield (q ha^{-1}) followed by umbels $plants^{-1}$ indicated the highest values of GCV while seeds $umbel^{-1}$ and plant height showed moderate values of GCV. The highest and moderate values of GCV observed in these characters provide a good scope for their genetic improvement.

Heritability in broad sense (H) was much higher (> 80%) for all the recorded traits, which denotes high proportion of genetic effect in the determination of these traits. The quickest and cheapest breeding method, the mass selection technique can be adopted for improving these traits. The estimates of heritability are more or less in agreement with the earlier reports of Godara (1995) and Tripathi *et al.* (2000).

Table 1. Estimate of parameters of variance in coriander for yield and yield components

Genotype	Days to flower	Plant height (cm)	Branches $plant^{-1}$	Umbels $plant^{-1}$	Umbellets $umbel^{-1}$	Seeds $umbel^{-1}$	Seed yield (q ha^{-1})
UD-36	72.7	64.2	7.5	16.3	5.3	22.8	4.86
UD-42	70.7	55.0	7.4	28.7	5.6	26.4	4.69
UD-92	72.7	56.3	7.6	17.7	5.9	23.2	4.69
UD-119	73.3	56.5	7.7	19.4	3.8	20.2	2.77
UD-310	62.7	44.0	7.1	16.8	3.6	24.5	2.60
UD-317	62.7	50.7	7.7	21.7	4.5	19.1	4.17
UD-380	64.0	61.9	7.3	28.3	4.3	18.7	4.17
UD-426	63.3	51.7	8.4	18.5	4.3	17.7	3.82
UD-483	63.3	57.7	6.5	25.4	3.9	12.1	2.77
UD-529	58.7	46.1	5.9	13.9	4.4	21.4	3.30
UD-530	57.3	56.9	6.0	25.1	4.3	25.1	3.13
UD-728	94.7	88.3	8.5	34.4	5.9	42.2	7.64
UD-748	64.3	74.1	7.2	27.3	4.6	24.5	3.26
NS-1	91.7	87.9	9.4	24.8	3.4	22.5	2.08
NS-2	81.0	73.1	9.4	31.1	6.6	29.5	8.68
RCr-435	76.0	89.6	8.5	43.4	5.9	28.1	8.30
RCr-436	57.0	48.0	6.1	27.6	4.6	25.3	2.77
RCr-446	74.7	81.3	8.7	30.8	5.1	25.8	5.55
RCr-684	73.0	60.4	9.8	27.3	5.3	26.7	4.83
Local	75.3	67.9	5.5	14.0	4.0	13.1	2.43
Range	56.0-95.0	43.0-92.0	5.2-10.8	12.0-44.8	3.2-6.7	10.0-41.4	2.1-9.4
Mean	70.45	63.68	7.61	24.63	4.46	23.94	4.33
CD at 5 %	2.45	4.04	0.68	3.88	0.69	4.87	0.96
CV (%)	2.11	3.84	5.41	9.55	8.79	12.33	13.49
σ^2g	106.54	200.98	1.43	54.10	0.74	48.98	3.62
σ^2p	108.75	206.97	1.60	59.63	0.91	57.69	3.96
GCV (%)	14.65	22.26	15.74	29.87	18.02	29.23	44.01
PCV (%)	14.80	22.59	16.64	31.36	20.04	31.72	46.02
H (%)	97.97	97.10	89.39	90.73	80.79	84.90	91.42
Genetic advance	21.05	28.78	2.33	14.43	1.59	13.28	3.75
GA (% of mean)	29.88	45.19	30.65	58.61	33.36	55.48	86.66

GCV= Genotypic coefficient of variation; PCV= Phenotypic coefficient of variation; σ^2g= Genotypic variance; σ^2p= Phenotypic variance; H= Heritability (broad sense)

Genetic advance was highest for seed yield followed by umbels plant^{-1} and seeds umbel^{-1}, suggesting improvement in these characters by hybridization and selection. The traits seed yield, umbels plant^{-1}, seeds umbel^{-1} and plant height showed high heritability estimates coupled with high values of genetic advance suggests additive genes for the expression of these traits. Johnson *et al.* (1955) also reported the importance of high heritability along with high genetic advance in predicting the gain under phenotypic selection than heritability estimates alone. The selection is therefore, likely to be useful in genetic improvement of characters like seed yield, umbels plant^{-1}, seeds umbel^{-1} and plant height.

Among the genotypes evaluated, the superior ones for different traits are RCr-436, UD-530 and UD-529 for days to flowering; RCr-435, UD-728 and NS-1 for plant height; RCr-684, NS-1 and NS-2 for branches plant^{-1}; RCr-435 for umbels plant^{-1}; RCr-435, UD-92, UD-728 and UD-42 for umbellets umbel^{-1}; UD-728 for seeds umbel^{-1} and NS-2 and RCr-435 for seed yield. These superior genotypes could be exploited for inter varietal hybridization (reciprocal recurrent selection method) for evolving a high yielding variety by combining other desirable traits.

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