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# Genetic variability studies of coriander (*Coriandrum sativum* L.) genotypes

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**Abstract**
The present experiment was conducted to find out the genetic variability in 12 genotypes of coriander. It was undertaken at HRS, Mandouri, Bidhan Chandra Krishi Viswavidyalaya, Nadia, West Bengal. The experimental design was RBD and evaluation studies were carried out on the basis of several genetic variability parameters. Among the characters studied, seed yield/plant, number of seeds/umbel, number of basal leaves, primary branch, secondary branch and plant height were characterised by high PCV, GCV, heritability and genetic advance indicating prevalence of additive gene action which offer good scope for further improvement.

**Keywords:** Coriander, PCV, GCV, heritability, genetic advance

## Introduction
Coriander (*Coriandrum sativum* L.) is a highly cross pollinated annual crop valued as spice for its aroma and flavour. India has leading position in cultivation and production of coriander. At present, coriander is grown widely in parts of western and central India in the states of Gujarat and Rajasthan. Germplasm collection with good variability for the desirable characters is the basic requirement of any crop improvement program (Moniruzzaman *et al.*, 2013) [7]. Again, in order to exploit the yield potential of coriander, the factors affecting yield and yield component ought to be thoroughly investigated. These factors consist of environment and cultural practices which directly affect the yield. The development of suitable plant type is of pronounced importance for all the crops through planned design programme. Attempts have therefore been made by some scientists to analyse different morphological characters to make available meaningful information about the significance of characters in relation to seed yield in coriander. An ideal plant ideotype would only be defined if the different components of coriander seeds are analysed and their relative importance can be assessed. In the present study, genetic diversity of coriander genotypes collected from different sources were examined and yield component analyses were carried out to identify important coriander seed yield components.

## Materials and methods
The experiment was undertaken at Horticulture Research Station, BCKV during 2014-15 and 2015-16. Twelve genotypes of coriander were used in the experiment. The genotypes were Arka Isha, Manipur collection-1, Suvashini, West Bengal collection-1, West Bengal collection-2, Assam collection, Five –X, Manipur collection-2, NRCS A.Cr-1, Tripura collection, Pant Haritma and West Bengal collection-3. The experiment was laid out in randomized block design (RBD), 12 number of treatments and 3 replications. Each genotypes were planted in plot size of 1.8m×1m. Land preparation was done by deep ploughing followed by pulverizing and levelling. Overnight soaked seeds were used for planting. Intercultural operations were done at timely intervals. Thinning and hoeing was done 30 days after sowing along with first weeding. The crop was harvested when 60 per cent of seeds in main umbels turn yellowish brown in colour.
The genotype (G.C.V.) and phenotype (P.C.V.) co-efficient of variation were calculated by the following formula given by Burton (1952) [2].

$$GCV = \frac{\text{Genotypic standard deviation}}{\text{Grand mean}} \times 100$$

$$PCV = \frac{\text{Phenotypic standard deviation}}{\text{Grand mean}} \times 100$$

Heritability in broad sense (H) was estimated by the formula given by Hanson *et al.* (1956).

$$H(\%) = \frac{\text{Genotypic variance}}{\text{Phenotypic variance}} \times 100$$

The expected genetic advance (GA) was calculated by the formula as suggested by Johnson *et al.* (1955) [5].

$$GA = \frac{\text{Genotypic variance}}{\text{Phenotypic variance}} \times K \times P = \delta H \times K \times \delta P$$

Where,
H = Heritability in broad sense.
δ P = Phenotypic Standard deviation.
K = Selection differential, a constant value is 2.06 for 5% selection intensity.

**Result and discussion**

The present study was initiated to examine the nature of variability in different characters of coriander germplasm. Analysis of variance of eleven traits revealed that mean squares due to genotypes were highly significant (Table 1). The co-efficient of variation were below 10% for the characters like days to flowering, days to harvest, plant height, number of basal leaves, secondary branch, umbels per plant, umbellets per umbel, number of seeds per umbel, test weight and seed yield per plant during 1st year and 2nd year, excluding primary branch confirming the reliability of the experiment and also suggesting less G x E interactions. However, the co-efficient of variation was little bit high for the characters like primary and secondary suggesting moderate G x E interactions. Range of variation was highest for plant height followed by days to maturity. The similar finding was reported by Dhakad *et al*., (2017) [3].

Phenotypic co-efficient of variation (PCV) agreed closely with the genotypic co-efficient of variation (GCV) but the magnitude of PCV was higher than GCV for almost all the characters (Table. 2). The PCV was lowest in days to maturity (10.610) and highest was recorded in seed yield per plant (53.25). The study is supported by the findings of Dhakad *et al*., (2017) [3], Shrivastava *et al*. (2000) [10]. Broad sense heritability values were higher (more than 90 %) for all the characters except secondary branch (89.16%). This was in accordance with Megeji and Korla (2002) [6], Anilkumar *et al*. (2018) [1]. However, genetic advance (GA) expressed as percentage of mean was high for the characters like seed yield/plant, number of seeds/umbel, number of basal leaves and primary branch. In other words, seed yield per plant, number of seeds per umbel, number of basal leaves and primary branch were characterised by high PCV, GCV, heritability and genetic advance. The results find support from the observations of Sanker and Khader. (1991) [8], Sharma and Sharma (1989) [9] and Singh *et al.* (2006) [11]. High heritability accompanied with low genetic advance for the character like days to flowering, days to harvest, umbel per plant and test weight suggesting that this character is influenced due to favourable influence of environment rather than genotypes.

**Conclusion**

Seed yield per plant, number of seeds per umbel, number of basal leaves, primary branches, secondary branches and plant height were characterised by high PCV, GCV, heritability and genetic advance offer good scope for further improvement.

**Table 1:** Analysis of variance for eleven different characters in 12 genotypes of coriander

| Source of variation (d.f.) | Mean Sum of Square (MS) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Days to flowering | Days to maturity | Plant height (cm) | No. basal leaves | No. Primary branches | No. Secondary branches | Umbels/plant | Umbellets/ umbel | No. seeds/umbel | Test weight | Seed yield/plant |
| **Replication (2)** | | | | | | | | | | | |
| 1st year | 0.861 | 10.028 | 183.688 | 0.361 | 0.083 | 2.694 | 2.237 | 0.232 | 5.434 | 0.033 | 0.030 |
| 2nd year | 5.083 | 0.111 | 75.710 | 0.528 | 0.528 | 2.861 | 1.061 | 0.042 | 6.641 | 0.022 | 0.011 |
| **Treatment (11)** | | | | | | | | | | | |
| 1st year | 412.899 | 397.785 | 1,119.132 | 12.694 | 14.917 | 27.543 | 46.951 | 3.182 | 249.001 | 2.872 | 8.985 |
| 2nd year | 329.280 | 405.263 | 1,144.176 | 13.232 | 15.111 | 28.960 | 51.091 | 3.394 | 236.142 | 2.301 | 9.203 |
| **Error (22)** | | | | | | | | | | | |
| 1st year | 10.104 | 1.634 | 44.167 | 0.331 | 0.386 | 1.240 | 2.295 | 0.109 | 5.143 | 0.061 | 0.080 |
| 2nd year | 7.568 | 2.838 | 33.416 | 0.528 | 0.407 | 2.770 | 2.166 | 0.111 | 4.986 | 0.036 | 0.062 |
| **CV (%)** | | | | | | | | | | | |
| 1st year | 5.39 | 1.17 | 7.17 | 9.91 | 12.57 | 9.43 | 6.75 | 6.65 | 6.44 | 3.18 | 8.69 |
| 2nd year | 4.57 | 1.54 | 6.31 | 12.57 | 10.25 | 13.56 | 6.60 | 6.75 | 6.33 | 2.44 | 7.53 |

**Table 2:** Genetic variability parameters in different characters in first and second year of 12 coriander genotypes

| | | Days to flowering | Days to maturity | Plant height (cm) | No. basal leaves | No. Primary branches | No. Secondary branches | Umbels/ plant | Umbellets/umbel | No. seeds/ umbel | Test weight | Seed yield/ plant |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 1st | 58.94 | 108.81 | 92.65 | 5.81 | 6.08 | 11.81 | 22.44 | 4.96 | 35.21 | 7.75 | 3.25 |
| | 2nd | 60.25 | 109.61 | 91.67 | 5.78 | 6.22 | 12.28 | 22.28 | 4.93 | 35.26 | 7.76 | 3.31 |
| | P | 59.60 | 109.21 | 92.16 | 5.79 | 6.15 | 12.04 | 22.36 | 4.95 | 35.24 | 7.75 | 3.28 |
| Range | 1st | 42.33-77.0 | 93.67-129.33 | 64.33-115.33 | 3.33-9.33 | 3.67-10.33 | 7.67-17.0 | 16.66-29.81 | 3.64-6.91 | 22.22-51.83 | 6.82-9.98 | 1.12-6.03 |
| | 2nd | 46.33-77.33 | 94.67-131.33 | 65.19-118.41 | 3.0-9.67 | 3.67-10.67 | 7.67-18 | 16.17-29.98 | 3.82-7.13 | 21.67-50.77 | 6.8-9.49 | 1.18-6.31 |
| | p | 44.83-77.33 | 94.17-130.33 | 64.76-114.98 | 3.17-9.50 | 3.83-10.50 | 8.0-17.50 | 16.42-29.89 | 3.75-7.02 | 21.94-51.30 | 6.86-9.74 | 1.15-6.17 |
| PCV (%) | | 20.384 | 10.626 | 21.655 | 36.344 | 37.592 | 26.796 | 18.468 | 21.467 | 26.401 | 12.896 | 53.654 |
| | | 17.784 | 10.678 | 21.918 | 37.771 | 37.027 | 27.620 | 19.288 | 22.258 | 25.686 | 11.462 | 53.214 |
| | P | 18.811 | 10.610 | 21.618 | 36.356 | 36.878 | 26.277 | 18.551 | 21.652 | 25.766 | 12.115 | 53.248 |
| GCV (%) | | 19.658 | 10.561 | 20.432 | 34.968 | 36.177 | 25.082 | 17.190 | 20.412 | 25.603 | 12.499 | 52.945 |
| | | 17.188 | 10.566 | 20.991 | 35.617 | 35.581 | 24.065 | 18.122 | 21.210 | 24.893 | 11.199 | 52.678 |
| | P | 18.444 | 10.565 | 20.670 | 35.260 | 35.918 | 24.812 | 17.814 | 20.826 | 25.358 | 11.811 | 52.826 |
| Heritability (%) in b.s. | | 93.002 | 98.778 | 89.027 | 92.569 | 92.612 | 87.610 | 86.641 | 90.405 | 94.049 | 93.929 | 97.377 |
| | | 93.408 | 97.928 | 91.722 | 88.918 | 92.341 | 75.911 | 88.274 | 90.810 | 93.922 | 95.468 | 97.998 |
| | P | 96.137 | 99.161 | 91.424 | 94.062 | 94.862 | 89.161 | 92.217 | 92.514 | 96.864 | 95.054 | 98.422 |
| GA (%) of mean | | 39.053 | 21.623 | 39.714 | 69.306 | 71.719 | 48.362 | 32.962 | 39.980 | 51.149 | 24.954 | 107.627 |
| | | 34.220 | 21.540 | 41.414 | 69.186 | 70.434 | 43.192 | 35.074 | 41.637 | 49.698 | 22.542 | 107.426 |
| | P | 37.254 | 21.672 | 40.714 | 70.447 | 72.065 | 48.263 | 35.240 | 41.265 | 51.413 | 23.722 | 107.959 |

## References


1. Anilkumar GS, Umesha K, Shivapriya M, Halesh GK, Nithin Kumar VC. Genetic Variability, Heritability and Genetic Advance Studies in Coriander (*Coriandrum sativum* L.). International Journal of Pure and Applied Bioscience. 2018; 6(3):426-430.
2. Burton GW. Quantitative inheritance in grasses. Proc. 6th Int. Grassld Cong. 1952; 1:277-283.
3. Dhakad RS, Sengupta SK, Lal N, Shiurkar G. Genetic diversity and heritability analysis in coriander. The Pharma Innovation Journal. 2017; 6(8):40-46
4. Hanson CH, Robinson GP, Comstock RE. Biometrical studies of yield in segregating population of Korean lespedeza. Journal of Agronomy. 1956; 48:268-272.
5. Johnson HW, Robinson HF, Comstock RE. Genotypic and phenotypic correlation and their implications in selection. Journal of agronomy. 1955; 47:477-483.
6. Megeji NW. Korla BN. Genetic variation in coriander. Haryana Journal of Horticultural Science 2002; 31(3-4):292-293.
7. Moniruzzaman M, Rahman MM, Hossain MM, Karim AJMS, Khaliq QA. Evaluation of coriander (*Coriandrum sativum* L.) genotypes for seed yield and yield contributing characters. Bangladesh Journal of Agricultural Research. 2013; 38(2):189-202
8. Sanker KB, Khader MA. Studies on genetic variability in coriander. South Indian Horticulture 1991; 39(5):312-314
9. Sharma KC and Sharma RK. Variation and character associations of grain yield and its component characters in coriander. Indian Journal of Genetics. 1989; 49(1):135-139
10. Shrivastava SBL, Kamaluddin, Tripathi SM, Shrivastava JP. Genetic spices and aromatic plant challenges and opportunities in the new century contributory papers centennial conference on spices and aromatic plant Spices Calicut, Kerala, India. 2000, 68-70.
11. Singh SP, Prasad R, Singh D. Variability and character association of grain yield and its component character in coriander. Journal of Applied Bioscience. 2006; 32(1):64-67.