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Assessment of genetic variability, heritability and genetic advance in coriander (*Coriandrum sativum* L.)

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Abstract

The present investigation entitled “Studies on genetic variability, character association and genetic divergence for seed yield and its contributing traits in coriander (*Coriandrum sativum* L.)” was carried out using fifty two genotypes including two checks (NDCor-2 and Hissar Anand) at the Main Experiment Station, Department of Vegetable Science, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj Ayodhya (U.P.) India, during *Rabi* 2019-2020 in Augmented Block Design with five blocks. The observations were recorded on eleven quantitative traits i.e. plant height (cm), number of braches per plant, number of node per plant, days to 50% flowering, umbel diameter (cm), number of umbels per plant, number of fruits per umbel, number of umbellates per umbel, number of fruits per umbellate, 1000 seed weight (g) and seed yield per plant (g). The variation due to the blocks were highly significant for the plant height (cm), umbels per plant and branches per plant, umbel diameter (cm), fruits per umbel in significant and variance due to checks were highly significant for plant height, and branches per plant, umbellate per umbel in significant for test weight and other characters are non-significant. Umbel per plant (14.95) showed highest phenotypic coefficient of variation and highest genotypic coefficient of variation was observed for umbels per plant (14.88). High heritability was expressed for Plant height (cm) (99), The highest genetic advance was expressed for umbels per plant (15.62) and Genetic advance in percent of mean was highest in case of umbels per plant (30.49).

Keywords: Coriander, Heritability, variability, PCV, GCV and genetic advance

Introduction

Coriander is generally known as "Dhania" but some other countries it is also known as Cilantro (leaves), Coriander (fruits) in Spanish, Coriander in French and Catalan, Coentro in Portuguese, Martorria As for botanically, coriander is known as *Coriandrum sativum* L., in East Africa, and Coriandolo in Italy. Coriander ($2n=2x-22$) is an annual plant that belongs to the Apiaceae family. It is originated in Mediterranean region. In India it is mainly cultivated in Rajasthan, Gujarat, Andhra Pradesh, Madhya Pradesh, Tamil Nadu and Uttar Pradesh etc. The flowers have 5 sepals, 5 petals, 5 stamens, and two free carpels with epigynous ovaries. Coriander's fruit is a schizocarp, yellow in color with brown ribs. The size of seed is about 3.0 mm in diameter and ripe seed are aromatic. The states Rajasthan and Gujarat have emerged as “Seed Spices Bowl.” In India, it covers 629 hectare area with 756 million tonnes production and 1.0 metric tonnes per hectare productivity (Anonymous 2019) ^[1]. The potential for coriander can be explored further and exploited to create new formulations and it can be adapted as a powerful and complete functional food. (Chawla and Thakur, 2013) ^[3].

Materials and Methods

Present investigation was carried out at the Main Experiment Station, Department of Vegetable Science, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj Ayodhya (U.P.) India, during *Rabi* 2019-2020. Fifty two genotypes including two checks (NDCor-2 and Hissar Anand) and coriander germplasm NDCor-1 to NDCor-50 maintained in All India Co-ordinated Research Project on Spices under Department of Vegetable Science A.N.D.U.A.&T., Kumarganj, Ayodhya were taken for this investigation. The observations were recorded on eleven quantitative traits i.e. plant height (cm), number of braches per plant, number of node per plant, days to 50% flowering, umbel diameter (cm), number of umbels per plant, number of fruits per umbel, number of umbellates per umbel, number of fruits per umbellate, 1000 seed weight (g) and seed yield per plant (g). The analysis of variance for different characters in “Augmented Design” was done according to Federer (1956) ^[7].

Heritability in broad sense (h^2) was calculated by the formula suggested by Hanson *et al.* (1956) [8].

Result and Discussion

The variation due to the blocks were highly significant for the plant height (cm), umbels per plant and branches per plant, umbel diameter (cm), fruits per umbel in significant and variance due to checks were highly significant for plant height, and branches per plant, umbellate per umbel in significant for test weight and other characters are non-significant. Umbel per plant (14.95) showed highest phenotypic coefficient of variation followed by branches per plant (14.80), fruits per umbel (14.36), fruits per umbellate (13.34), test weight (11.45), umbellates per umbel (9.52), yield per plant(g) (9.45), umbel diameter(cm) (8.85), nodes per plant (8.51), plant height (cm) (4.92) and lowest phenotypic coefficient of variation was observed for days to 50% flowering (1.93) highest genotypic coefficient of variation was observed for umbels per plant (14.88) followed by fruits per umbel (14.24), branches per plant (14.04), fruits per umbellate (11.00), test weight (9.99), umbellates per umbel (9.17), umbel diameter (8.12), yield per plant (7.79), nodes per plant (6.74), plant height (4.92) and lowest genotypic coefficient of variation was observed for days to

50% flowering (1.74). The similar results reported by Jyothi *et al.* (2017), Devi *et al.* (2019) and Shiwangi *et al.* (2020) [9, 4, 10].

High heritability was expressed for plant height (cm) (99) followed by umbels per plant (98), fruits per umbel (98), umbellates per umbel (92), branches per plant (90), umbel diameter (cm) (84), days to 50% flowering (80), test weight (76). Moderate heritability in fruits per umbellate (67), seed yield per plant (67).

The highest genetic advance was expressed for umbels per plant (15.62) followed by plant height (13.26), fruits per umbel (12.63), days to 50% flowering (2.89), test weight(g) (1.58), branches per plant (1.55), nodes per plant (1.29), umbellate per umbel (1.22), fruits per umbellate (1.17) and yield per plant (1.07). Genetic advance in percent of mean was highest in case of umbels per plant (30.49) followed by fruits per umbel (29.09), branches per plant (27.46), fruits per umbellate (18.68), umbellates per umbel (18.20), test weight (17.95), umbel diameter (15.36), seed yield per plant (13.22), nodes per plant (11.01), plant height (10.10) and days to 50% flowering (3.23). The findings of present study are in agreement with those of Chauhan *et al.* (2020), Dhakad *et al.* (2017) [2, 5] and Bhuwanesh *et al.* (2021).

Table 1: Estimates of range, general mean, genotypic and phenotypic coefficient of variation, heritability, genetic advance and genetic advance in percent of mean for 11 characters in coriander

Parameters/Characters	Range		General mean	Genotypic coefficients of variation	Phenotypic coefficients of variation	Heritability Broad sense (%)	Genetic advance	Genetic advance as per cent of mean
	Min.	Max.						
	1	2						
Days to 50% flowering	85.84	92.91	89.39	1.74	1.93	80	2.89	3.23
Plant height (cm)	112.61	143.01	131.29	4.92	4.93	99	13.26	10.10
Branches per plant	3.96	7.94	5.67	14.04	14.80	90	1.55	27.46
Nodes per plant	10.33	14.07	11.75	6.74	8.51	62	1.29	11.01
Umbel diameter (cm)	4.81	7.81	6.19	8.12	8.85	84	0.95	15.36
Umbels per plant	32.17	63.61	51.25	14.88	14.95	98	15.62	30.49
Fruits per umbel	32.00	61.04	43.43	14.24	14.36	98	12.63	29.09
Umbellates per umbel	4.23	8.48	6.71	9.17	9.52	92	1.22	18.20
Fruits per umbellate	5.21	8.27	6.27	11.00	13.34	67	1.17	18.68
Test weight (g)	6.94	11.68	8.82	9.99	11.45	76	1.58	17.95
Yield per plant (g)	6.72	9.89	8.13	7.79	9.45	67	1.07	13.22

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