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Studies the genetic variability and nature of association among the yield and contributing character in coriander (*Coriandrum sativum* L.)

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Abstract
The present investigation was conducted during November 2014 to March 2015 at Main Experimental Station of Vegetable Science, Narendra Deva University of Agriculture &Technology, Kumarganj, Faizabad (U.P.). The field experiment was laid out in Augmented Block Design with 120genotypes along with two checks in ten blocks. The characters studied were Days to 50% flowering, Plant height (cm), number of branches per plant, number of fruiting node per plant, number of umbels per plant**,** number of umbellate per umbel, number of fruits per umbellate, number of fruits per umbel**,** umbel diameter (cm),1000 seed weight(g)**,** seed yield per plant (g).Data were analyzed statistically for their mean, range, coefficient of variation, heritability, genetic advance, and genetic advance as percent of mean.
The variation due to the blocks were highly significant for all the characters except days to 50% flowering and variance due to checks was non-significant for fruits per umbel while, highly significant for all characters. The genotypes NDCor-39 followed by NDCor-4, NDCor-92, NDCor-64 and NDCor-31 produced highest seed yield. The most desirable genotypes for characters other than seed yield were NDCor-5 and NDCor-7 for days to 50% flowering, NDCor-80, NDCor-81 for plant height, NDCor-10, NDCor-9 for branches per plant, NDCor-25, NDCor-19 for fruiting nodes per plant, NDCor-40, NDCor-70 for umbels per plant, NDCor-20, NDCor-17 umbellates per umbel, NDCor-21, NDCor-16 for fruits per umbellate, NDCor-92, NDCor-75 for fruits per umbel, NDCor-69, NDCor-58, for umbel diameter and NDCor-34, NDCor-108 for test weight. The high magnitude coefficients of variation at genotypic level as well as phenotypic level in case of umbel diameter. Therefore, crosses between members of clusters separated by high inter cluster distance are likely to produces desirable segregates.

Keywords: nature, coriander, vegetable science

Introduction
Historically, India has always been recognized as a "Home of Spices" in which the seed spices constitute an important group of agricultural commodities and play a significant role in national economy. It was lure of these spices that brought many seafarers to the shore of India. India is the largest producer, consumer and exporter of spices in the world, where 63 kinds of spices are grown (Pruthi, 1998). Mainly 52 spices are grown in India according to Spices Board, Calicut, and Kerala. Coriander is one of the important seed spices crop grown throughout the world.
Coriander is generally known as “Dhania” but some other countries it is also known as Ciliantro (leaves), Coriandero (fruits) in Spanish, Coriandre in French and Catalan, Coentro in Portuguese, Martorria in Euskara, Coriandolo in Italian, Koriander in German, Dutch and Coandro or Coriandro in Galego.
Coriander is botanically known as *Coriandrum sativum* L., 2n=2x=22, is an annual herb belongs to the family *Apiaceae*. 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 states Rajasthan and Gujarat have emerged as "Seed Spices Bowl" and together contribute more than 80 percent of total seed spices production in the country. In India it covers 0.58 Mha area with 0.55 Mt production with their 0.95 tonnes per hectare productivity (Anonymous, 2015).
Coriander plant is a smooth, erect, annual herb, 30-90 cm high, with conspicuously enlarged nodes and hollow internodes. The stems are vertically ridged. The leaves are pinnately compound and often decompounds. The lower leaves are broad with serenely-lobed margins. The upper leaves are finely cut with linear lobes. The petiole is often swollen even, hollow at the base and sheathing the stem. The leaf arrangement is alternate. The plant comes to the flowering stage in about 45-60 days after sowing.

The flowers are small, white or pinkish in compound terminal umbels. There are 5 sepals, 5 petals, 5 stamens and two carpels which are free with an epigynous ovary. The fruit of coriander is schizocarp, globular, yellow in colour with brown ribs. The size of seed is about 3.0 mm in diameter and ripe seed are aromatic. At dehiscence, the carpel called pericarp separate, each containing a single seed with a copious endosperm and a minute embryo.

Genetic variability forms the basis for crop improvement. Selection and hybridization approaches are easily followed in bringing about the quantitative improvement. It is essential to assess the nature and magnitude of variability, heritability and genetic advance for various characters in respect of germplasm available for maximizing the correlated response to selection. Besides, knowledge of inter-character association and direct and indirect effects on seed yield is also essential.

Yield is the end product of various characters, which directly or indirectly influence the growth of plant. The correlation coefficient gives an idea about the various associations existing between the yield and its components. It only reveals the direction and magnitude of association between any two characters.

Material and Method

The present investigation entitled "Studies the genetic variability and nature of association among the yield and contributing character in coriander (*Coriandrum sativum* L.)" Was carried out at the Main Experiment Station, Department of Vegetable Science, Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad (U.P.) India, during *Rabi*, 2014-15.

The experiments was conducted at Main Experiment Station, Department of Vegetable Science, Narendra Deva University of Agriculture and Technology, (Narendra Nagar) Kumarganj, Faizabad (U.P.) India in well leveled field having proper drainage. This farm is situated in the main campus of the university on left side of Faizabad-Raibareilly road at a distance of 42 km away from main city of Faizabad district.

The experimented design laid out Augmented block design, Number of entries is 122 (120+ 2 checks), 10 blocks and spacing 30 x 15 cm^2.

To determine the initial fertility status, a composite soil sample was taken just after field preparation and before laying out the experiment with the help of soil auger from all over the field at random to a depth of 0-25 cm.

Result and Discussion

The result of analysis of variance for Augumented Design was carried out for 11 characters and the results obtained are presented in table-1.

The variation due to the blocks were highly significant for all the characters except days to 50% flowering and variance due to checks was non-significant for fruits per umbel while, highly significant for all characters.

The days 50% flowering varied from 84.21 (NDCor-7 and NDCor-8) to 94.63 days (NDCor-70) with general mean of 89.83 days. Top five genotypes NDCor-5, NDCor-7, NDCor-8, NDCor-53 and NDCor-59 were found significantly superior than best check NDCor-2 (89.00) for this trait.

Plant height (cm) is varied from 99.70 (NDCor-109) to 151.02 (NDCor-80) with general mean of 130.03. Top five genotypes NDCor-80, NDCor-81, NDCor-39, NDCor-10, and NDCor-96 were found significantly superior than best check NDCor-2 (127.60) for this trait.

Branches per plant varied from 4.62 (NDCor-7) to 9.22 (NDCor-10) with general mean of 6.38. Top five genotypes NDCor-10, NDCor-9, NDCor-61, NDCor-69, and NDCor-40 were found significantly superior than best check Hisar Anand (7.50) for this trait.

Fruiting nodes per plant varied from 11.80 (NDCor-9) to 16.31 (NDCor-25) with general mean of 13.54. Top five genotypes NDCor-25, NDCor-19, NDCor-50, NDCor-64 and NDCor-24 were found significantly superior than best check NDCor-2 (14.40) for this trait.

Umbel per plant varied from 66.42 (NDCor-27) to 99.28 (NDCor-40) with general mean of 77.89. Top five genotypes NDCor-40, NDCor-70, NDCor-47, NDCor-74 and NDCor-52 were found significantly superior than best check NDCor-2 (98.20) for this trait.

Umbellates per umbel varied from 4.84 (NDCor-1) to 9.13 (NDCor-20) with general mean of 6.24. Top five genotypes NDCor-20, NDCor-17, NDCor-89, NDCor-79 and NDCor-39 were found significantly superior than best check HisarAnand (7.00) for this trait.

Fruits per umbellate varied from 5.09 (NDCor-108) to 9.89 (NDCor-21) with general mean of 7.89. Top four genotypes NDCor-21, NDCor-16, NDCor-76, and NDCor-43 were found significantly superior than best check NDCor-2 (9.60) for this trait.

Fruit per umbel varied from 32.06 (NDCor-14) to 42.83 (NDCor-92) with general mean of 37.43. Top five genotypes, NDCor-92, NDCor-75, NDCor-83, ND Cor-18andNDCor-31 were found significantly superior than best check NDCor-2 (36.20).

Umbel diameter (cm) varied from 2.47 (NDCor-51) to 7.84 (NDCor-69) with general mean of 5.13. Top five genotypes NDCor-69, NDCor-58, NDCor-59, NDCor-64 and NDCor-70 were found significantly superior than best check NDCor-2 (5.80) for this trait.

Test weight (g) varied from 8.01 (NDCor-79) to 12.47 (NDCor-34) with general mean of 10.14. Top five genotypesNDCor-34, NDCor-108, ND Cor-111, ND Cor-116 and NDCor-120 were found significantly superior than best check Hisar Anand (10.80) for this trait.

Yield per plant (g) varied from 7.86 (NDCor-57) to 14.39 (NDCor-39) with general mean 11.20. Top five genotypes NDCor-39, NDCor-4, ND Cor-92, ND Cor-64 and NDCor-31 were found significantly superior than best check NDCor-2 (12.40) for this trait.

Table 1: Analysis of variance (Augumented design) for eleven characters in coriander germplasm

Characters	Sources of variation		
	Blocks	Check	Error
	9 (d. f)	1 (d. f)	9
Days to 50% flowering	3.74	44.99**	2.14
Plant height (cm)	183.37**	1462.05**	7.89
Branches/plant	1.16**	6.05**	0.006
Fruiting nodes/plant	2.04**	5.00**	0.026
Umbels/plant	326.76**	180.02**	2.59

Umbellates/umbel	0.63**	4.99**	0.01
Fruits/umbellate	6.53**	7.21**	0.014
Fruits/ umbel	3.70**	1.80	0.69
Umbel diameter (cm)	6.13**	4.05**	0.003
Test weight (g)	0.95**	25.09**	0.039
Yield/ plant (g)	2.42**	1.01**	0.023

***Significant at 5% and 1% probability level, respectively

Table 2: Adjusted means of genotypes and mean checks, range and least significant differences for 11 characters in Coriander

S. No.	Characters\ Genotype	Days to 50% flowering	Plant height (cm)	Branches/ plant	Fruiting nodes/ plant	Umbels/ plant	Umbellates/ umbel	Fruits/ umbellates	Fruits/ umbel	Umbel diameter (cm)	Test weight (g)	Yield/ plant (g)
1	NDCor-1	88.21	126.61	5.82	13.80	71.34	4.84	7.55	38.27	5.72	8.97	12.52
2	NDCor-3	88.21	142.01	5.22	14.20	89.14	6.24	8.35	35.07	4.32	8.31	10.54
3	NDCor-4	87.21	132.61	7.02	12.60	73.14	5.64	5.75	35.47	5.92	9.09	13.33
4	NDCor-5	84.21	132.61	6.22	14.10	75.94	6.24	8.75	37.07	6.52	11.07	11.92
5	NDCor-6	87.21	145.81	6.62	12.60	66.54	7.24	9.55	36.87	6.12	11.47	12.33
6	NDCor-7	84.21	131.91	4.62	12.80	68.54	5.64	7.55	38.07	4.92	8.37	12.63
7	NDCor-8	84.21	121.41	6.62	12.10	67.54	5.04	5.35	38.87	6.52	9.17	10.54
8	NDCor-9	89.21	143.01	9.02	11.80	73.54	7.04	6.95	36.67	4.92	11.47	11.15
9	NDCor-10	89.21	147.41	9.22	12.40	77.94	5.24	7.95	37.87	6.52	11.51	12.92
10	NDCor-11	88.21	140.11	7.42	13.10	75.54	6.44	5.75	35.47	6.12	10.91	10.95
11	NDCor-12	90.21	121.61	7.42	12.60	73.54	6.04	8.35	37.47	5.72	10.08	10.20
12	NDCor-13	91.21	123.81	7.42	12.50	70.94	5.64	5.75	39.87	5.32	10.37	11.99
13	NDCor-14	87.79	145.70	6.14	12.31	66.98	5.33	7.09	32.06	6.44	10.29	7.91
14	NDCor-15	87.79	124.10	6.74	12.01	76.38	6.13	6.69	35.26	6.24	9.59	10.33
15	NDCor-16	89.79	141.10	5.94	11.91	78.98	6.73	9.89	34.66	5.24	8.89	9.37
16	NDCor-17	89.79	124.90	6.54	12.51	70.78	7.73	6.89	35.06	4.54	9.44	10.77
17	NDCor-18	91.79	129.50	6.34	12.41	73.58	5.93	8.69	40.26	4.34	9.64	11.55
18	NDCor-19	89.79	128.00	6.74	16.21	74.78	6.13	7.69	33.86	3.54	8.44	9.26
19	NDCor-20	90.79	137.90	6.14	14.71	67.18	9.13	9.29	35.66	4.84	10.84	8.25
20	NDCor-21	90.79	126.90	6.14	13.51	74.78	6.93	9.89	38.06	5.44	8.74	11.69
21	NDCor-22	87.79	106.00	6.14	13.91	68.18	5.93	7.49	38.66	5.44	10.97	11.88
22	NDCor-23	87.79	111.80	5.94	13.81	69.18	5.93	6.29	39.46	5.84	10.57	11.21
23	NDCor-24	89.79	143.90	6.14	15.71	70.78	7.13	8.89	37.66	5.34	10.77	10.59
24	NDCor-25	89.79	139.10	6.14	16.31	75.98	5.73	9.09	32.86	4.54	10.57	12.43
25	NDCor-26	90.57	146.21	7.27	13.36	67.01	6.45	7.83	37.23	4.22	10.42	11.73
26	NDCor-27	92.57	140.01	6.67	12.36	66.42	6.85	8.03	38.23	4.12	9.67	10.99
27	NDCor-28	91.57	127.11	5.47	12.26	78.42	6.25	9.43	38.03	4.82	9.77	11.16
28	NDCor-29	91.57	118.31	6.27	12.56	69.62	6.45	8.63	39.23	3.32	10.67	11.05
29	NDCor-30	92.57	118.91	5.87	13.46	73.62	5.65	8.63	36.43	4.12	10.47	11.80
30	NDCor-31	91.57	129.01	5.67	13.16	70.42	6.45	9.23	40.03	4.12	10.67	12.84
31	NDCor-32	90.57	120.01	6.07	12.76	73.42	5.85	8.23	36.63	3.92	11.17	11.43
32	NDCor-33	90.57	121.81	7.07	14.06	69.42	7.25	7.63	38.23	4.82	11.07	12.12
33	NDCor-34	92.57	111.61	6.67	14.36	74.82	5.45	6.03	37.43	3.82	12.47	11.22
34	NDCor-35	92.57	123.01	5.87	13.46	71.42	6.65	7.23	39.43	3.82	9.27	12.14
35	NDCor-36	89.57	136.61	5.87	13.56	73.42	5.65	9.03	39.63	4.12	9.47	10.64
36	NDCor-37	90.57	119.81	6.47	14.36	74.22	6.45	9.03	39.23	4.82	10.97	10.13
37	NDCor-38	87.82	127.06	7.07	13.76	70.88	5.48	8.92	36.45	4.70	10.82	8.74
38	NDCor-39	86.82	149.06	7.27	13.66	96.28	7.28	9.52	38.45	4.80	11.42	14.39
39	NDCor-40	88.82	132.06	7.47	13.56	99.28	6.48	8.32	35.85	5.40	11.42	12.39
40	NDCor-41	89.82	127.66	7.07	13.46	75.08	6.28	9.32	36.45	3.70	9.42	10.83
41	NDCor-42	89.82	138.66	5.87	12.36	87.88	5.88	9.12	37.85	4.00	10.32	12.43
42	NDCor-43	88.82	100.06	5.27	15.36	69.68	5.08	9.72	37.65	3.80	9.52	9.55
43	NDCor-44	89.82	126.46	7.47	15.06	91.48	6.48	8.32	38.85	4.70	10.52	12.62
44	NDCor-45	88.82	133.86	6.27	12.16	94.88	6.68	9.52	35.45	3.70	10.48	11.59
39	NDCor-40	88.82	132.06	7.47	13.56	99.28	6.48	8.32	35.85	5.40	11.42	12.39
40	NDCor-41	89.82	127.66	7.07	13.46	75.08	6.28	9.32	36.45	3.70	9.42	10.83
41	NDCor-42	89.82	138.66	5.87	12.36	87.88	5.88	9.12	37.85	4.00	10.32	12.43
42	NDCor-43	88.82	100.06	5.27	15.36	69.68	5.08	9.72	37.65	3.80	9.52	9.55
43	NDCor-44	89.82	126.46	7.47	15.06	91.48	6.48	8.32	38.85	4.70	10.52	12.62
44	NDCor-45	88.82	133.86	6.27	12.16	94.88	6.68	9.52	35.45	3.70	10.48	11.59
45	NDCor-46	88.82	139.46	6.47	12.76	83.08	6.48	8.32	37.85	4.70	8.42	11.47
46	NDCor-47	87.82	136.66	6.47	14.26	98.88	6.68	9.52	35.45	3.80	9.12	12.39
47	NDCor-48	87.82	128.86	6.07	13.36	89.48	6.48	7.92	34.05	6.10	9.12	12.55
48	NDCor-49	88.82	132.86	6.27	13.46	75.48	5.88	9.52	37.45	4.00	9.92	10.22
49	NDCor-50	89.02	142.87	7.25	16.16	70.44	5.13	9.51	36.95	4.77	8.83	12.52

50	NDCor-51	88.02	141.87	7.45	12.06	89.84	6.13	7.51	36.75	2.47	9.73	11.28
51	NDCor-52	90.02	131.47	7.05	15.26	97.24	5.93	8.51	37.95	5.47	9.43	12.21
52	NDCor-53	87.02	118.07	6.25	15.06	87.24	5.73	6.11	36.35	5.37	10.33	8.97
53	NDCor-54	88.02	104.07	6.45	15.16	69.44	5.73	9.31	34.95	6.47	10.53	11.43
54	NDCor-55	90.02	113.07	7.05	14.26	78.64	6.13	7.31	37.15	6.27	8.83	10.45
55	NDCor-56	90.02	120.67	6.65	14.66	72.04	6.33	7.11	38.15	6.37	9.73	12.71
56	NDCor-57	89.02	128.87	5.65	14.76	78.24	5.93	9.31	39.35	6.27	9.53	7.86
57	NDCor-58	90.02	143.87	6.25	13.96	77.44	5.93	7.31	37.15	7.47	10.33	9.00
58	NDCor-59	87.02	138.47	7.05	13.36	87.04	5.53	6.51	37.55	7.47	10.53	10.94

59	NDCor-60	89.02	122.87	6.65	15.26	82.04	5.53	7.51	36.55	6.37	10.43	10.23
60	NDCor-61	87.02	137.47	8.05	13.06	76.24	6.13	9.31	34.95	6.47	10.13	9.87
61	NDCor-62	91.63	141.12	5.94	13.34	83.73	6.05	9.17	35.88	4.94	9.67	11.40
62	NDCor-63	91.63	117.32	5.74	13.54	85.13	6.65	9.17	37.88	5.44	9.77	12.63
63	NDCor-64	93.63	101.52	6.34	16.14	69.33	6.25	8.97	38.28	7.44	10.17	12.85
64	NDCor-65	91.63	106.32	5.74	15.14	72.13	6.05	7.17	39.28	6.44	9.47	10.77
65	NDCor-66	92.63	108.92	5.74	13.34	76.73	5.25	8.37	38.08	6.44	10.27	11.63
66	NDCor-67	91.63	144.52	6.34	12.34	67.73	6.05	7.97	38.48	6.34	9.67	12.42
67	NDCor-68	92.63	145.92	5.94	12.74	93.33	6.45	7.77	37.28	6.44	9.67	12.18
68	NDCor-69	93.63	142.72	7.74	13.74	96.73	7.05	7.37	39.08	7.84	10.17	12.12
69	NDCor-70	94.63	119.12	7.14	13.34	98.93	6.05	9.57	38.28	6.84	10.17	11.80
70	NDCor-71	90.63	129.72	6.54	12.74	89.13	5.65	7.17	39.08	5.84	11.27	12.23
71	NDCor-72	93.63	135.12	6.94	13.34	95.93	6.45	7.97	38.28	6.44	10.70	9.12
72	NDCor-73	91.63	125.92	5.54	13.14	82.93	7.25	8.37	37.48	6.54	11.40	11.45
73	NDCor-74	89.87	141.62	7.36	13.61	98.32	6.04	8.21	37.32	6.74	10.31	12.77
74	NDCor-75	90.87	124.22	6.36	15.11	75.72	5.84	9.01	40.52	5.84	11.31	11.87

75	NDCor-76	88.87	136.42	5.96	13.11	77.92	6.04	9.81	38.42	6.24	9.61	8.41
76	NDCor-77	89.87	134.02	5.36	12.91	70.12	6.04	7.61	39.32	5.44	8.61	10.23
77	NDCor-78	89.87	144.82	5.16	12.11	67.32	6.24	8.21	36.52	6.14	9.21	11.70
78	NDCor-79	88.87	150.02	5.36	12.21	68.12	7.44	8.41	37.12	4.74	8.01	12.29
79	NDCor-80	88.87	151.02	5.76	12.91	84.92	6.84	8.21	37.32	6.74	10.31	11.15
80	NDCor-81	89.87	150.22	5.56	14.11	79.12	6.24	8.21	36.92	6.54	10.31	8.66
81	NDCor-82	87.87	140.82	5.96	13.91	94.52	6.84	8.61	37.72	5.54	9.68	9.60
82	NDCor-83	89.87	133.02	5.76	13.81	72.52	6.24	8.81	40.32	5.24	9.18	11.73
83	NDCor-84	90.87	132.22	5.36	14.91	70.52	6.64	8.21	37.32	5.24	10.18	10.29
84	NDCor-85	89.87	107.62	6.96	13.71	84.72	7.04	8.01	36.32	6.14	9.18	11.22
85	NDCor-86	91.03	108.33	5.46	13.56	92.24	6.89	8.06	37.23	5.29	9.52	12.56
86	NDCor-87	90.03	124.13	6.06	13.66	70.24	6.69	7.66	39.83	4.19	9.22	11.20
87	NDCor-88	91.03	140.93	5.86	13.26	73.64	7.09	8.66	36.83	4.09	10.22	12.73
88	NDCor-89	89.03	136.13	6.26	13.46	75.64	7.49	8.06	39.03	4.19	10.42	10.75
89	NDCor-90	91.03	135.93	6.26	14.86	81.84	6.69	8.46	37.03	4.29	9.62	12.56
90	NDCor-91	90.03	122.53	5.86	14.66	71.44	6.09	7.86	37.03	3.19	9.62	12.05
91	NDCor-92	91.03	135.13	5.86	13.16	73.24	5.69	8.26	42.83	3.49	11.19	13.01
92	NDCor-93	88.03	135.13	6.26	13.46	79.84	5.89	7.86	37.63	4.89	10.22	11.29

93	NDCor-94	89.03	133.13	6.06	12.56	75.24	6.29	8.46	36.43	3.09	9.89	10.65
94	NDCor-95	92.03	135.73	6.06	13.86	70.84	6.69	8.06	35.83	3.69	11.19	12.12
95	NDCor-96	91.03	146.63	6.06	14.66	69.64	6.29	7.26	36.83	4.19	10.59	12.10
96	NDCor-97	88.03	136.73	6.46	13.26	70.64	6.29	8.26	36.63	5.09	10.29	9.34
97	NDCor-98	91.55	139.30	6.27	11.84	68.59	6.05	7.89	37.70	5.17	9.89	11.60
98	NDCor-99	90.55	138.70	5.67	13.44	74.59	7.05	9.09	38.10	4.37	11.49	12.05
99	NDCor-100	89.55	139.30	6.47	11.84	68.99	6.85	8.89	39.50	5.07	11.29	10.07
100	NDCor-101	88.55	143.50	6.27	12.44	77.79	6.45	7.89	35.70	4.27	10.89	10.64
101	NDCor-102	91.55	136.30	5.67	12.84	67.79	6.85	8.29	38.30	5.27	10.52	8.06
102	NDCor-103	90.55	140.10	5.87	12.74	72.19	6.65	7.09	38.50	5.27	11.12	9.28
103	NDCor-104	88.55	134.50	6.27	13.84	73.59	5.85	8.09	39.50	5.37	10.32	11.44
104	NDCor-105	90.55	133.50	6.07	13.04	67.79	6.25	8.09	39.30	5.17	10.32	11.45
105	NDCor-106	91.55	131.90	6.07	13.24	73.19	6.25	5.69	38.50	3.87	9.52	9.59
106	NDCor-107	87.55	131.70	6.27	13.04	75.99	5.65	5.29	37.50	4.17	8.82	8.27
107	NDCor-108	89.55	114.70	6.07	12.84	77.79	5.85	5.09	39.50	4.77	11.72	12.70
108	NDCor-109	91.55	99.70	5.67	13.84	67.99	5.85	6.09	38.30	4.27	11.52	9.23
109	NDCor-110	89.51	100.40	5.82	13.37	67.26	5.93	5.36	38.91	4.79	10.06	12.05

110	NDCor-111	87.51	135.00	6.42	12.57	79.46	5.93	5.56	37.71	4.29	11.66	11.86
111	NDCor-112	91.51	107.60	6.82	12.77	75.46	6.33	5.16	35.91	5.39	9.66	12.63
112	NDCor-113	91.51	126.80	6.22	14.77	69.66	5.33	5.56	33.91	5.29	9.86	11.82
113	NDCor-114	90.51	136.80	6.42	12.77	67.66	5.53	6.16	36.91	5.59	9.26	10.42
114	NDCor-115	88.51	137.00	7.22	13.97	69.26	5.53	5.16	37.91	4.79	9.26	10.48

115	NDCor-116	90.51	125.20	6.42	14.97	93.66	5.93	6.26	39.11	3.49	11.66	12.45
116	NDCor-117	90.51	119.40	6.82	12.77	77.66	5.73	5.36	37.11	3.19	9.86	11.27
117	NDCor-118	91.51	117.60	6.22	13.77	77.06	6.13	5.16	36.71	3.49	9.86	10.82
118	NDCor-119	89.51	115.40	7.22	14.97	68.06	5.93	7.16	36.51	5.59	11.26	10.08
119	NDCor-120	90.51	139.80	6.22	12.97	74.46	5.53	6.16	36.31	4.39	11.66	11.58
120	NDCor-121	88.51	129.00	6.42	13.77	80.66	6.53	8.16	35.31	4.79	10.76	10.65
121	HisarAnand	92.00	110.50	7.50	13.40	92.20	7.00	8.40	35.60	4.90	10.80	11.95
122	NDCor-2	89.00	127.60	6.40	14.40	98.20	6.00	9.60	36.20	5.80	8.56	12.40
118	NDCor-119	89.51	115.40	7.22	14.97	68.06	5.93	7.16	36.51	5.59	11.26	10.08
119	NDCor-120	90.51	139.80	6.22	12.97	74.46	5.53	6.16	36.31	4.39	11.66	11.58
120	NDCor-121	88.51	129.00	6.42	13.77	80.66	6.53	8.16	35.31	4.79	10.76	10.65
121	HisarAnand	92.00	110.50	7.50	13.40	92.20	7.00	8.40	35.60	4.90	10.80	11.95
122	NDCor-2	89.00	127.60	6.40	14.40	98.20	6.00	9.60	36.20	5.80	8.56	12.40

Mean	**89.83**	**130.02**	**6.37**	**13.54**	**77.29**	**6.23**	**7.88**	**37.43**	**5.13**	**10.14**	**11.20**
Std. Dev.	1.85	12.28	0.71	1.03	9.12	0.63	1.26	1.66	1.08	0.90	1.31
Std. Error	0.17	1.11	0.06	0.09	0.83	0.06	0.11	0.15	0.10	0.08	0.12
C. V.%	2.06	9.44	11.16	7.62	11.80	10.05	16.04	4.43	21.14	8.84	11.68
Lowest	84.21	99.70	4.62	11.80	66.42	4.84	5.09	32.06	2.47	8.01	7.86
Highest	94.63	151.02	9.22	16.31	99.28	9.13	9.89	42.83	7.84	12.47	14.39
LSD_1	1.47	2.84	0.07	0.16	1.63	0.10	0.12	0.84	0.05	0.20	0.15
LSD_2	4.67	8.98	0.24	0.51	5.15	0.34	0.37	2.65	0.16	0.63	0.48
LSD_3	5.72	11.00	0.30	0.63	6.31	0.41	0.46	3.25	0.20	0.77	0.59
LSD_4	4.24	8.16	0.22	0.46	4.68	0.31	0.34	2.41	0.15	0.57	0.44

LSD_1 = Least significant difference between two check means.
LSD_2 = Least significant difference between adjusted mean of two genotypes in same block.
LSD_3 = Least significant difference between adjusted mean of two genotypes in different block.
LSD_4 = Least significant difference between adjusted mean of genotype and check mean.

Table 3: 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 (%)**	**Genetic advance**	**Genetic advance in percent of mean**
	Min.	**Max.**						
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Days to 50% flowering	84.21	94.63	89.83	-0.37	1.58	-5.35	-0.20	-0.22
Plant height (cm)	99.70	151.02	130.03	8.79	9.05	94.32	29.35	22.54
Branches / plant	4.62	9.22	6.38	10.62	10.69	98.73	1.77	27.86
Fruiting nodes/ plant	11.80	16.31	13.54	7.24	7.33	97.35	2.55	18.85
Umbels/plant	66.42	99.28	77.29	11.13	11.33	96.59	22.24	28.89
Umbellate/umbel	4.84	9.13	6.24	9.40	9.56	96.80	1.52	24.43
Fruits/umbellate	5.09	9.89	7.89	15.01	15.08	99.00	3.10	39.42
Fruits/umbel	32.06	42.83	37.43	3.48	4.13	71.11	2.90	7.75
Umbel diameter (cm)	2.47	7.84	5.13	19.85	19.87	99.73	2.68	52.33
Test weight (g)	8.01	12.47	10.14	8.18	8.41	94.65	2.13	21.01
Yield/plant (g)	7.86	14.39	11.20	10.96	11.04	98.48	3.21	28.71

The phenotypic and genotypic coefficients of variation for all the eleven characters have been given in table 4.3. In general, the magnitude of phenotypic coefficient of variation was higher than corresponding genotypic coefficient of variation for all the characters.

The high estimates (>20%) of phenotypic (PCV) and genotypic (GCV) coefficients of variation were not recorded for any characters. Moderates estimates (>10% - <20%) of PCV and GCV were noted for umbel diameter (PCV=19.87%, GCV=19.85%) and fruits per umbellate (PCV=15.08%, GCV=15.01%) whereas, the low estimates (<10%)of phenotypic and genotypic coefficients of variations were observed for umbels per plant (PCV=11.33%, GCV=11.13%), yield per plant (PCV=11.04%, GCV=10.96%), branches per plant (PCV=10.69%, GCV=10.62%), umbellate per umbel (PCV=9.56%, GCV=9.40%), plant height (PCV=9.05%, GCV=8.79%), test weight (PCV=8.41%, GCV=8.18%), fruiting nodes per plant (PCV=7.33%, GCV=7.24%), fruits per umbel (PCV=4.13%, GCV=3.48%), and days to 50% flowering (PCV=1.58%, GCV=-0.37%),

The high heritability (>75) was expressed inumbel diameter (99.73), fruits per umbellate (99.00), branches per plant (98.73), yield per plant (98.48), fruiting nodes per plant (97.35), umbellate per umbel (96.80), umbels per plant (96.59), test weight (94.65),plant height (94.32) and moderate heritability (50-75) was expressed for fruit per umbel (71.11) while, days to 50% flowering (-5.35) characters showed low estimate of heritability (<50) in broad sense.

The highest genetic advance (>20) was expressed by plant height (29.35) followed by umbels per plant (22.24) and low genetic advance (<10) was expressed by yield per plant (3.21), fruits per umbellate (3.10), fruit per umbel (2.90), umbel diameter (2.68), fruiting nodes per plant (2.55), test weight (2.13), branches per plant (1.77), umbellate per umbel (0.70) and days to 50% flowering (-0.20).

Genetic advance in percent of mean was highest (>20)in case of umbel diameter (52.33) followed by fruits per umbellate (39.42),umbels per plant (28.89), yield per plant (28.71),branches per plant (27.86), umbellate per umbel (24.43), plant height (22.54), test weight (21.01) and moderately (10-20) in fruiting nodes per plant (18.85), while

low genetic advance (<10) in percent of mean was showed infruits per umbel (7.75) and days to 50% flowering (-0.22).

In the present study, 120 genotypes of coriander, including 2 checks, showing wide spectrum of variation for various characters, were evaluated under irrigated condition during *Rabi* 2014-15. The experiment was conducted following Augmented Design at Main Experiment Station, Narendra Deva University of Agriculture and Technology, Narendra Nagar, Kumarganj, Faizabad. The observations were recorded on eleven quantitative characters *viz*. Days to 50% flowering, branches per plant, fruiting nodes per plant, umbels per plant, umbellates per umbel, fruits per umbellate, fruits per umbel, umbel diameter (cm), plant height (cm), test weight (g) and yield per plant (g).

The analysis of variance for augmented design (Federer, 1956) revealed highly significant differences among the checks for all the characters, except effective umbellates per umbel. The assessment of existing variability in coriander germplasm and identification of superior genotypes for different characters were done by comparing the test genotypes with check and with best genotypes for each character using least significant difference values. The nature of associations among characters was studied by using simple correlations (Searle, 1961) [9] and Non-hierarchial Euclidean Cluster analysis (Beale, 1969; Spark, 1973) [3, 12] was used to examine genetic divergence existing in coriander genotypes evaluated.

Heritability estimates assess the amount of transmissible genetic variability to the total variability and happens to most important basic factor that determines the genetic improvement or response to selection. However, the degree of improvement attained through selection is not only depending upon heritability but also on the amount genetic variation present in breeding population and extent of the selection pressure applied by the breeder. The estimates of heritability in broad sense were higher for all the characters. High values of heritability suggest the major role of genotypic constitution in the expression of character. In the present study, the estimates of heritability in broad sense ranged from -5.35 (days to 50% flowering) to 99.73 (umbel diameter). The highest heritability per cent was observed for umbel diameter followed by fruits per umbellate, the findings of present study are in agreement with those of Reddy *et al.* (1989) [7], Sanker and Khader (1991) [8], Bhandari *et al.* (1993) [4], Tripathi *et al.* (2000) [3], Rajput and Singh (2003) [6], Singh *et al.* (2006) [11] and Singh *et al.* (2008) [10].

The highest genetic advance was expressed for plant height followed by umbels per plant, and fruits per umbellate, while lowest genetic advance was showed for days to 50% flowering followed by umbellate per umbel and branches per plant. The findings of present study are in agreement with those of Ali *et al.* (1993), Rajput and Singh (2003) [6] and Singh *et al.* (2008) [10].

The genetic advance in percent of mean was highest for umbel diameter followed by fruits per umbellate and umbels per plant, while lowest genetic advance in percent of mean was showed in days to 50% flowering followed by fruits per umbel and fruiting nodes per plant. The findings of present study are in agreement with those of Rajput and Singh (2003) [6] and Singh *et al.* (2008) [10].

Reference

1. Agnihotri P, Dashora SL, Sharma RK. Variability, correlation and path analysis in fennel (*Foeniculum vulgare* Mill) J Spices and Aromatic Crops. 1997; 6(1):51-54.
2. Ali SA, Mishra RK, Yadav LN, Maurya KN. Variability and correlation studies in coriander (*Coriandrum sativum L.*) Inter. J Trop. Agri. 1993; 11(1):40-42.
3. Beale EML. Euclidean cluster analysis. Bull. Int. Stat. Inst. 1969; 43:92-94.
4. Bhandari MM, Gupta A. Divergence analysis in coriander. The Ind. J of GPB. 1993; 53(1):71-75.
5. Burton GW, De Vane EW. Estimation of heritability in tall fescue (*Fistuea arundicea*) from replicated clonal materials. Agric. J. 1953; 45:178-181.
6. Rajput SS, Singh D. Variability in coriander (C*oriandrum sativum* L.) for yield and yield components. J Spices and Aromatic Crops. 2003; 12(2):162-164.
7. Reddy PV, Rao TSR, Rao SBSN, Reddy AN. Genetic variability in coriander. Indian Cocoa, Arecanut and Spices J. 1989; 12(3):90-92.
8. Sankaer KB, Khader MA. Studies of genetic variability in coriander. South Ind. Hort. 1991; 39(3):312-314.
9. Searle SR. The value of endive of selection. Mass Selection Bio metrica. 1961; 21:682-709.
10. Singh SP, Katiyar RS, Rai SK, Yadav HK, Tripathi SM Nigam HK, Srivastava JP. Studies on genetic variability and character association in coriander (*Coriandrum sativum* L.) grown on sodic soil. J Medicinal and Aromtic Plant Sci. 2008; 30(2):164-167.
11. Singh SP, Prasad R, Singh D. Variability and character association of grain yield and its component characters in coriander. J Applied Bio sci. 2006; 32(1):64-67.
12. Spark DN. Euclidean cluster analysis algorithm. Appl. Stat. 1973; 22:126-130.
13. Tripathi SM, Kamaluddin, Srivastava SBL, Srivastva JP. Variability, heritability and correlation studies in coriander (*Coriandrum sativum* L.) J Spices and Aromatic Plants. 2000. 30-34.