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Short communication

Stability analysis in coriander (*Coriandrum sativum* L.)

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ABSTRACT

Stability studies were performed in 15 coriander genotypes including three checks during *rabi* 2007-08 to 2009-10. The G × E interaction showed non-significant differential response of the genotypes to the changing environments. Highly significant pooled deviation for all the characters except days to 50 percent flowering, days to maturity and number of umbels per plant and highly significant G × E (Linear) interaction for number of secondary branches and days to maturity indicated the preponderance of non-linear components of G × E interaction. The estimates of mean performance, regression coefficient and deviation from regression for different traits showed that the genotypes RKD 18 and RKD 16 are more stable and can be a useful source for varietal development as these are the widely adapted landraces under common cultivation at farmers' field in Kota region.

Key words: Coriander, variability, stability analysis.

Coriander is an important seed spice crop of Apiaceae family having a wide medicinal importance. India is the world's biggest producer, consumer and exporter of coriander. In Rajasthan (the major coriander producing state), zone V (districts of Kota, Bundi, Baran, Jhalawar) covers approximately 98 percent coriander area of the state. The local material of Kota is popular due to its adaptation to the prevailing environmental conditions as it has been grown here traditionally since long. It is having high demand in the market due to its pleasant aroma owing to its comparatively high essential oil content. The important traits including percent essential oil of these lines are provided in Tables 1 and 2. This local material is a good source of genetic variability mainly for essential oil and yield. Keeping this fact in view, a set of germplasm representing the local material of Kota region was evaluated to isolate the best entry having stability for high yield and essential oil. The experimental material for the present investigation comprising of 12 promising genotypes along with three state checks was laid out in randomized block design with three replications during *rabi* 2007-08 to 2009-10 at ARS, Kota. Each genotype was accommodated in eight rows of 4 m length with row to row and plant to plant spacing of 30 and 10 cm, respectively. The observations were recorded on five randomly selected plants in each plot in each replication in all the environments for all the traits except days to 50 percent flowering and maturity which were recorded on plot basis. The G × E interaction analysis was done as per Eberhart and Russel model (1).

The mean sum of squares due to environment + (G × E) was significant only for number of primary branches per plant, number of secondary branches per plant and days to maturity. The non-significant G × E (linear) interactions for all the characters except number of secondary branches and days to maturity and significant pooled deviation mean sum of squares for all the characters except days to 50 percent flowering, days to maturity and number of umbels per plant suggested the preponderance of non- inear component of genotype × environment interaction. It indicates that the genotypes differed with respect to the stability of these traits making the prediction of the performance of the genotypes more difficult. Similar results were earlier reported (Gangopadhyay *et al*., 2; Pan and Krishna, 3; Sastry *et al*., 4; Singh and Prasad, 5).

The estimates on the three stability parameters, mean performance, regression coefficient and deviation from regression for different traits are presented in Tables 1 & 2. The genotype having high mean with near unity bi and lowest S^2d_i are considered as an ideal genotype, stable over the environments. The genotypes RKD 13, RKD 11 and RKD 16 had mean lower than the population mean for flowering and maturity and are therefore, suitable for selection for earliness; but their bi > 1 (for days to 50 per cent flowering) indicates their high sensitivity to environmental conditions and can be recommended for cultivation in most favourable environment where there is not much fluctuation in temperature and humidity. The genotypes RKD 16 and RKD 27 were found stable with respect to plant height. These genotypes can be used for selection for dwarfness

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Table 1. Stability parameters for different traits in coriander.

Genotype	Days to 50% flowering			Plant height (cm)			No. of pri. br.			No. of sec. br.			No. of umbels per plant		
	Mean	b_i	S^2d_i	Mean	b_i	S^2d_i	Mean	b_i	S^2d_i	Mean	b_i	S^2d_i	Mean	b_i	S^2d_i
RKD 25	59.700	1.02	-2.71	90.400	1.64	-22.74	3.400	0.78	0.00	7.326	1.28	-0.03	15.833	0.88	44.74
RKD 29	59.367	1.20	-2.58	92.300	0.27	137.81	2.767	0.71	1.04	6.425	2.08	0.27	14.333	0.83	-2.41
RKD 21	59.500	0.56	-0.75	89.200	1.38	106.93	3.067	1.13	-0.04	6.361	0.79	-0.09	16.833	0.88	2.65
RKD 32	59.933	1.45	-2.56	93.233	0.86	74.07	3.100	1.18	-0.04	5.961	0.92	0.01	17.567	1.02	25.08
RKD 27	59.167	1.31	-2.25	81.500	0.94	-5.31	3.767	1.13	-0.02	7.592	1.31	1.23	14.433	0.43	18.00
RKD 10	58.733	1.39	-2.24	82.667	0.52	-14.52	3.567	1.22	0.19	7.26	0.40	-0.10	18.300	1.06	11.23
RKD 3	61.400	1.18	0.95	88.167	0.73	35.37	3.667	0.91	0.21	7.327	0.55	1.04	18.067	1.17	4.23
RKD 18	58.933	1.44	-1.88	76.600	1.71	50.71	3.500	1.27	0.07	7.827	-0.20	0.01	19.267	1.18	-0.54
RKD 11	58.167	1.31	-0.71	77.633	1.11	45.18	3.400	0.88	0.15	6.76	0.77	-0.07	15.767	0.79	-2.00
RKD 13	55.833	1.50	-2.24	94.067	0.88	26.02	3.200	0.85	0.45	6.425	2.08	0.27	15.133	0.69	43.16
RKD 16	58.333	1.50	-2.78	82.650	1.28	-24.43	4.200	1.60	0.50	8.327	-0.25	0.00	21.267	1.28	-2.05
RKD 23	58.833	1.23	-1.70	91.367	0.67	70.92	3.500	0.63	-0.03	7.759	1.16	2.12	15.433	0.82	1.84
CS 6 (C)	59.867	0.64	-1.83	86.500	0.90	-6.71	3.233	1.14	0.22	6.126	1.70	0.14	18.233	1.25	-2.23
RCr 41 (C)	65.000	-1.11	29.46	89.500	0.11	-24.95	3.433	0.46	0.33	6.694	0.88	1.10	26.200	2.03	443.68
RCr 436 (C)	60.333	0.38	-2.78	79.100	2.01	-2.42	3.067	1.11	0.29	6.126	1.54	0.28	13.967	0.68	47.04
Mean	59.54			86.32			3.39			6.95			17.37		

Table 2. Stability parameters for number of umbellets per plant, days to maturity, seed weight, yield (kg/ha), essential oil content in coriander.

Genotype	No. of umbellets per plant			Days to maturity			Seed weight (g)			Yield (kg/ha)			Essential oil content (%)		
	Mean	b_i	S^2d_i	Mean	b_i	S^2d_i	Mean	b_i	S^2d_i	Mean	b_i	S^2d_i	Mean	b_i	S^2d_i
RKD 25	55.700	0.82	390.84	103.333	0.90	-27.28	11.673	0.92	-0.96	1239.333	1.53	34558	0.200	0.00	0.00
RKD 29	51.033	0.36	224.77	103.333	0.90	-27.28	10.818	1.22	-1.05	1181.333	0.61	3198	0.300	3.10	0.01
RKD 21	58.867	0.05	45.63	102.167	0.98	-29.85	11.459	0.83	1.93	1461.000	-0.21	338646	0.300	-1.59	0.01
RKD 32	63.733	1.36	27.24	102.667	0.89	-30.33	11.589	1.95	-0.90	1174.000	0.20	-8691	0.267	-0.15	0.01
RKD 27	56.467	0.61	-18.22	100.167	0.98	-29.85	11.575	1.14	3.23	994.667	2.03	57585.27	0.387	-0.06	0.00
RKD 10	52.300	1.17	271.34	101.333	0.77	-29.91	11.144	0.82	-1.05	849.000	1.93	36602.79	0.407	0.56	0.00
RKD 3	64.733	1.46	315.09	104.167	0.87	-20.19	11.085	0.94	-0.94	898.000	2.17	-7057.17	0.340	0.97	0.01
RKD 18	56.967	1.00	-21.97	101.333	0.83	-30.05	11.712	1.42	0.15	1481.333	0.01	-9091	0.413	-0.56	0.00
RKD 11	59.300	1.27	21.06	102.000	0.78	-29.40	12.455	0.95	0.69	1092.333	0.11	39040	0.393	-0.03	0.00
RKD 13	59.367	1.32	113.41	100.000	0.59	-30.31	11.334	1.40	-0.67	1474.333	1.52	18861	0.267	2.95	0.00
RKD 16	66.633	0.82	776.07	101.000	0.83	-30.27	10.966	0.88	-0.98	1277.333	2.50	387734	0.407	0.47	0.00
RKD 23	62.567	1.28	356.21	101.833	1.04	-29.16	11.057	1.50	0.09	1074.000	1.67	-8223	0.220	5.85	0.00
CS 6 (C)	63.767	1.41	7.19	105.167	1.16	-30.00	11.850	0.69	0.41	1220.000	0.84	-6862	0.167	-2.81	0.00
RCr 41 (C)	73.367	1.40	2416.45	112.667	2.30	28.88	8.597	0.61	3.42	1031.667	0.65	10562	0.313	2.72	0.01
RCr 436 (C)	49.633	0.70	372.43	104.833	1.16	-28.38	8.461	-0.27	10.61	1044.333	-0.55	6269	0.327	3.57	0.00
Mean	59.62			103			11.05			1166.17			0.31		

and lodging resistance due to their mean lower than the population mean. For number of primary branches per plant, RKD 25, while for number of secondary branches per plant, RKD 16 and RKD 18 were the most stable genotypes due to highest mean value, bi < 1 and zero deviation from regression. For number of umbels per plant, the genotypes RKD 16 and RKD 18 were found to be stable over the environments. For number of umbellets per plant, RKD 16 with mean higher than the population mean, bi < 1 indicates above average stability but due to high values of S^2di, this genotype is expected to give good yield under favorable environmental conditions only while RKD 18 with mean lower than the population mean but bi equal to unity and non-significant S^2di value can be said to be the stable genotype.

The genotypes RKD 18, RKD 16, RKD 10, RKD 11 and RKD 27 were found highly stable over the environments for essential oil content. For the most complex and important character seed yield, RKD 18 having highest mean than the population mean, bi near to zero (absolute stability) and non-significant S^2d_i value proved to be most stable over environments. In the present investigation, different genotypes stable for yield through their different component characters were identified. Based on the stability parameters, it is concluded that the stability of yield is imparted in the genotypes RKD 16 and RKD 18 through the number of secondary branches, number of umbels and umbellets per plant. These stable genotypes can be further used for varietal development programme in coriander.

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