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STABILITY ANALYSIS IN CORIANDER (*CORIANDRUM SATIVUM* L.)

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ABSTRACT

Twelve lines of coriander (*Coriandrum sativum* L.) were evaluated over five years for grain yield and its components. The varieties exhibited significant differences for most of the traits. Joint regression analysis suggested that both predictable and unpredictable components contributed significantly towards the differences in stability of lines for various characters. Varieties UD-1, UD-20, PS-360, CS-2 and CS-4 were found to be stable for grain yield. Evidence for and against the theory that the stability of grain yield is dependent on the stability of yield components was found.

Key words: Stability, coriander.

A desirable variety should possess high stability of performance besides high yield. The same is true for coriander also. Therefore, data on grain yield and related morphological traits obtained on a number of promising lines of coriander were subjected to stability analysis to obtain information on genotype × environment interaction.

MATERIALS AND METHODS

Twelve promising genotypes were evaluated from 1980–81 to 1984-85 in RBD with four replications. The plot size was 4 m × 2.4 m, accommodating six rows spaced at 40 cm. Each plot accommodated one genotype. At maturity, data were recorded on a random sample of 10 plants per plot, except for days to flowering and maturity, and grain yield, which were recorded on plot basis. The plot means were used for statistical analysis [1].

RESULTS AND DISCUSSION

Environment (year)-wise analysis of variance revealed that significant differences existed among varieties under each environment (year) for all the characters. The pooled analysis also revealed significant differences among varieties for most of the traits, indicating that real differences existed among the varieties (Table 1). The environmental effects were also highly significant for all the traits, indicating that years influenced widely the performance of varieties. Highly significant G × E interactions were obtained for most of the traits except branches/plant. The joint regression analysis revealed that the components of G × E interaction was highly significant for all the characters, except branches/plant, indicating that the genotypes had divergent linear response to environmental changes, while significant pooled deviation suggests that deviation from linear regression also contributed substantially towards the differences in stability of genotypes. Thus, it can be concluded that both predictable (linear) and unpredictable (nonlinear) components contributed significantly to the differences in stability among genotypes. However, nonsignificance of both predictable and nonpredictable components for branches/plant indicates that genotypes responded nonlinearly to the change in environment.

Table 1. Joint regression analysis for different characters tested over five environments

Source	d.f.	Mean sum of squares							
		days to flowering	plant height	branches per plant	umbels per plant	umbellets per plant	grains per umbel	1000-grain weight	grain yield
Varieties (V)	11	306.8**	131.1**	3.2	72.2**	0.7**	136.4**	25.2**	0.10**
Environments (E)	4	269.0**	479.4**	7.8*	418.9**	10.5**	450.9**	2.0**	1.19**
V × E	44	14.0**	20.5**	0.4	15.1**	0.3**	15.4**	0.6**	0.02**
E (linear)	1	1075.8**	1917.6**	31.2**	1675.7**	42.1**	1803.7**	7.9**	4.77**
E + (V × E)	48	35.3**	58.7**	1.0	48.7**	1.1**	51.7**	0.7**	0.12**
V × E (linear)	11	19.9**	29.1**	1.1	18.8**	0.7**	23.3**	1.2**	0.04**
Pooled error	180	1.5	11.8	3.0	0.4	0.1	7.8	0.2	0.01

*, **Significant at 5% and 1% levels, respectively.

As per the stability parameters given by Eberhart and Russell [1], the S^2d estimates for grain yield were nonsignificant for most of the varieties except UD-20, UD-41 and UD-373, thus, these varieties are unstable for grain yield (Table 2).

Table 2. Mean values and stability parameters in coriander for grain yield

Variety	Mean yield, kg/plot	b	S^2d
UD-1	0.64	1.21**	−0.0001
UD-20	0.76	1.55**	0.0254
UD-21	0.58	0.85**	0.0089
UD-41	0.75	1.22**	0.0520
UD-373	0.79	1.19**	0.0165
UD-374	0.69	0.61*	−0.0073
GAU-1	0.67	1.29**	0.0100
PS-360	0.66	0.91**	0.0028
CS-2	0.47	1.04**	0.0024
CS-4	0.50	0.83**	0.0010
CS-6	0.35	0.52*	−0.0046
CS-7	0.48	0.78**	−0.0057

*, **Significant at 5% and 1% levels, respectively.

The stable varieties generally had mean close to the general mean of the character. Varieties UD-1, UD-21, PS-360, CS-2 and CS-4 are stable as they had regression coefficient near unity. The S^2d estimates nonsignificantly deviated from zero and means were near the general mean of the characters. It is interesting to note that varieties GAU-1, UD-41 and UD-373, having higher means and regression coefficients than unity, are better suited to better management conditions. Varieties CS-6 and CS-7 had lower regression coefficient ($b<1$), hence both are suitable for poor management conditions.

In coriander, high positive association has been reported between grain yield and plant height, branches and umbels per plant, umbellets and grains/umbel, and straw yield/plant [2, 3]. Thus, these traits can be termed as main yield components in coriander. The lines which showed stability for grain yield in this investigation also showed stability for one or two yield components. Variety UD-1 was found stable for days to flowering and grains/umbel. Similarly CS-2 and CS-4, which exhibited suitability for below average conditions, had below average stability ($b<1$) for most yield components. The interrelationship among yield components is complex and mostly, negative, therefore, a linear relationship between the stability of yield and its components may not always be observed. Variety UD-41 had high grain yield, the value of b more than 1 suggests above average stability for plant height, branches and umbels/plant, but it is tall and has longer duration of flowering.

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