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STABILITY FOR SEED YIELD AND ITS COMPONENTS IN TORIA (*BRASSICA CAMPESTRIS*)

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ABSTRACT

The stability analysis in 30 toria genotypes for six characters (No. of primary and secondary branches, seeds/siliqua, 1000-seed weight, and seed yield/plant), grown over three locations on two dates of sowing thus making six environments, was done and significant G × E interactions were revealed. The linear G × E component for primary and secondary branches, seeds/siliqua, 1000-seed weight, and seed yield was significant and predictable. This indicated that the performance of genotypes over environments for these traits could be predicted. The nonlinear component of G × E was significant for siliquae/plant, 1000-seed weight, and seed yield. Genotypes TH 69, TH 84, TK 8403, TGC-2, and Sangam showed average stability.

Key words: Toria, *Brassica campestris*, genotype–environment interaction, stability analysis.

The significance of evolving stable and high yielding genotypes of oilseed crops to increase production is now receiving due attention of the plant breeders. However, the information on toria is very scanty. The present study has been undertaken to identify stable, early maturing, and high yielding toria varieties which could fit in various agroclimatic regions of the Haryana State.

MATERIALS AND METHODS

Thirty indigenous toria genotypes collected from Haryana, Punjab, Uttar Pradesh, Assam and West Bengal were grown in six environments at three locations (Hisar, Karnal and Kaul) on two sowing dates (6 and 20 September, 1985). Each genotype was sown in six environments in single rows of 4 m length, spaced at 30 cm with 15 cm plant-to-plant distance and three replications in randomized block design. Observations on five random plants from each plot were recorded for six quantitative traits (Table 1). The data were subjected to analysis of variance following the technique of Panse and Sukhatme [1]. Stability analysis was done as per Eberhart and Russell [2]. During crop growth period, the recommended package of practices were followed for raising a normal crop. However, the September sown crop was damaged at Hisar due to adverse weather at pod formation stage. At other locations, viz. Karnal and Kaul, this damage was negligible.

RESULTS AND DISCUSSION

ENVIRONMENTAL RESPONSE OF GENOTYPES

The analysis of variance conducted for six traits in six environments of the study (Table 1) indicated presence of significant variability of genotypes for all the characters. The pooled analysis of variance (Table 1) indicated presence of significant variability of genotypes for all the characters. The pooled analysis of variance (Table 1) revealed that both linear and nonlinear components of G × E interaction were significant for 1000-seed weight and seed yield/plant, whereas the linear component of G × E was significant for number of primary branches, secondary branches, and seeds per siliqua; the nonlinear component was significant only for siliquae/plant. This indicated that predictions of performance for seed yield and 1000-seed weight were possible over different environments. However, such predictions for the remaining traits would be difficult as the genotypes differ considerably in stability. The significant G × E (linear) for number of primary and secondary branches/plant and seeds/siliqua indicates that major portion of interaction was linear and prediction for these traits is possible across environments.

Table 1. Analysis of variance for seed yield and its components in toria

Source	d.f.	Mean squares					
		primary branches	secondary branches	siliquae per plant	seeds/ siliqua	1000-seed weight	seed yield per plant
Genotypes	29	0.84	4.69	6512.1**	17.3*	0.25	9.73**
Environment + (environment × genotypes)	150	1.71	7.42	4251.1	7.4	0.45	9.68
Environment (linear)	1	145.11**	317.08**	14976.2**	879.9**	32.25**	829.73**
Genotype × environment (linear)	29	2.06*	8.74*	2317.8	14.9*	0.44**	5.85*
Pooled deviation	120	0.74	4.52	2128.9**	5.1	0.18**	3.77*
Pooled error	348	1.72	12.65	3088.3	10.4	0.16	2.87

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

Assessment of the genotypes based on individual parameters of adaptability (X_i, b_i and S^2d_i) for seed yield revealed that the highest yielder genotype TK-8403 has average stability for this trait. This genotype is also stable for secondary branches and siliquae/plant. TH-90 was found unstable for seed yield but stable for all other characters. TH-84, a variety ranking third, shows stability for all the characters except seeds/siliqua. This genotype exhibited above average performance for seed yield, primary branches, and siliquae/plant. TH-84 also showed above average response for secondary branches and seed yield, below average response for seeds/siliqua and average response for the remaining characters. All the remaining top ranking genotypes, TH-80, LTC-1, TH-92 and TKH-2, were unstable for seed yield. TH-69 was stable for yield and other characters except siliquae/plant. It also gave above average response for secondary branches. Based on their characteristics described above, these varieties can be used to evolve improved toria varieties suited to the various agroclimatic regions of the Haryana State.

Table 2. Genotypes with highest mean, maximum responsiveness and stability for different traits

Character	Best performer	Most responsive	Most stable
Number of primary branches	TK-8403	TH-80	TH-90
Number of secondary branches	TH-84	TH-69	Shamgarh
Siliquae/plant	TH-80	TH-80	None
Seeds/siliqua	Sangam	None	TH-94
1000-seed weight	TH-98	None	TH-93
Seed yield/plant	TK-8403	TH-80	T-9

VARIETY SUITABLE TO VARYING AGROCLIMATIC CONDITIONS

While the genotypes TH-69, TH-90, TK-8403, Sangam and TH-92 possess average and genotypes TH-80 and TH-84 possess above average stability, TH-80 was found to be more unstable (Table 2). It is, therefore, evident that TH-69, TH-90, TK-8403, Sangam and TH-92 are suitable under all conditions. TH-84 produces maximum number of secondary branches and is particularly good for rich environments. Another genotype, Shamgarh, is stable for number of secondary branches and is also better for poor yielding environments. Labana, Badwal and Chaurasia [3] in Indian mustard and Singh and Gupta [4] in toria also identified stable genotypes for seed yield and maturity.

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