Table 3. Mean yields and parameters of stability of different genotype

Genotypes	Mean grain yield (g/ha)	bi	S^2di
PSC 12	8.98	1.6218	-0.014
PSC 1	8.15	1.2604	-0.010
PSC 9	8.07	1.5500	-0.015
IPS 147-1	7.94	1.0531	0.018
PSC 11	7.49	0.5518	0.098
PSC 3	6.99	1.5128	0.003
PSC 4	5.73	0.4172	0.022
Local	2.11	0.0009	-0.006
Mean	6.93		

deviation when tested against pooled error was found to be non significant. It suggested that it is possible to predict the performance of genotypes across the environments as was reported by Pandey (1983).

Based on the stability parameters worked out (Table 3) it can be said that, PSC 1 and IPS 147-1 with high mean performance were found to be the most stable genotypes.

PSC 9 and PSC 12 though possess high mean performance, are suitable to favourable environments because of their high responsiveness to environments, whereas PSC 11 with average mean performance can be suggested for poor environments owing to its low 'bi' values. Therefore, PSC 1, a high yielding stable genotype can be considered for recommendation to the zone.

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PHENOTYPIC STABILITY FOR SEED YIELD IN INDIAN RAPE

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ABSTRACT

The performance of 11 diverse promising genotypes of Indian rape (**Brassica campestris** L. var. toria) evaluated for genotype x environment interactions for seed yield in four environments revealed that the genotypes interacted considerably with environmental conditions. Both linear and non-linear components were significant. Genotypes Sangam, TGC 1, PT 507 B and T 9 performed better especially in high yielding environments. Out of these, except TGC 1, all had large deviation values from regression. Genotypes TLC 1, TK 6 and TH 63 were found promising under less favourable situations. PT 43 had almost unit responses to the changing environmental conditions and was a stable genotype; However, it was a low yielder.

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KEY WORDS : Indian Rape, Genotype-Environment interaction, stability.

Indian rape or toria (*Brassica campestris* L.) var. toria) is a short duration oilseed crop in rapeseed mustard group. It is generally grown in the intervening period of rainy season and winter season as a catch crop. Breeders aim at evolving strains which may give maximum mean economic yield over environments and show consistent performance. Since the yield potential of this crop is low, it is desirable to evaluate the performance of promising genotypes in varying environmental conditions so as to identify the promising genotype for further exploitation and improvement. Since information available on genotype x environment interaction is scanty in case of toria, diverse genotypes were evaluated for G x E interactions for seed yield for identifying the high yielding stable genotype for the region.

MATERIAL AND METHODS

The performance of 11 diverse promising genotypes of toria was evaluated for seed yield in randomized block design with three replications during winter seasons of 1982-83 to 1984-85 consisting of four environments. During 1982-83 and 1983-84, the crop was sown in the first fortnight of October with three irrigations. In 1983- 84 the crop was also sown in first fortnight of November with two irrigations, whereas, in 1984-85, the crop was sown with one irrigation only in first fortnight of November. The level of irrigation was 5 cm each, and was given at critical stages of crop growth in all the environments. The plot size was 7.5 m^2. The seeds were sown in lines with inter and intra row spacings of 40 cm and 10 cm, respectively, in all the environments. The crop received a basal dressing of 20 kg N/ha and 20 kg P/ha during all the years. Top dressing of 20 kg N/ha was done at the time of first irrigation during 1982-83, 1983-84 (first fortnight of November), whereas no top dressing was done in year 1984-85. The stability parameters of different genotypes were computed on the basis of mean performance (q/ha) over years, using

Table 1. Estimate of stability parameters (mean, b and $S^{-2}d$) for seed yield (g/ha) in toria.

Genotypes	1982-83 First fortnight of Oct.	1983-84 First fortnight of Nov.	1983-84 First fortnight of Oct.	1984-85 First fortnight of Nov.	Mean	'b'	$s^{-2}d$
TSC-1	15.79	8.90	14.70	0.97	10.09	1.32	0.02
ITSA -1	14.81	4.45	11.50	1.02	7.95	1.16	6.38**
TLC 1	11.68	6.37	10.70	3.24	8.00	0.75	0.79**
TSC 3	11.58	5.71	11.00	2.13	7.61	0.86	1.10**
TWC 3	11.93	7.15	9.50	2.02	7.65	0.82	0.10
Sangam	15.58	10.90	12.50	1.60	10.15	1.15	1.77**
TH 63	11.16	10.68	13.00	1.91	9.19	0.90	4.69**
TK 6	11.30	11.40	13.50	2.31	9.63	0.88	6.27**
PT 43	12.28	7.94	12.50	1.95	8.67	0.96	0.24
PT 507 B	15.93	8.16	12.50	2.33	9.73	1.12	1.65**
T 9	14.63	10.40	11.20	1.02	9.31	1.10	2.79**
Mean	13.33	8.37	12.06	1.86	8.91	1.00	
SEm±	0.28	0.19	0.42	0.18			
CD 5%	0.80	0.54	1.22	0.53			

* Significant at P = 0.01

Table 2. Analysis of variance for genotype x environment interactions for seed yield in toria

Source	df	MS
Genotypes	10	3.78**
Env. + (Geno. x Ev.)	33	28.92**++
Env. (linear)	1	873.26**++
Genotype x Environment (linear)	10	2.72**
Pooled deviation	22	2.45**
Pooled error	80	0.08

**P = 0.01 against pooled error
++P = 0.01 against pooled deviation

statistical model suggested by Eberhart and Russell (1966).

RESULTS AND DISCUSSION

The differences due to genotypes were significant during all the seasons. The mean seed yield of all the genotypes ranged from 7.61 q/ha to 10.19 q/ha (Table 1). The environmental mean for seed yield was the highest in 1982-83 (13.33 q/ha) followed by 1983-84 (12.06 q/ha) when crop was sown in first fortnight of October and received three irrigations. In 1983-84 and 1984-85 when crop was sown in first fortnight of November in two and one irrigations, respectively. It was 8.37 and 1.02 q/ha. Genotype 'Sangam' gave the highest mean seed yield followed by 'TGC 1' (10. 15 and 10.09 q/ha, respectively). Pooled analysis of variance (Table 1) showed that mean differences between the genotypes and the environments were significant. This revealed that there was enough variability amongst the genotypes as well as environments under the study. Highly significance mean squares due to environment plus genotype-environment interactions revealed that the genotypes interacted considerably with environmental conditions that existed in different situations. Both linear and non-linear components were significant. Similar results were also reported by Singh and Gupta (1983) for seed yield per plant in toria.

In the final selection of genotypes, it is usually considered necessary to identify genotypes performing well under high, medium and low yielding environments. Study of genotype-environment interactions lead to successful classification of stable genotypes performing well under such situations, which could be used in future breeding programmes. Different measures of stability have been used by various workers. Earlier, Finlay and Wilkinson (1963) considered linear regression as a measure of stability. Eberhart and Russell (1966) emphasized the need for considering both linear (b) and non-linear components of genotypes x environmen interactions in judging the stability o genotype. Later, Breese (1969), Samuel *et al.* (1970) and Paroda and Hayes (1971) emphasised that linear regression coulc simply be regarded as a measure of response of a particular genotype, whereas, deviation around regression ($S^{-2}d$) is the most suitable measure of stability, genotypes with the lowest deviation around the regression ($s^{-2}d$) being the most stable and *vice versa*. Accordingly, it was possible to judge the stability of the genotypes, out of 11 genotypes investigated, Eight genotypes had significant deviation from regression for seed yield (Table 1). Genotypes, 'Sangam', and 'TGC 1' indicated higher yield potential over other. These genotypes were responsive to favourable growing conditions, particularly 'TGC 1' as reflected by higher value of regression (b = 1.32). 'TGC 1' had low deviation value from regression and was a stable genotype, whereas 'Sangam' had large deviation value. The other genotypes performing well under favourable conditions and had high deviation values were 'PT 507 B' and 'T 9'. 'PT 43' had responses approaching near unity under fluctuating environmental conditions and was a stable genotype as it has less deviation value. However, this genotype was a low yielder as its mean seed yield was less than the population mean seed yield. 'TLC 1' performed the best under low yielding environments, especially in year 1984-85, as reflected by low value of regression. 'TWC 3' and 'TGC 3' also performed better under low yielding environments but all these genotypes had low mean seed yield and large deviation values. However, genotypes like 'TK6' and 'TH 63' had high mean seed yield and performed better under low yielding environments.

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INDUCED POLYGENIC VARIABILITY IN RICE

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ABSTRACT

Two short duration rice varieties ADT 31 and Co 33 were subjected to induced mutagenesis with three doses each in gamma rays and EMS with a view to findout the economic potentiality of viable mutants and to study the nature of induced variability in M2 generation. Significant shift in the mean value was observed in different mutagen treatments for all characters except panicle length in ADT 31 and Co 33. The mean plant height decreased in Co 33. Grain yield significantly increased in all the three mutagen treatments with gamma rays in Co 33. The genotypic variance in M2 was of higher magnitude in most of the treatments as compared with the control. High heritability combined with higher genetic advance was observed in all the treated populations for plant height, productive tillers and plant yield except 120mM EMS treated population in Co 33 indicating that the induced genetic variation was due to additive effect. The magnitude and heritable portion of the induced variations differed with the genotype, character and mutagen.

KEY WORDS : Rice, Induced mutagenesis

Induced mugagenesis in self-fertilized annual species of crop plants has resulted in an enhanced genetic variability in quantitative characters associated with productivity. An important aspect of mutation breeding has been the quick mutational rectification of defects in varieties besides induction of polygenic mutations and development of ideotypes for varied agroclimatic conditions. As many as 68 mutants of rice have been evolved through induced mutagenesis and recommended for cultivation in different situations (Sharma, 1985). The present study was undertaken to find out the economic potentiality of viable mutants and to observe the nature of induced variability