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GENOTYPE ENVIRONMENT INTERACTION AND STABILITY ANALYSIS IN BLACKGRAM

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ABSTRACT

A set of 21 premising genotypes of blackgram were evaluated in Summer, Kharif and Rabi seasons during 1983, 1984 and 1985. Pooled analysis of variance indicated significant differences among the genotypes and the environments. Moreover the genotype x environment interaction was highly significant indicating differential performance of the genotypes under varied environmental conditions. The genotypes UG 301, OBG 2, UH 28, OBG 1, UG 191 and T 9 showed higher yield and stability of yield performance. UG 301 and UH 28 were better adapted to rich environments, while T 9 was more suitable for poor environment and OBG 2, OBG 1 and UG 191 were well adapted to all environmental conditions.

KEY WORDS : Blackgram, G x E interaction, stability

Blackgram (*Vigna mugo* Hepper) is one of the important pulse crops of India. In addition to cultivation in submarginal lands and poor crop management, low yield potential of the cultivars is a major factor of low productivity of the crop. Though several improved varieties in the crop have been developed, most of them show inconsistent performance under varied environmental conditions due to genotype-environment interaction. Finlay and Wilkinson (1963) have suggested use of linear regression (b_i) as a measure of stability of genotypes, while Eberhart and Russell (1966) have emphasised the need for considering both linear (b_i) and non-linear (S^2d) components of G-E interaction for judging phenotypic stability of genotypes. The method suggested by Bilbro and Ray (1976) makes use of b_i as a measure of adaptation and the coefficient of determination (r^2) as the stability parameter. In the present investigation an attempt has been made to identify genotypes with higher yield and stability of yield performance.

MATERIALS AND METHODS

The material for the investivation comprised 21 improved varieties of blackgram developed at various research centres in the country. These genotypes were grown a randomised block design with 3 replications at the EB-II section of Department of Plant Breeding and Genetics, Bhubaneswar. The experiment was repeated during Summer (March-May), Kharif (July-September) and Rabi (October-January) seasons during 1983, 1984 and 1985. The seed yield data of all the nine experements were taken for G-E interaction study. The linear (b_i) and non-linear (S^2d) components of G-E interaction were calculated as suggested by Eberhart and Russell (1966), while the coefficient of determination (r^2) of the linear regression coefficients was estimated after Bilbro and Ray (1976).

Table 1. Pooled analysis of variance of seed yield of blackgram genotypes under varied environments.

Source	d.f.	M S	F
Genotypes (G)	20	4.404	9.99**
Environments (E)	8	28.482	64.60**
G X E	160	1.431	3.25**
Env. + G X E	168	2.719	6.17**
Env. (linear)	1	227.857	516.80**
G X E (linear)	20	2.467	5.60**
Pooled deviation	147	1.222	2.77**
Pooled error	378	0.441	

** - Significant at 1% level.

RESULTS AND DISCUSSION

Pooled analysis of variance (Table 1) revealed significant difference among the genotypes studied and the average yield of the varieties varied from 3.83 to 6.62 q/ha. Singh *et al.* (1975) and Misra (1983) have reported similar significant differences in yield of blackgram genotypes. The highly significant M.S. due to environments revealed wide diversity in the environment which may be attributed to seasonal variations and other microclimatic and soil factors. The average yield in different environments varied from 3.86 to 7.49 q/ha. The highly significant genotype x environment and E+GxE interaction indicated differential performance of the genotypes under varied environmental conditions. The M.S. due to environment (linear) was highly significant indicating considerable bearing of environment on yield of the crop. The linear component of G x E interaction was significant, so prediction about performance of most of the genotypes appeared feasible. The significant M.S. due to pooled deviation indicated that the genotypes differed considerably with respect to their stability of yield performance.

Eberhart and Russell (1966) have suggested that an ideal genotype for cultivation should have high mean yield, linear regression and least deviation from regression (S^2d) indicating stability of yield. Bilbro and Ray (1976) have pointed out that the value of regression coefficient (b_i) indicates the adaptation of the genotype of type of environment, while high coefficient of determination (r^2) indicates stability. Thus to judge the stability of a genotype,

Table 2. Mean seed yield and estimates of stability parameters of blackgram genotypes.

No. Variety	Yield (q/ha)	b	S^2d	r^2
1. UG 301	6.62	1.69	1.42	70.7
2. OBG 2	6.31	0.93	0.25	76.9
3. UH 28	6.28	1.56	0.41	81.6
4. OBG 1	6.22	1.07	0.34	79.2
5. UG 191	6.21	1.16	0.06	80.6
6. T 9	6.12	0.38	0.21	75.3
7. UG 298	5.88	1.68	0.12	88.7
8. Pant U 30	5.79	1.07	0.09	76.8
9. OBG 10	5.76	1.01	0.57	60.8
10. JU 77 - 41	5.71	1.46	1.83	54.1
11. OBG 3	5.70	0.55	3.11	15.0
12. Sarala	5.67	1.42	-0.13	90.8
13. OBG 7	5.66	1.67	2.87	46.5
14. PH 25	5.59	1.30	0.44	75.0
15. H 76 - 1	5.59	0.53	1.31	19.9
16. Pant U 26	5.50	0.80	0.27	68.5
17.Pant U 19	5.34	1.09	0.19	74.4
18. OBG 11	5.23	0.47	0.22	54.0
19. K 78	4.59	0.46	1.06	27.9
20. C 35 - 5	4.10	0.14	0.69	27.0
21. Sel 37	3.83	0.59	1.99	18.1
C.D. (at 5%)	0.57			

both S^2d and r^2 were taken into consideration.

Considering the average yield of the genotypes, UG 301 gave the maximum yield of 6.62 q/ha and was at par with OBG 2, UH 28, OBG 1, UG 191 and T 9, which yielded more than 6.1 q/ha. The genotypes UG 301, UH 28, UG 298, JU 77-41, Sarala and OBG 7 showed bi-values of 1.4 to 1.7 indicating their better adaptation to rich environments. Stability of yield of the genotypes were high for UH 28, UG 298, and Sarala, moderate for UG 301 and low for JU 77-41 and OBG 7. The genotypes OBG 2, OBG 1, UG 191, Pant U 30 and OBG 10 showed b values of around 1.0 (0.9-1.2) indicating that these are well adapted to all types of environments. Stability of genotypes was high for OBG 2, OBG 1, UG 191 and moderate for Pant U 30 and OBG 10. The low bi-values (less than 0.6) of T 9 and OBG 3 indicated their better adaptation to poorer environments. Stability of yield was moderate for T 9 and low for OBG 3. Rest of the genotypes had lower average yield (less than 5.6 q/ha) and showed moderate to low yield stability.

Thus considering average yield, adaptation and stability, the genotypes UG 301, OBG 2, UH 28, OBG 1, UG 191 and T 9 had high average yield (6.1 to 6.62 q/ha) and moderate to high stability of yield performance under varied environmental conditions. Of these genotypes UG 301 and UH 28 were better adapted to rich environments. while T 9 was better suited for poorer environments and OBG 2, OBG 1 and UG 191 were well adapted to all environmental conditions.

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PHENOTYPIC STABILITY FOR SEED YIELD IN INDIAN MUSTARD

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ABSTRACT

Twenty nine promising genotypes of Indian mustard (**Brassica juncea** (L.) Czern & Coss) tested for their seed yield and phenotypic stability revealed that the genotypes interacted considerably with environmental conditions that prevailed in different situations. Both linear and non linear components were significant. S^2d value was significant for 19 genotypes. Genotypes DIR 153 and RH 827, though having high s^2d values, had almost unit responses to changes in environmental conditions and were high yielders. Genotypes RK 8302 and RK 8301 had high mean seed yield and indicated stable performance in high yielding environments. However, it was T 59 with high deviation value, which gave higher productivity in such situations. Genotypes RIK 81-1, RK 8304 and RS 83 performed promosingly in low yielding environments with latter two genotypes giving stable performance.

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