The Andhra Agric. J 55 (1): 22-24, 2008

Stability Analysis for Biomass, its Partitioning Efficiency and Productivity in Blackgram

M Lal Ahamed and P M Salimath

Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad

ABSTRACT

Stability analysis was undertaken with sixteen genotypes along with two checks for seed yield per hectare and two of its important component traits, biomass and harvest index in blackgram. The study revealed the genotypic differences for yield but the linear and non-linear components of GxE were not significant. The linear component for biomass and linear and non-linear components for harvest index of GxE were significant. As many as eleven genotypes have given higher yield than the check (TAU-1). Ten genotypes were found better over check, and TAU-1 topped in the list for harvest index . The genotypes, 946-PLU-58 and 813-PLU-126 were high yielding and stable for biomass and harvest index. The study indicated the need for identifying the genotypes with higher biomass so that they could be used for improving productivity with increased biomass and better partitioning efficiency.

Key words: Blackgram, Biomass, Harvest Index, Stability Analysis.

Blackgram is an important legume crop known for its nutritional value. However, its productivity is 473n Kgs/ ha, which is one of the lowest. At least two reasons appear to be most important for the lowest productivity in blackgram; one is the lower biomass and also its poor partitioning efficiency and the other is the fluctuating yields over years and seasons. Hence, if any cognizable improvement is to be made in blackgram, it is essential to improve the total biomass, its partitioning efficiency and also in respect of stability. Keeping this in view, breeding efforts have been accordingly initiated at Department of Genetics and Plant Breeding, College of Agriculture, Dharwad. As a first step in this direction, a vast collection of 196 genotypes of blackgram was evaluated for productivity and other related traits for two years (Patil, 1996). Based on this evaluation, sixteen promising genotypes were identified for better biomass and better partitioning efficiency. Having identified these lines, the next step was to assess them for their stability in respect of productivity and two of its critical component traits, biomass and harvest index. An experiment was planned to confirm the potentiality of these promising lines and to assess their stability in respect of each of the characters.

MATERIAL AND METHODS

Based on the statistical evaluation of a vast collection of 196 blackgram genotypes sixteen were identified as the potential lines for productivity. These sixteen genotypes along with two check varieties were evaluated at three different locations viz., Agricultural College, Dharwad; Agricultural Research Station, Bidar and Agricultural Research Station, Bheemnarayan-gudi. The evaluation was done by following Randomized Block Design with two replications, at each of the locations each genotype was sown in 5 rows of 3m length adopting a spacing of 35x15cm. The recommended agronomic practices were followed to raise a good crop in all the three locations. Observations were recorded on five randomly selected plants in each genotype in each location for biomass and seed yield per hectare (SYPH). Harvest index was calculated by using biomass and seed yield. The data from each of the locations so collected on these three characters was subjected to stability analysis following Eberhart and Russell (1966) model.

RESULTS AND DISCUSSION

Being elite genotypes from the germplasm, the interest was to evaluate them for stability particularly for productivity (yield/ha) and two of its main components, biomass and harvest index. The results obtained from the study indicated that the genotypic differences existed for yield (Table 1) but the linear and non-linear components of GxE interaction were non-significant. But in respect of biomass only the linear component i.e., predictable nature of the character was significant while, the linear and non-linear components of GxE were significant for harvest index.

Table 1. Analysis of variance for stability in respect of seed yield per hectare and its yield component traits in blackgram

Source	d.f	Biomass	HI	SYPH
Genotypes	17	0.25	24.80**	2.05**
Environment + (G X E)	36	83.87	63.66	2028.74
Environment (linear)	1	30008.34	1353.89	1705.60
(G X E) (linear)	17	0.43**	12.92**	6.45
Pooled Deviation	18	0.19	39.97*	50.60
Pooled Error	51	0.16	4.90	94.49

*Significant at 5% probability level
** Significant at 1% probability level
HI = Harvest Index
SYPH = Seed Yield Per Hectare

Table 2. Relative performance and stability parameters in respect of 18 genetypes for seed yield per hectare, biomass and HI in blackgram.

S.No.	Name of the genotype	SYPH			BIOMASS			HI		
		Mean (Q/ha)	bi	S^2di	Mean (g)	bi	S^2di	Mean	bi	S^2di
1	738/Pusa-1	10.36	0.60*	2.58	12.52	1.03	0.02	29.44	1.18	188.03**
2	499-1416	16.16	1.01	-0.38	12.93	0.92*	0.58**	29.37	1.39	8.14*
3	488-1316	11.94	0.76	-0.90	12.35	0.96*	-0.01	31.07	0.45	-2.29
4	4-41-3	17.11	0.96	5.90**	12.98	1.07*	-0.04	28.90	0.27	43.46**
5	813-PLU-126	13.41	0.93	-0.32	13.66	1.05	0.06	31.91	0.60	1.95
6	682-24-8	16.56	1.35*	2.08	12.94	1.04	-0.05	29.43	0.57	14.60*
7	447-2	14.74	1.15	-0.81	13.08	1.07*	-0.07	28.17	1.29	2.98
8	1760/1-1-21	12.74	0.96	6.36**	12.87	0.96	0.01	28.87	1.18	7.98
9	70-PLU-149	16.09	0.07	-0.61	12.64	0.90**	0.06	28.80	1.01	17.44**
10	946-PLU-58	15.03	0.02	-0.27	12.84	0.96	-0.06	32.41	0.50	3.22
11	VALLURE	15.31	1.33*	-0.75	12.94	1.00	0.38*	36.30	1.50	36.92**
12	AB-14	13.88	1.04	-0.74	12.90	1.01	0.57**	32.33	1.79	1.18
13	543-33-3	12.29	0.96	1.16	13.32	0.96	0.02	28.80	1.19	29.82**
14	778/Janpur	13.47	1.07	6.04**	13.13	1.07*	0.02	35.66	0.66	128.37**
15	18-PLU-45	12.20	0.89	2.94	13.18	1.00	0.39*	28.38	0.82	123.37**
16	KMB-3	15.19	1.14	11.43**	12.81	0.99	-0.04	30.74	1.29	-2.35
17	MANIKYA	10.73	0.84	0.87	12.91	1.02	-0.04	23.77	1.15	38.94**
18	TAU-1	12.72	0.80	-0.61	12.92	1.00	0.01	28.72	1.14	32.32**

*Significant at 5% probability level **Significant at 1% probability level

Among the genotypes, 4-41-3 turned out to be significantly higher yielder than the best check variety, TAU-1 (Table 2). But its S^2di value was significant indicating its non-predictable behaviour over different environments. Another genotype 662-24-8 was also significantly higher yielder than TAU-1 and had significant bi value than the check indicating its suitability to rich environments. Genotype, 499-1416, though was just numerically high yielder than the best check variety; it was a stable genotype by virtue of its non-significant bi and S^2di values. Therefore, 662-24-8 for rich environments, 499-1416 for general adoptability could be considered as promising genotypes worth pursuing further. There are many reports available indicating stability for yield (Deshmukh et al., 1987 and Singh et al., 1994). Further, of these three high yielding genotypes, 662-24-8 showed numerically higher biomass value compared to check and also stable. 4-41-3 with significant bi value more than unity was suitable for rich environments. But 499-1416 which was stable for yield turned out to be unstable for biomass. The other promising genotypes for biomass are 813-PLU-126 and 543-33-3 which had higher mean value for biomass and were also stable.

None of the three high yielding genotypes, 4-41-3, 662-24-8 and 499-1416 was stable for harvest index. But few tested entries like, 778/Janpur, AB-14, 946-PLU-58, 813-PLU-126, 488-13/6, KMB-3 and 739/Pusa-1 had higher mean values than the check for harvest index and all except 778/Janpur and 739/Pusa-1 were stable. Genotype, VALLURE, was superior to the check but unstable. Incidentally, 813-PLU-126 was also promising for biomass as indicated earlier. This was also good for yield. This genotype may therefore prove to be useful genotype in the blackgram breeding programme for improving productivity. This genotype can be crossed with 662-24-8 and 499-1416 to improve the productivity and also to achieve stability.

Acknowledgement: First author is grateful to ICAR for providing JRF during M.Sc.(Ag) programme.

LITERATURE CITED

Deshmukh R B, Patil S B Sonone A H and Shinde N V (1987). Stability for grain yield in balckgram. Journal of Maharashtra Agricultural Universities, 12: 163-164.

Eberhart S A and Russell W A (1966) Stability parameter for comparing varieties. Crop Science, 6: 36-40.

Patil B S (1996). Genetic variation for morpho-physiological traits influencing seed yield in blackgram (Vigna mungo L. Hepper). M.Sc. Thesis, University of Agricultural Sciences, Dharwad.

Singh B P, Patra G J and Samalo B N (1994) Genotype x Environment interaction in blackgram (Phaseolus mungo) Indian Journal of Agricultural Sciences, 64: 1870-1871.

(Received on 01.06.2007 and revised on 03.10.2007)