

Genetic Variability Studies for Yield and Yield Components in Blackgram (*Vigna mungo* (L.) Hepper)

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ABSTRACT

A Study was conducted involving 100 genotypes of blackgram for genetic variability of seed yield and its component traits. The analysis of variance indicated significant differences among the hundred genotypes for all the characters studied. The estimates of PCV for all characters were higher than the estimates of GCV indicating the presence of environmental component along with genetic component. High heritability coupled with high Genetic advance as per cent of mean was recorded for plant height, number of clusters per plant, numbers of pods per plant, leaf area, SPAD, chlorophyll content and seed yield per plant. This indicates the preponderance of additive gene effects which may serve as better source for breeding programme to develop high yielding varieties.

Key words: Heritability, Genetic advance, Variability, YMV and Blackgram

The importance of blackgram as the source of vegetable protein and its role in sustainable agriculture in Indian situation is well known. Though, tremendous progress has been made in achieving quantum jumps in cereal crops, which ushered in an era of green revolution, the gains made in improvement of productivity of pulses in general and blackgram in particular are very meagre. One of the many reasons ascribed to the low productivity and production is the low potentiality of the present day cultivars. It has also been implicated that lack of variability is one of the main factors responsible for the poor progress made in breeding programmes of pulse crops. Many attempts have been made to assess the extent of variability for productivity and its component traits in blackgram. However, the assessment of variation made on truly diverse germplasm provides the correct picture of the extent of variation which would help in assessing the variability and factors for limited progress made in blackgram. From this point of view, the present investigation was undertaken involving 100 genotypes of blackgram.

MATERIAL AND METHODS

The experimental material comprised of 100 genotypes from different sources was evaluated during *kharif* 2015-16 at Regional Agricultural Research Station, Lam farm, Guntur (Andhra Pradesh). The said material also consisted of four checks, which were included for comparison. The experiment was laid out in augmented completely randomized block design II (ACRBD) with three replications. A plot size of one row each with a row length of 4 meter per replication with a spacing of 30 X 10 cm was adopted. Recommended agronomic practices were followed to raise the crop. Observations on 13 quantitative

characters *viz.*, Days to 50 % flowering, Plant height, Number of branches per plant, Number of clusters per plant, Number of pods per plant, Pod length, Number of seeds per pod, 100 seed weight, Days to maturity, Leaf area, SPAD, Chlorophyll content and Seed yield per plant were recorded on 5 randomly selected plants in each treatment and the estimates of variability, heritability and genetic advance were estimated by using the statistical methods suggested by Burton (1952) and Johnson *et al.* (1955) respectively.

RESULTS AND DISCUSSION

The augmented analysis of variance revealed that significant differences among the genotypes for all the characters indicating a high degree of variability in the material (Table 1). The PCV values are higher than the GCV values indicating the role of environment in the expression of these traits (Table 2). Genetic variability together with the heritability estimates would give a better idea on the amount of genetic gain expected out of selection (Burton, 1952).

The PCV and GCV estimates were low for days to 50% flowering, pod length, number of seeds per pod, 100 seed weight and days to maturity while moderate PCV and GCV estimates were noticed for number of branches per plant and SPAD indicating the presence of considerable amount of variation among the genotypes. High PCV and GCV estimates were recorded for plant height, number of clusters per plant, number of pods per plant, leaf area, chlorophyll content and seed yield per plant indicating more variation among the genotypes under study for these traits. Higher estimates of PCV and GCV for above characters were also reported by Panigrahi *et al.* (2014), Kadam *et al.* (2014) and Rani and Kumar (2016).

Table 1. Augmented RBD Analysis of variance for seed yield and yield component characters in blackgram (*Vigna mungo* L.)

	d.f	Days to 50% flowering	Plant height (cm)	No. of branches / plant	No. of clusters / plant	No. of pods / plant	Pod length (cm)	No. of seeds / pod	100 seed weight (g)	Days to maturity	Leaf area (cm ²)	SPAD	Chlorophyll content (mg/g)	Seed yield/plant (g)
Entries	103	2.31**	250.13**	0.25	8.24**	82.69**	0.15*	0.44*	0.26**	35.91**	59488.71**	45.80**	0.16**	8.43**
Varieties	99	1.08	255.60**	0.23	7.88**	59.06**	0.08	0.23	0.21**	20.67**	58804.16**	43.96**	0.16**	6.40**
Block	4	6.64**	2226.25**	0.32	30.58**	293.94**	0.24*	0.22	1.57**	163.70**	364207.91**	62.90**	0.30**	44.42**
Checks	3	1.93	19.92*	0.29	3.18**	8.55*	0.11	1.21**	0.1	3.87	19031.27**	7.84*	0.00	1.27**
Error	12	0.64	5.21	0.14	0.26	1.98	0.06	0.14	0.05	1.37	1637.74	1.65	0.00	0.07

** significant at 1% level

* significant at 5% level

d.f: degrees of freedom

Table 2. Estimation of variability, heritability and genetic advance per cent of mean for seed yield and yield components in blackgram (*Vigna mungo* L.)

S.No	Character	Mean	Range		Coefficient of variation		Heritability (broad sense) (%)	Genetic advance as per cent of mean
			Min.	Max.	PCV (%)	GCV (%)		
1	Days to 50% flowering	40.54	36.90	44.65	2.48	1.51	37.00	1.90
2	Plant height (cm)	44.45	20.00	98.40	33.28	32.88	97.00	66.94
3	No. of branches / plant	2.14	0.32	3.90	21.69	12.96	35.00	15.90
4	No. of clusters / plant	6.38	1.28	15.10	40.47	39.70	96.00	80.22
5	No. of pods / plant	25.82	9.46	51.16	27.17	26.64	96.00	53.82
6	Pod length(cm)	4.64	3.59	5.54	6.10	3.12	26.00	3.29
7	No. of seeds/ pod	6.30	4.80	7.59	7.37	4.19	32.00	4.94
8	100 Seed weight (g)	4.62	3.51	5.74	9.31	8.08	75.00	14.47
9	Days to maturity	79.74	69.20	91.20	5.29	5.08	92.00	10.07
10	Leaf area (cm ²)	522.54	198.60	1797.35	42.77	42.07	96.00	85.26
11	SPAD	37.47	19.85	50.25	16.54	16.18	95.00	32.60
12	Chlorophyll content (mg/g)	0.98	0.18	1.62	38.22	38.03	99.00	77.95
13	Seed yield /plant (g)	7.41	2.98	14.43	31.08	30.90	98.00	63.28

PCV : Phenotypic coefficient of variation

GCV : Genotypic coefficient of variation

The heritability estimates ranged from 32 (Number of seeds per pod) to 99 (Chlorophyll content). Days to 50% flowering recorded low genetic advance as per cent of mean (1.90) where as chlorophyll content manifested maximum value (85.9). Low heritability and low genetic advance as per cent of mean were observed for pod length indicating this trait is governed by non additive gene action. Moderate heritability and low genetic advance as per cent of mean were noticed for days to 50 % flowering and number of seeds per pod indicating the presence of both additive and non additive gene action in the inheritance of this trait. Moderate heritability (35) coupled with moderate genetic advance (15.9) was observed for number of branches per plant trait indicating the predominance of both additive and non additive gene action in the inheritance of this trait. High heritability and moderate genetic advance were noticed for 100 seed weight and days to maturity revealing the predominance of both additive and non additive gene actions in the expression of this trait. Higher heritability coupled with high genetic advance as per cent of mean was noted for plant height, number of clusters per plant, leaf area, SPAD, chlorophyll content and seed yield per plant indicating the presence of additive gene action in the inheritance of these characters. Similar kind of high estimates of heritability and GAM for seed yield per plant was also reported by Parameswarappa and Kumar (2005) and Sunanya *et al.* (2017).

CONCLUSION

In the present study, the estimates of PCV for all characters were higher than the estimates of GCV which may be due to the interaction of genotypes with the environment. High heritability coupled with high

GAM was recorded for plant height, number of clusters per plant, numbers of pods per plant, leaf area, SPAD, chlorophyll content and seed yield per plant. This indicates the preponderance of additive gene action and hence phenotypic selection would be more effective for further improvement of these traits.

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