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GENETIC VARIABILITY STUDIES FOR PRODUCTIVITY AND ITS COMPONENTS IN BLACKGRAM [*VIGNA MUNGA* (L.) HEPPER]

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ABSTRACT

A Study was conducted involving 40 genotypes of blackgram for genetic variability of seed yield and its component traits. The estimates of PCV values were higher than GCV. High estimates of GCV was observed for plant height, crude fiber content and hundred seed weight. Moderate GCV estimates were observed for days to 50% flowering, length of reproductive period and grain yield per plant. Very high heritability was seen for days to 50% flowering, days to maturity, plant height, length of reproductive period, hundred seed weight, protein content and crude fiber content. High genetic advance as per cent of mean was observed for plant height, crude fiber content, hundred seed weight and days to 50% per cent flowering indicating under the control of additive gene effects, may serve as better source for breeding programme to develop high yielding varieties.

Key words : Blackgram, Genetic variability, Productivity.

INTRODUCTION

The importance of black gram 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 meager. One 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 (Jain, 1975). 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 40 genotypes of blackgram.

MATERIAL AND METHODS

The experimental material comprised of 40 genotypes from different sources was evaluated during *kharif* 2001–02 at Agricultural Research Station, Bidar (Karnataka). Among them, 36 genotypes were elite lines obtained from different locations like Indian Institute of Pulses Research, Kanpur (Six), Bhabha Atomic Research Center, Trombay (12), Genetics and Plant Breeding Department, University of Agricultural Sciences, Dharwad (11), seven genotypes were outcome of selections from breeding lines at Agricultural Research Station, Bidar. The said material also consisted of four checks, which were included for comparison. The experiment was laid out in homogenous block following randomized block design (RBD) with three replications. A plot size of three rows each with a row length of 3 meter per replication with a spacing of 30 X 10 cm was adopted. Recommended agronomic practices were followed to raise the crop. Observations on 12 quantitative characters in Table1 were recorded on 5 randomly selected plants in each treatment. The estimates of variability, heritability and genetic advance were estimated by using the statistical

methods suggested by Burton (1952), Lush (1944) and Johnson *et al.* (1955) respectively.

RESULTS AND DISCUSSION

The present study revealed that the 40 genotypes varied significantly for all 12 characters indicating existence of vide range of variability among the genotypes (Table 1). The estimates of phenotypic coefficient of variation (PCV) were higher than the genotypic coefficient of variation (GCV) (Table 2). The high estimates of GCV was observed for plant height, crude fiber content and hundred seed weight compared to other characters studied. Lakshmaiah *et al.* (1988) and Sirohi *et al.* (1994). Moderate GCV estimates were observed for days to 50% flowering, length of reproductive period and grain yield per plant. These characters showed high values for PCV, heritability and high genetic advance as per cent mean. On the other hand, low values of variability were seen for seeds per pod, pod length, days to maturity and pods per plant.

Characters days to 50% flowering, days to maturity, plant height, length of reproductive period, hundred seed weight, protein content and crude fibre content had very high heritability similar to the reports of Wanjari (1988) for plant height, Mahanta *et al.* (2001) for length of reproductive period and Khabiruddin *et al.* (1996) for protein. On the contrary, characters like clusters per plant, pods plant, seeds per pod and pod length were less heritable indicating sensitivity of these genotypes to variations in the environment. Parameshwarappa (1989) also reported low heritability for these characters. High genetic advance as per cent mean was observed for plant height, crude fiber content, days to 50% flowering, hundred seed weight and length of

Table 1. Analysis of variance for different characters in blackgram

Characters	Mean sum of squares		
	Replication (df : 2)	Treatments (df : 39)	Error (df : 78)
Days to 50% flowering	0.07	46.16**	0.47
Days to maturity	0.04	44.27**	0.55
Plant height	6.12	210.92**	0.04
Clusters per plant	0.26	2.05**	0.67
Pods per plant	0.79	4.48**	1.64
Seeds per pod	0.01	0.06**	0.03
Pod length	0.00	0.04**	0.02
Length of reproductive period	0.11	27.44**	0.66
Hundred seed weight	0.11	0.53**	0.01
Protein (%)	1.89	8049**	0.34
Crude fiber (%)	0.07	0.63**	0.01
Grain yield per plant	0.34	1.61**	0.41

** Significant at p=0.01

Table 2. Mean, range, variability, heritability (broad sense), genetic advance and genetic advance as per cent of mean for different characters in blackgram.

Character	Mean	Range	Co-efficient of Variation		Heritability (broad Sense) %	Genetic advance	Genetic advance as per cent of mean
			Phenotypic	Genotypic			
Days to 50% flowering	42.40	35.67 – 49.33	9.34	9.10	97.00	7.92	18.76
Days to maturity	76.63	71.33 – 84.67	5.06	4.98	96.40	7.72	10.07
Plant height	33.47	21.40 – 56.67	25.14	25.01	99.00	17.16	51.27
Clusters per plant	8.44	6.53 – 9.73	12.6	8.02	40.50	00.89	10.54
Pods per plant	23.43	21.47 – 26.13	7.00	4.36	38.90	01.31	05.59
Seeds per pod	6.67	6.40 – 6.93	3.67	1.42	20.10	0.09	01.35
Pod length	4.63	4.20 – 4.82	3.64	1.91	27.50	0.10	02.15
Length of reproductive period	34.23	29.67 – 43.33	9.40	8.73	92.20	5.94	17.76
Hundred seed weight	4.56	3.53 – 5.10	9.34	9.20	97.10	0.85	18.64
Grain yield per plant	7.39	5.73 – 9.40	12.17	8.55	49.40	0.92	12.45
Protein (%)	23.42	20.60 – 25.90	7.47	7.04	88.70	3.20	13.66
Crude fibre (%)	4.06	3.23 – 5.05	11.42	11.17	95.60	0.91	32.41

reproductive period, whereas, the characters protein content, grain yield per plant and days to maturity exhibited moderate values suggesting that these characters are governed by additive gene action and selection would be easy to fix them. The low genetic advance as per cent mean was observed for seeds per pod and pod length indicates that these are conditioned by non-additive factors.

The above results indicated that the high variability coupled with high heritability is ideal for making high gain through selection. From this point of view, plant height, hundred seed weight, days to 50% flowering, protein content and crude fiber content may respond better to selection. This indeed was reflected in higher genetic advance as per cent of mean of these traits.

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