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Research Article

GENETIC VARIABILITY AND HERITABILITY STUDIES IN F5 GENERATION OF BLACK GRAM (*Vigna mungo* L.Hepper)

A.S. Reddy* and G.M. Lal
Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, 211007, Uttar Pradesh, India
*Corresponding Author: Email - aireddysrinijareddy26@gmail.com

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Abstract: The present investigation was prevailed to examine the 25 black gram genotypes along with one check (SHEKHAR-2) to study the genetic variability and heritability. Analysis of variance showed highly significant differences among 25 black gram genotypes all the 13 quantitative characters studied. Maximum phenotypic and genotypic coefficient of variation was recorded for harvest index (22.162 & 13.138) followed by seed yield per plant (16.775 & 10.695), no of primary branches per plant (12.013 & 7.972). Heritability estimates revealed that characters like days to 50% flowering and number of seeds per pod was high. Seed index and pod length was low. Highest genetic advance recorded for harvest index (5.951), plant height (5.199). Highest genetic advance as percentage mean recorded for number of seeds per pod (17.05), harvest index (16.045). In general, genotypic correlation is higher than phenotypic ones. Correlation coefficient analysis revealed that seed yield per plant exhibited significant and positive correlation both at genotypic and phenotypic level with harvest index (0.820 & 0.715), number of clusters per plant (0.493 & 0.368), number of pods per plant (0.787 & 0.616), number of seeds per pod (0.249 & 0.776). Hence direct selection for these traits could be helpful in improvement of black gram breeding. Path analysis revealed that the characters like days to 50% pod setting, number of clusters per plant exhibited negative direct effect on seed yield per plant at both phenotypic and genotypic level.

Keywords: *Black gram, Genetic variability, Heritability*

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Introduction

Pulses are indispensable source of protein for predominantly vegetarian population of our country and they constitute a major part in our daily diet. Pulses are also known to increase the soil fertility and productivity of succeeding crop. The domestication and cultivation of staple food crops received more attention than pulses. Pulses are being ceaselessly grown under marginal lands of low fertility and moisture stress conditions hence genotypes are more adoptable to poor management which registers limited yield, this does not reflect low genetic potential but they may have higher genetic potential than cereals. Black gram (*Vigna mungo* L. Hepper) is commonly known as urad, mesh or kalai. India is primary centre of origin of Black gram and Central Asia is a secondary centre of origin. It is one of the most important legumes of India which belongs to family leguminosae, sub order Papilionaceae and the tribe phaseoleae with chromosome number (2n=22). Crop is suitable for inter cropping with different crops such as cotton, sorghum, pearl millet, green gram, maize, soybean, groundnut, for increasing production and maintaining soil fertility. Black gram is a self-pollinating and widely cultivated grain legume. It is one of the most important pulse crops grown in Bangladesh. This crop is grown in cropping systems as a mixed crop, cash crop, sequential crop besides growing as sole crop under residual moisture conditions after the harvest of rice and also before and after the harvest of other summer crop under semi irrigated and dry land conditions [1]. In addition, its green fodder is of very nutritive and useful for milch cattle. It is also used as green manure. Being a leguminous plant, it has capacity to fix atmospheric nitrogen and restore soil fertility. The productivity of pulse crop is very low compared to cereals, which have been selected for high grain yield under high input conditions, while the selection pressure in case of pulses have been focused on the adaptation to both biotic and abiotic stresses.

The reason for low yield is

1. Adaption of crop to marginal lands of rainfed nature. The crop has been traditionally cultivated under less fertile soils with least inputs.

2. Unavailability of cultivars with high potential. 3. Stress to diseases insects and environmental fluctuations, etc. Hence, large parts of the genetic variability for yield contributing characters were lost during the course of evolution.

The main factors responsible for low yields are lack of high yielding varieties/hybrids suitable for cultivation and susceptibility of existing local varieties to pests and diseases. Thus, there is an urgent need for evolving varieties having shorter duration, bold grain and disease resistance coupled with high yield potential. In the history of development of scientific concepts and their applications in agriculture, heterosis deserves a prominent position. Shull (1908) coined the term heterosis and described this phenomenon as the superiority of F1 which manifest the increased or decreased vigour over the mid parent value. It also helps in rejecting large number of crosses in first generation itself and selecting only those with high potential and having desired gene action for the trait of interest. The study of genetic variability is the pre-requisite for any crop improvement programme, success in a recombination breeding depends on the exploitation of genotypes as parents for obtaining high heterotic crosses and transgressive segregants for this, the presence of genetic variability in a base population is essential. The effectiveness of selection depends on existence of genetic variability within or among population, which is subjected to selection. While the existing variability can be augmented and new variability generated through appropriate genetic or breeding techniques. Yield is a polygenetically controlled character with complex inheritance. Therefore, while exercising selection pressure, breeders should have information on the association of various component traits like yield.

Material and Methods

The present investigation, 25 genotypes were grown in the kharif season, 2019 at the field experimentation centre, Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology & Sciences, Prayagraj (U.P). Prayagraj is located in south eastern part of Uttar Pradesh, with as elevation of 98 m above sea level at 25.28°N latitude and 81.54°E longitude. The Experimental Farm is situated on the left side of the Prayagraj. Rewa road at National Highway 27, is nearly 4 kilo meters away from the Prayagraj city and near to the river Yamuna. The spacing of 30 cm within rows and 10 cm between the plants was followed. All recommended agronomical cultural practices were carried out to raise a good crop. Observation were recorded based on five randomly selected plants in each genotype in each replication for all important characters *viz*., Days to 50% flowering, Days to 50% pod setting, Days to 50% maturity, Plant height, Number of primary branches per plant, Number of clusters per plant, Number of pods per plant, Number of seeds per pod, Pod length, Seed index, Biological yield, Harvest index, Seed yield per plant. Mean values were computed data were analysed for analysis were suggested by Analysis of variance by Fisher (1936) [2], Genetic variability Burton (1952) [3], Heritability (Broad sense) by Lush (1949) [4] and Burton and Devane (1953) [5], Genetic advance by Johnson *et al*., (1955) [6], Genotypic and phenotypic correlation by Al Jibouri *et al*., (1958) [7], Path coefficient analysis by Dewey and Lu (1959) [8].

Result and Discussion

Analysis of variance for all the 13 characters are presented in [Table-1]. The mean sum of squares due to 25 genotypes were highly significant for all the characters studied, suggesting that the experimental materials were genetically divergent from each other. This indicates that here is ample scope for selection of promising lines for the present gene pool for yield and its components. On the basis of mean performance, highest seed yield per plant was observed for the genotypes ADT-3 followed by SU-URD-54, SHEKHAR-2. In the present investigation, it is depicted from the [Table-2] that in general, estimates of phenotypic coefficient of variation was found higher than their corresponding genotypic coefficient of variation, indicating that the influence of environment on the expression of these characters. Konda *et al*., (2009) [9] observed similar results in black gram. However, good correspondence was observed genotypic coefficient of variation and phenotypic coefficient in all characters.

Table-1 Analysis of variance for 13 characters in black gram

Characters	Mean Sum of Squares		
	Replications (df=2)	Treatments (df=24)	Error (df=48)
Days to 50% flowering	2.41	13.19**	1.32
Days to 50% pod setting	3.00	9.09**	2.92
Days to 50% maturity	14.57	15.5**	4.45
Plant height (cm)	26.96	64.28**	19.75
No of primary branches per plant	0.30	0.33**	0.10
No. of clusters per plant	1.45	0.79**	0.12
No. of pods per plant	1.72	8.68**	3.16
No. of seeds per pod	0.09	1.46**	0.15
Pod length (cm)	0.02	0.019*	0.01
Seed index (g)	0	0.067*	0.03
Biological yield (g)	1.77	5.30**	1.52
Harvest index (%)	47.16	115.04**	43.82
Seed yield per plant (g)	1.62	1.53**	0.50

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

A wide range of phenotypic coefficient of variation (PCV) was observed for all the traits ranged from Pod length (2.664) to harvest index (22.162). Higher magnitude of PCV were recorded for seed yield/plant (16.775) followed by no of primary branches per plant (12.013), no of pods per plant (11.642), no of seeds per pod (11.051). Moderate magnitude of PCV were recorded for biological yield (10.795), plant height (10.416), no of clusters per plant (10.272). Low magnitude of PCV were recorded for seed index (5.727), days to 50% flowering (4.915), days to 50% maturity (3.892), days to 50% pod setting (3.868), suggested for a limited scope of selection for improvement of these trait. The studies on phenotypic coefficient variation the magnitude of PCV was highest in case of number of branches per plant, seed yield per plant. Similar results were reported by Sarkar *et al*. (2006) in black gram [10]. A wide range of genotypic coefficient of variation (GCV) was observed for all the traits ranged from Pod length (1.4) to harvest index (13.138). Higher magnitude of GCV were recorded for harvest index (13.138), seed yield per plant (10.695), no of seeds per pod (9.564), no of clusters per plant (8.238), no of primary branches per plant (7.972). Moderate magnitude of GCV were recorded for biological yield (7.268), no of pods per plant (7.069), plant height (6.823). Low magnitude of GCV were recorded for days to 50% flowering (4.258), seed index (3.046), days to 50% maturity (2.62), days to 50% pod setting (2.488), pod length (1.4). The studies on genotypic coefficient of variation indicated the magnitude of GCV was highest in case of harvest index, seed yield per plant, number of branches per plant, indicating the presence of high amount of variation in these traits. Similar results were reported by Kumar *et al*. (1998), Sarkar *et al*. (2006) and Pervin *et al*. (2007) [11] in black gram. The estimates of genotypic coefficient of variation (GCV) reflect the total amount of genotypic variability present in material. However, the proportion of this genotypic variability which is transmitted from parents to progeny is reflected by heritability. Lush (1949) gave the concept of broad sense heritability. It determines the efficiency with which we can utilize the genotypic variability in a breeding programme. The genotypic variance and its components are influenced by the gene frequencies. Because the frequencies of genes differ from one population to another, estimates of heritability also vary from one population to another for a given character. Burton (1952) suggested the genetic variation along with heritability estimates would give a better idea about the expected efficiency of selection thus a character possessing high GCV along the high heritability will be valuable in selection programme. The estimates of heritability for all 13 characters are presented in [Table-2].

The perusal of the [Table-2] revealed the estimates of heritability (%) in broad sense for 13 characters studied, which range from (27.63%) to (75.05%). Days to 50% flowering (75.05%), no of seeds per pod (74.90%), showed high heritability. Neelawati and Govindarasu (2010) [12] also reported high heritability for branches per plant, biological yield and seed yield. Moderate heritability was recorded for no of clusters per plant (64.32%) when compared to other genetic parameters for heritability. Low heritability was recorded for biological yield (45.33%), no of primary branches per plant (44.04%), plant height (42.91%), days to 50% pod setting (41.39%), seed yield per plant (40.65%), number of pods per plant (36.87%), harvest index (35.15%), seed index (28.29%), plant height (27.63%). Characters exhibiting high heritability may not necessarily give high genetic advance. Johnson and Robinson (1955) showed that high heritability should be accompanied by high genetic advance to arrive at more reliable conclusion. The breeder should be cautious in making selection best on heritability as it includes both additive and non-additive gene effect. Heritability in broad sense refers to the functioning of the whole genotypes as unit and is used in context of environmental effect. The heritability estimates in broad sense were classified by Robinson *et al*. (1951) as low (<50%), medium (50-70%) and high (>70%). Panigrahi *et al*. (2014) [13] reported moderate heritability for branches per plant and seeds per pod in black gram. A perusal of genetic advance [Table-3] revealed that it was high for harvest index (5.951) followed by plant height (5.199), days to 50% flowering (3.551), days to 50% maturity (2.661). Moderate for days to 50% pod setting (1.902), no of pods per plant (1.698), biological yield (1.557), no of seeds per pod (1.182). Low no of clusters per plant (0.782), seed yield per plant (0.769), no of primary branches per plant (0.384), seed index (0.125), pod length (0.063). Neelawati and Govindarasu (2010) reported high genotypic variability for number of branches per plant, cluster per plant, biological yield and seed yield along with high heritability and genetic advance. Panigrahi *et al*. (2014) reported in blackgram showed high genetic advance for seed yield per plant and number of clusters per plant. Heritability alone provides no indication of the amount of genetic improvement that would result from selection of individual genotypes. Hence knowledge in the mean of selected families over the base population (Lush, 1949 and Johnson and Robinson, 1955). It is also expressed as the shift in gene frequency towards the superior side on exercising selection pressure. High estimate of genetic advance as percent of mean was recorded for number of seed per pod (17.05), harvest index (16.045), seed yield per plant (14.046), number of clusters per plant (13.61), number of primary branches per plant (10.899), biological yield (10.08).

Table-2 Genetic parameters for 13 characters of 25 black gram genotypes

Character	GCV	PCV	Heritability (%) Broad sense	GA	GA as % mean
Days to 50% flowering	4.258	4.915	75.05	3.551	7.599
Days to 50% pod setting	2.488	3.868	74.90	1.902	3.298
Days to 50% maturity	2.620	3.892	64.32	2.661	3.632
Plant height (cm)	6.823	10.416	45.33	5.199	9.206
No. of primary branches per plant	7.972	12.013	45.30	0.384	10.899
No. of clusters per plant	8.238	10.272	44.04	0.782	13.61
No. of pods per plant	7.069	11.642	42.91	1.698	8.841
No. of seeds per pod	9.564	11.051	41.39	1.182	17.05
Pod length (cm)	1.400	2.664	40.65	0.063	1.516
Seed index (g)	3.046	5.727	36.87	0.125	3.337
Biological yield (g)	7.268	10.795	35.15	1.557	10.08
Harvest index (%)	13.138	22.162	28.29	5.951	16.045
Seed yield per plant (g)	10.695	16.775	27.63	0.769	14.046

Table-3 Correlation coefficient between yield and its related traits in 25 black gram genotypes at genotypic level

Character	Day s to 50% Flowering	Days to 50% Pods Setting	Days to 50% Maturity	Plant Height (cm)	Number of Primary branch es Per Plant	Number of Clusters Per Plant	Number of Pods Per Plant	Number of Seeds Per Pod	Pod Length (cm)	Seed Index (g)	Biologic al Yield (g)	Harvest Index (%)	Seed Yield Per Plant (g)
Days to 50% Flowering	1	0.627**	0.444**	0.194NS	0.118NS	0.168NS	-0.184NS	0.234*	0.438**	-0.029NS	-0.198NS	0.249*	0.209NS
Days to 50% Pods Setting		1	0.544**	0.082NS	0.037NS	0.277*	-0.227*	0.054NS	0.310**	0.053NS	0.202NS	0.113NS	-0.067NS
Days to 50% Maturity			1	- 0.135NS	0.324**	0.389**	0.175NS	-0.495**	0.293**	0.072NS	0.081NS	0.474**	0.334**
Plant Height (cm)				1	0.410**	-0.186NS	0.064NS	0.020NS	0.323**	-0.373**	0.184NS	0.173NS	0.395**
Number of Primary branches Per Plant					1	0.113NS	-0.137NS	0.110NS	-0.108NS	-0.160NS	0.097NS	-0.042NS	-0.056NS
Number of Clusters Per Plant						1	-0.164NS	-0.350**	-0.117NS	0.306**	-0.021NS	-0.276*	0.493**
Number of Pods Per Plant							1	-0.430**	-0.263*	0.427**	-0.187NS	0.523**	0.787**
Number of Seeds Per Pod								1	-0.199NS	-0.442**	-0.135NS	-0.201NS	0.249*
Pod Length (cm)									1	-0.361**	-0.527**	0.057NS	-0.163NS
Seed Index (g)										1	-0.473**	0.063NS	-0.212NS
Biological Yield(g)											1	-0.675**	-0.354**
Harvest Index (%)												1	0.820**

Table-5 Correlation coefficient between yield and its related traits in 25 black gram genotypes at Phenotypic level

Character	Days to 50% Flowering	Days to 50% Pods Setting	Days to 50% Maturity	Plant Height (cm)	Number of Primary branches Per Plant	Number of Clusters Per Plant	Number of Pods Per Plant	Number of Seeds Per Pod	Pod Length (cm)	Seed Index (g)	Biologic al Yield (g)	Harvest Index (%)	Seed Yield Per Plant (g)
Days to 50% Flowering	1	0.498**	0.285*	0.104NS	- 0.025NS	0.085NS	0.004NS	0.178NS	0.226*	0.002NS	-0.299**	0.151NS	0.078NS
Days to 50% Pods Setting		1	0.564**	0.118NS	0.082NS	0.067NS	-0.040NS	-0.041NS	0.040NS	-0.099NS	-0.002NS	-0.067NS	-0.238*
Days to 50% Maturity			1	0.001NS	0.221NS	0.234*	0.034NS	-0.380**	0.031NS	0.022NS	0.020NS	0.151NS	0.034NS
Plant Height (cm)				1	0.196NS	- 0.088NS	-0.087NS	-0.059NS	0.102NS	-0.080NS	0.110NS	-0.061NS	-0.006NS
Number of Primary branches Per Plant					1	0.201NS	-0.221NS	0.019NS	-0.019NS	-0.071NS	0.120NS	-0.130NS	-0.095NS
Number of Clusters Per Plant						1	-0.072NS	-0.279*	0.016NS	0.243*	0.061NS	-0.097NS	0.368**
Number of Pods Per Plant							1	-0.167NS	0.022NS	0.075NS	-0.129NS	0.486**	0.616**
Number of Seeds Per Pod								1	-0.020NS	-0.201NS	-0.039NS	-0.085NS	0.776**
Pod Length (cm)									1	0.022NS	-0.159NS	0.147NS	0.148NS
Seed Index (g)										1	-0.218NS	0.092NS	0.063NS
Biological Yield (g)											1	-0.422**	-0.081NS
Harvest Index (%)												1	0.715**

Table-6 Direct and indirect effects between yield and its related traits in 25 Black gram genotypes at Genotypic level

Character	Days to 50% Flowering	Days to 50% Pods Setting	Days to Maturity	Plant Height (cm)	Number of Primary branches Per Plant	Number of Clusters Per Plant	Number of Pods Per Plant	Number of Seeds Per Pod	Pod Length (cm)	Seed Index (g)	Biological Yield (g)	Harvest Index (%)	Seed Yield Per Plant (g)
Days to 50% Flowering	0.2078	-0.36927	0.18839	0.06481	-0.03616	-0.00292	-0.07841	0.10138	0.04953	-0.00313	-0.09663	0.1834	0.209
Days to 50% Pods Setting	0.13036	-0.58862	0.23058	0.02756	-0.01139	-0.00482	-0.0969	0.0235	0.03508	0.00577	0.09854	0.08313	-0.067
Days to Maturity	0.09236	-0.32021	0.42387	-0.04521	-0.09951	-0.00677	0.07456	-0.21491	0.03314	0.00789	0.0394	0.34978	0.334
Plant Height (cm)	0.04025	-0.04847	-0.05727	0.33463	-0.12592	0.00324	0.02738	0.00863	0.03653	-0.04067	0.08953	0.12743	0.395
Number of Branches Per Plant	0.02446	-0.02181	0.13729	0.13717	-0.3072	-0.00197	-0.05838	0.0478	-0.01225	-0.01751	0.0471	-0.03065	-0.056
Number of Clusters Per Plant	0.03487	-0.16316	0.16504	-0.06236	-0.03483	-0.0174	-0.06979	-0.15197	-0.01322	0.03335	-0.01043	-0.20335	0.493
Number of Pods Per Plant	-0.03819	0.13368	0.07407	0.02148	0.04203	0.00284	0.42667	-0.18676	-0.02968	0.04662	-0.09123	0.38545	0.787
Number of Seeds Per Pod	0.04855	-0.03188	-0.20994	0.00665	-0.03385	0.00609	-0.18366	0.43388	-0.02251	-0.04824	-0.06559	-0.14829	0.249
Pod Length (cm)	0.09109	-0.18272	0.12432	0.1082	0.03332	0.00203	-0.11208	-0.08645	0.11299	-0.03934	-0.25649	0.04194	-0.163
Seed Index (g)	-0.00596	-0.03113	0.03066	-0.12471	0.04928	-0.00531	0.18231	-0.19181	-0.04074	0.10912	-0.23013	0.04666	-0.212
Biological Yield (g)	-0.04123	-0.11911	0.03429	0.06152	-0.02971	0.00037	-0.07993	-0.05844	-0.05951	-0.05156	0.48699	-0.49764	-0.354
Harvest Index (%)	0.05167	-0.06633	0.20099	0.05781	0.01276	0.00479	0.22296	-0.08722	0.00642	0.0069	-0.32855	0.73763	0.82

Table-7 Direct and indirect effects between yield and its related traits in 25 Black gram genotypes at Phenotypic level

Character	Days to 50% Flowering	Days to 50% Pods Setting	Days to Maturity	Plant Height (cm)	Number of Primary branch es Per Plant	Number of Cluster s Per Plant	Number of Pods Per Plant	Number of Seeds Per Pod	Pod Length (cm)	Seed Index (g)	Biological Yield (g)	Harvest Index (%)	Seed Yield Per Plant (g)
Days to 50% Flowering	0.2386	-0.1622	0.01618	-0.00006	-0.00224	-0.01827	0.00145	-0.00696	0.01441	0.00011	-0.09074	0.08744	0.078
Days to 50% Pods Setting	0.11887	-0.32557	0.03199	-0.00007	0.00742	-0.01446	-0.014	0.0016	0.00256	-0.00647	-0.00061	-0.03891	-0.238
Days to Maturity	0.06808	-0.18367	0.05671	0.05702	0.02	-0.05049	0.01185	0.01483	0.00201	0.00141	0.00596	0.08758	0.034
Plant Height (cm)	0.02491	-0.03826	0.00005	-0.00057	0.01776	0.01889	-0.03047	0.00231	0.00651	-0.00522	0.03335	-0.03554	-0.006
Number of Branches Per Plant	-0.00592	-0.0267	0.01253	-0.00011	0.09052	-0.04337	-0.07702	-0.00075	-0.0012	-0.00461	0.03649	-0.07502	-0.095
Number of Clusters Per Plant	0.02019	-0.0218	0.01326	0.00005	0.01818	-0.2159	-0.02519	0.01092	0.00105	0.01585	0.01842	-0.05611	0.368
Number of Pods Per Plant	0.00099	0.01305	0.00192	0.00005	-0.01997	0.01558	0.34914	0.00652	0.00141	0.00487	-0.03913	0.28129	0.616
Number of Seeds Per Pod	0.04249	0.01335	-0.02152	0.00003	0.00173	0.06029	-0.05823	-0.03908	-0.00126	-0.01309	-0.01195	-0.04931	0.776
Pod Length (cm)	0.05388	-0.01305	0.00179	-0.00006	-0.00171	-0.00356	0.00772	0.00077	0.06381	0.00145	-0.04822	0.08512	0.148
Seed Index (g)	0.00039	0.03224	0.00122	0.00005	-0.0064	-0.05241	0.02602	0.00784	0.00142	0.0653	-0.06609	0.05352	0.063
Biological Yield (g)	-0.0714	0.00066	0.00111	-0.00006	0.01089	-0.01311	-0.04505	0.00154	-0.01015	-0.01423	0.30323	-0.24464	-0.081
Harvest Index (%)	0.03602	0.02187	0.00857	0.00003	-0.01172	0.02091	0.16956	0.00333	0.00938	0.00603	-0.12807	0.57921	0.715

Moderate estimate of genetic advance as percent of mean was recorded for plant height (9.206), number of pods per plant (8.841), days to 50% flowering (7.599). Low estimate of genetic advance as percent of mean was recorded for days to 50% maturity (3.632), seed index (3.337), days to 50% pod setting (3.298), pod length (1.516).

Correlation coefficient analysis revealed that seed yield per plant exhibited significant and positive correlation both at genotypic and phenotypic level with harvest index (0.820 & 0.715), number of clusters per plant (0.493 & 0.368), number of pods per plant (0.787 & 0.616), number of seeds per pod (0.249 & 0.776). Hence direct selection for these traits could be helpful in improvement of black gram breeding. Path analysis revealed that characters like days to 50% flowering (0.2078 & 0.2386), days to 50% maturity (0.42387 & 0.05671), number of pods per plant (0.42667 & 0.3914), pod length (0.11299 & 0.06381), seed index (0.10912 & 0.0653), biological yield (0.48699 & 0.30323), harvest index (0.73763 & 0.57921) exhibited positive direct effect on seed yield per plant at genotypic and phenotypic level. Path analysis revealed that characters like days to 50% pod setting, number of clusters per plant exhibited positive direct effect on seed yield per plant at genotypic and phenotypic level.

Conclusion

On the bases of observations recorded it can be concluded that all 25 genotypes of black gram showed significant genetic variability. Based on the results, ADT-3 followed by SU-URD-54, SHEKHAR-2, genotypes coupled with high mean performance for seed yield per plant. Harvest index and seed yield per plant exhibited high estimates of GCV and PCV, high heritability was observed in days to 50% flowering, high genetic advance and genetic advance as percentage mean was observed in number of seed per pod and also in harvest index and seed yield per plant. Correlation coefficient analysis revealed that seed yield per plant exhibited significant and positive correlation both at genotypic and phenotypic level with harvest index, number of clusters per pod, number of pods per plant and number of seeds per pod. Hence direct selection for these traits could be helpful in improvement of black gram breeding. Path analysis revealed that characters like days to 50% flowering, days to 50% maturity, number of pods per plant, plant length, seed index, biological yield, harvest index exhibited positive direct effect on seed yield per plant at phenotypic and genotypic level. Hence, utmost importance should be given to these characters during selection for seed yield per plant.

Application of research: Harvest index and seed yield per plant exhibited high estimates of GCV and PCV, high heritability was observed in days to50%flowering, high genetic advance and genetic advance as percentage mean was observed in number of seed per pod and also in harvest index and seed yield per plant.

Research Category: Genetics and Plant Breeding

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****Research Guide or Chairperson of research: Dr G.M. Lal**

University: Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, 211007, Uttar Pradesh, India

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Study area / Sample Collection: Experimental Farm, Prayagraj

Cultivar / Variety / Breed name: *Vigna mungo* L.Hepper - ADT-3, SU-URD-54, SHEKHAR-2

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