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STUDIES ON GENETIC VARIABILITY IN GREEN GRAM (*Vigna radiata* L. Wilczek)

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Abstract

The present investigation was undertaken to appraise the genetic variation in forty genotypes of green gram for yield and yield contributing characters. The nature and magnitude of genetic variability present in genetic stock afford the plant breeder, information to formulate a purposeful breeding programme for crop improvement. The mean performance of all genotypes for eleven characters includes days to first flowering, plant height, number of branches per plant, number of cluster per plant,number of pods per plant, pod length, pod weight, number of seeds per pod, hundred seed weight, seed yield per plant were recorded. The genotype RM8-665, PMB-27 and LM-49 were superior for the characters includes number of cluster plant, number of pods per cluster, pod length,, hundred seed weight, and seed yield per plant. Maximum PCV and GCV were also recorded for number of branches per plant and number of pods per plant indicating these characters are highly amenable for selection and also have good scope for exploitation in the breeding programme. Low variability was recorded for days to first flowering. low genetic advance and high level of heritability suggest that selection will be effective for the former characters and modified selection methods like progeny testing could be applied for improvement.

Introduction

Greengram (*Vigna radiata* L. Wilczek) having rich source of high quality protein and high digestibility. It is good source of riboflavin, thiamine and ascorbic acid. Being a short duration crop which suits well in crop rotation and also for improving soil fertility which fixes atmospheric nitrogen (30-40 kg/ha) (Tak *et al*., 2013). Mainly grown as a rainfed crop with poor nutrient management. The genetic improvement in production and productivity of greengram has been very slow owing to several constraints. The extent of improvement expected by selection in any population depends on the nature and amount of genetic variability present in the population. Therefore, information on genetic parameters such as variance, coefficient of variation and heritability of desirable traits will help the breeder to evolve suitable cultivars.

Materials and Methods

The experiment was conducted at plant breeding farm, department of genetics and plant Breeding, Faculty of Agriculture, Annamalai University, during January and March. The experiment was carried out in RBD design with three replication. The investigation was carried out with forty genotypes of greengram of diversified origin. Particulars of genotype are presented in table 1.

Table 1 : List of genotypes

S. No	Varieties/cultures	Sources
G1	GPLM-139	VAMBAN
G2	SV-4-137	GUNTUR
G3	NL-10	WARANGAL
G4	KM-2	KUDUMIYANMLAI
G5	Nl-170	Warangal
G6	KMG-149	Warangal
G7	PDM-99-2A	Punjab
G8	GPB-113	GUNTUR
G9	RM8-653	IIPR, KANPUR
G10	RM8-659	IIPR, KANPUR
G11	RM8-661	IIPR, KANPUR
G12	RM8-662	IIPR, KANPUR
G13	RM8-664	IIPR, KANPUR
G14	RM8-665	IIPR, KANPUR
G15	RM8-667	IIPR, KANPUR
G16	RM8-668	IIPR, KANPUR
G17	CO-6	TNAU, COIMBATURE
G18	CO-7	
G19	LM-49	VAMBAN
G20	PMB-27	PUNJAB AGRICULTURAL UNIVERSITY
G21	S-8	EXOTIC CULTURE, TAIWAN
G22	GP-7	VAMBAN

G23	LM-122	GUNTUR
G24	ML-1165	VAMBAN
G25	NL-19-1	WARANGAL
G26	GP147-4	VAMBAN
G27	PLS-313	PUNJAB
G28	3880-A	VAMBAN
G29	PDH-89-96	WARANGAL
G30	COGG-939	COIMBATORE
G31	CDM-LOCAL	AADUTHURAI
G32	COGG-9032	COIMBATORE
G33	RM-8-651	IIPR, KANPUR
G34	RM8-652	IIPR, KANPUR
G35	RM8-654	IIPR, KANPUR
G36	RM8-655	IIPR, KANPUR
G37	RM8-656	IIPR, KANPUR
G38	RM8-657	IIPR, KANPUR
G39	RM8-658	IIPR, KANPUR
G40	RM8-660	IIPR, KANPUR

The observation were recorded on eleven biometrical characters includes days to first flowering, plant height, number of branches per plant, number of cluster per plant, number of pods per plant, pod length, pod weight, number of seeds per pod, hundred seed weight, seed yield per plant were recorded. The estimates of mean, standard deviation, standard error, coefficient of variation, were worked out by the standard methods of Panse and Sukhatme (1964).

Results and Discussion

The results of analysis of variance were presented in table. 2. The mean performance of all eleven characters was tabulated in table.3. The genotype NL-19-1show earliness in flowering (27.50 days). NL-10 (60.85 cm) genotype was the tallest one where RM8-660 (32.92 cm) was the smallest one. The genotype GPLM-139 has highest number of branch (3.00). Among the genotype studied RM8-662 consist of maximum number of clusters, number of pods (31.50) per plant and lowest mean value in pod length. The genotype PMB-27 has maximum pod weight (0.93 g). The genotype pdm-99-2a show maximum value in number of seeds per pod. The mean value for hundred seed weight was found to be maximum in S-4-137 genotype. The genotype RM8-665 show highest mean value for seed yield per plant (8.47 g).

Variability studies

The variability for 11characters were estimated on the basis of phenotypic and genotypic variances furnished in table.3. The PCV was low for days to first flowering, moderate for plant height, number of pods per cluster, pod length, number of seeds per pod and hundred seed weight; high for number of branches per plant, number of pods per plant, pod weight and seed yield per plant. GCV was low for days to first flowering, number of pods per cluster, number of seeds per pod, hundred seed weight. Moderate for plant height, number of branches per plant, pod length, pod weight, and seed yield per plant and high for the number of pods per plant.

Genetic analysis

Estimates of heritability, genetic advance and genetic advance as percent of mean of genotypes were presented in table. 3. The maximum heritability in broad sense was recorded by plant height (96.04) percent, least value by number of branches per plant (23.05) percent. Low level of genetic advance were recorded by days to first flowering, where high recorded by number of pods per plant. In general , the genotype RM8-665, PMB-27 and LM-49 were superior in respect of characters includes number of cluster plant, number of pods per cluster, pod length,, hundred seed weight, and seed yield per plant. Maximum PCV and GCV were also recorded for number of branches per plant and number of pods per plant indicating these characters are highly amenable for selection and also have good scope for exploitation in the breeding programme. Low variability was recorded for days to first flowering. Low genetic advance and high level of heritability suggest that select will be effective for the former characters and modified selection methods like progeny testing could be applied for improvement.

Table 2 : Analysis of variance

Sources	DF	Days To first flowering	Plant height	No. of. Branches per plant	No. of. Cluster Per plant	No. of. Pods per plnt	No. of. pods per cluster	Pod length	Pod Weight	No. of. Seeds per pod	Hundred seed weight	Seed yield per plant
Replication	2	4.050	0.623	2.812	2.450	0.012	0.619	1.444	0.069	13.612	0.690	0.720
Genotype	40	3.584*	110.441**	0.479*	1.441**	39.638**	0.490*	1.301**	0.037**	3.338**	0.250**	1.913*
Error	39	1.896	2.233	0.299	0.526	1.012	0.265	0.463	0.013	1.535	0.040	0.132

*Significant at 5% level **Significant at 10% level

Table 3 : Coefficient of variation, heritability (broad sense), genetic advance and genetic advance as percent of mean for yield and yield contributing traits in greengram

S. No	Characters	Coefficient of variation		Heritability (B.S)%	Genetic advance as percent of mean
1.	Days to first flowering	5.52	3.06	30.8	3.50
2.	Plant height	17.69	17.34	96.04	35.01
3.	Number of branches per plant	36.98	17.75	23.05	17.55
4.	Number of clusters per plant	20.24	13.79	46.45	19.37
5.	Number of pods per plant	30.48	29.71	95.02	59.67
6.	Number of pods per cluster	14.04	7.66	29.82	8.62
7.	Pod length	18.77	12.93	47.47	18.35
8.	Pod weight	26.93	18.30	46.16	25.61
9.	Number of seeds per pod	14.95	9.09	36.99	11.39
10.	Hundred seed weight	11.44	9.72	72.16	17.01
11.	Seed yield per plant	20.26	18.91	87.05	36.34