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ANALYSIS OF VARIABILITY, HERITABILITY AND GENETIC ADVANCE FOR YIELD AND YIELD CONTRIBUTING TRAITS IN SUMMER MUNGBEAN (*Vigna radiata* L. Wilczek)

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ABSTRACT

Thirty one diverse mungbean (*Vigna radiata* L. Wilczek) genotypes were evaluated for the estimation of genetic variability, heritability and genetic advance for ten quantitative traits and five physiological traits. The genotypes differed significantly for all the characters studied. Higher genotypic and phenotypic coefficient of variation was observed for Relative Injury Percentage (RI), seed yield per plant and number of pods per cluster. High heritability coupled with high genetic advance was observed for the traits Viz., harvest index, seed yield per plant, relative injury, chlorophyll content, 100 seed weight, specific leaf area, number of pods per cluster, number of clusters per plant, number of pods per plant and plant height indicating the importance of additive gene effects in the expression of these characters. The present findings could be useful for establishing selection criteria for high seed yield in the summer mungbean breeding programmes.

KEY WORDS: Genetic advance, Genetic variability, Heritability and Mungbean.

INTRODUCTION

Mungbean is the third most leading pulse crop in India and mostly cultivated in the tropical and subtropical parts of the world. From nutritional point of view, mungbean is an excellent source of protein which contains nearly 27 per cent and its essential amino acids composition is 9.59 mg/100 g. Though, mungbean is generally grown in *kharif*, it is also grown in summer under normal as well as rice fallow situations or in crop rotation to enhance symbiotic nitrogen fixation in the soil. The main drawback in summer mungbean is coincidence of high temperatures with flowering and pod formation besides moisture stress thus resulting in poor yields. Hence there is an immediate need to develop suitable varieties for growing in summer season. However, the natural variability for yield and yield related traits is very narrow in highly self pollinated crops like mungbean and proper evaluation of the extent of genetic variation available for yield components, their heritability values and genetic advance could be of great help for the breeders in order to initiate selection criteria for improvement of yield in summer conditions. Estimates of genetic parameters provide an indication of relative importance of the various types of gene effects affecting total variation of a plant character. Genotypic and phenotypic coefficient of variation and heritability accompanied with genetic advance are very important genetic parameters in improving the traits. Therefore, the present study was conducted to assess genetic variability, heritability and genetic advance for yield and yield contributing traits using thirty one mungbean accessions in order to initiate the breeding programme aimed at yield improvement in summer conditions.

MATERIAL AND METHODS

The experimental material for the present investigation consisted of thirty one diverse mungbean genotypes obtained from the germplasm collections of Regional Agricultural Research Station, Lam, Guntur and Agricultural Research Station, Madhira. The experiment was conducted in randomized block design (RBD) with three replications during summer, 2013-14 at wet land farm, Sri Venkateswara Agricultural College, Tirupati. Each genotype was sown in three rows of 4 m length with a spacing of 30 cm between rows and 10 cm between plants within rows. Observations were recorded on five randomly selected plants per replication for traits namely plant height, number of clusters per plant, number of pods per cluster, number of pods per plant, number of seeds per pod, 100 seed weight, harvest index, SPAD

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chlorophyll meter reading (SCMR), Relative Water Injury (RWC), Relative Injury Percentage (RI), Chlorophyll content and Specific Leaf Area (SLA) whereas, days to 50% flowering and days to maturity were recorded on plot basis. The mean values for each trait over the replications were subjected to the analysis of variance. The phenotypic and genotypic variances and coefficient of variation were estimated according to the methods suggested by Burton and Devane (1953) whereas, estimation of heritability and estimation of expected genetic advance were computed using the formula adopted by Lush (1940) and Johnson *et al.* (1955), respectively.

RESULTS AND DISCUSSION

Estimates of phenotypic and genotypic variance, phenotypic and genotypic coefficient of variation, heritability (broad sense) and genetic advance as per cent of mean for fifteen characters in thirty one mungbean genotypes are presented in Table 1. The perusal of the results indicated that the estimates of PCV for all the characters were slightly higher than the estimates of GCV, which may be due to the interaction of genotypes with the environment. The characters, relative injury, seed yield per plant and number of pods per cluster showed higher estimates of genotypic and phenotypic coefficient of variation indicating the presence of ample variation among the genotypes for these traits. Therefore, simple selection could be effective for further improvement of these characters. Similar findings were also reported by Arpita Das *et al.* (2010), Rahim *et al.* (2010) and Kousar Makeen *et al.* (2007) for seed yield per plant in mungbean.

Any variation available in the genotypes is the basis of plant breeding, as the success of any crop improvement depends on the magnitude and range of variability in the genotypes. The magnitude of heritable variation in the traits studied has immense value in understanding the potential of the genotype for future breeding programmes. Assessment of variability for yield and its component characters becomes absolutely essential before planning for an appropriate breeding strategy for genetic improvement. In the present study moderate estimates of PCV and GCV were observed for the traits 100-seed weight, harvest index, number of pods per plant, chlorophyll content, specific leaf area, number of clusters per plant and plant height. However, low estimates of co-efficient of variation was observed for the characters number of seeds per pod, SCMR, days to 50% flowering, days to maturity and relative water content in the decreasing order of their magnitude indicating the low range of variation for these characters in the genotypes, thus offering little scope for further improvement of these characters through simple selection. These results were also in consonance with the findings of Rahim *et al.* (2010) for days to maturity.

Genotypic coefficient of variation together with heritability estimates would give the best indication of the amount of gain due to selection. Therefore, there could be better chance for improvement of the above traits with the relatively highest value of genotypic coefficient of variation. High heritability estimates were recorded for all the characters which were in the range of 76.39 to 99.78 per cent. The highest heritability was registered for seed weight, followed by number of pods per cluster, relative injury, harvest index, number of seeds per pod, plant height, chlorophyll content, number of pods per plant, specific leaf area, SCMR, seed yield per plant, days to maturity, number of clusters per plant, days to 50% flowering and RWC in the decreasing order of their magnitude indicating the least influence of environment on these characters. These findings are also in consonance with the findings of Srivastava and Singh (2012) and Aqsa Tabasum *et al.* (2010) for harvest index, 100 seed weight and seed yield per plant.

Genetic advance provides information on expected genetic gain resulting from selection of superior individuals. Heritability and genetic advance are important selection parameters. Heritability values along with genetic advance would be more reliable and helpful in predicting the gain under selection than heritability estimates alone.

The maximum genetic advance as per cent of mean was registered for relative injury followed by seed yield, number of pods per cluster, seed weight, harvest index, chlorophyll content, number of pods per plant, specific leaf area, plant height and number of clusters per plant. The traits number of seeds per pod and SCMR recorded moderate genetic advance as per cent of mean. In contrast, low genetic advance was reported for days to 50% flowering, days to maturity and relative water content indicating that these characters are governed by non-additive gene effects and highly influenced by environmental effects. Hence, direct selection for such characters would be ineffective.

In the present investigation, high heritability coupled with high genetic advance as per cent of mean was

Table 1. Mean, coefficient of variability, heritability (broad sense) and genetic advance as per cent of mean for fifteen characters in thirty one mungbean genotypes in summer

Sl. No.	Character	Mean	Variance		Coefficient of Variation		Heritability (Broad sense) (%)	Genetic advance (GA)	Genetic advance as percent of mean (%)
			Genotypic	Phenotypic	Genotypic	Phenotypic			
1.	Days to 50% flowering	**43.44**	2.63	3.13	3.73	4.07	83.98	3.06	7.04
2.	Days to maturity	**68.79**	2.05	2.14	2.08	2.13	95.79	2.89	4.19
3.	Plant height (cm)	**55.82**	44.29	44.64	11.92	11.97	99.20	13.65	24.46
4.	No. of Clusters per plant	**9.86**	1.33	1.44	11.69	12.15	92.67	2.29	23.19
5.	No. of Pods per cluster	**3.95**	1.18	1.19	27.52	27.56	99.73	2.24	56.62
6.	No. of Pods per plant	**23.80**	16.23	16.44	16.92	17.03	98.79	8.25	34.63
7.	No. of Seeds per pod	**10.23**	0.77	0.78	8.57	8.59	99.28	1.79	17.58
8.	100 seed weight (g)	**4.07**	0.63	0.64	19.56	19.58	99.78	1.64	40.25
9.	Harvest index (%)	**35.08**	40.31	40.57	18.10	18.15	99.37	13.04	37.17
10.	SCMR	**46.51**	8.08	8.23	6.11	6.16	98.19	5.80	12.48
11.	Relative water content (%)	**84.13**	1.73	2.26	1.56	1.78	76.39	2.37	2.81
12.	Relative injury (%)	**27.92**	119.11	119.71	39.08	39.18	99.50	22.43	80.31
13.	Chlorophyll content	**2.63**	0.19	0.20	16.93	17.02	98.93	0.91	34.68
14.	Specific leaf area (cm^2 g^{-1})	**125.58**	420.03	426.66	16.32	16.44	98.45	41.89	33.36
15.	Seed yield per plant (g)	**7.95**	6.06	6.18	30.97	31.28	98.00	5.02	63.15

recorded for harvest index, seed yield per plant, relative injury, chlorophyll content, 100 seed weight, specific leaf area, number of pods per cluster, number of clusters per plant, number of pods per plant and plant height indicating the preponderance of additive gene action and phenotypic selection would be more effective for these characters for improvement of yield in summer conditions.

REFERENCES

Arpita Das., Mainak Biswas and Ghosh Dastidar, K.K. 2010. Genetic Divergence in Mungbean (*Vigna radiata* (L.) Wilczek). *Journal of Agronomy*. 9(3): 126-130.

Aqsa Tabasum., Muhammad Saleem and Irum Aziz. 2010. Genetic variability, trait association and path analysis of yield and yield components in mungbean (*Vigna radiata* (L.) Wilczek). *Pakisthan Journal of Botany.* 42(6): 3915-3924.

Burton, G.M and Devane, E.M. 1953. Estimating heritability on tall Fescue from replicated clonal material. *Agronomy Journal.* 45: 478-481.

Johonson, H.W., Robinson, H.F and Comstock, R.E. 1955. Estimation of genetic and environmental variability in Soybean. *Agronomy Journal*. 47(7): 314-318.

Kousar Makeen., Garad Abrahim., Arif Jan and Archana Singh, K. 2007. Genetic variability and correlation studies on yield and its components in mungbean (*Vigna radiata* (L). Wilczek). *Journal of Agronomy.* 6(1): 216-218.

Lush, J.L. 1940. Intra-sire correlation and regression of offspring in rams as a method of estimating heritability of characters. *Proceedings of American Society of Animal Product*. 33: 292-301.

Rahim, M.A., Mia, A.A., Mahmud, F., Zeba, N and Afrin, K.S. 2010. Genetic variability, character association and genetic divergence in mungbean (*Vigna radiata* (L). Wilczek). *Plant Omics Journal.* 3(1): 1-6.

Srivastava, R. L and Singh, G. 2012. Genetic Variability, Correlation and Path Analysis in mungbean (*Vigna radiata* (L.) Wilczek). *Indian Journal of Science*. 2 (1): 61-65.