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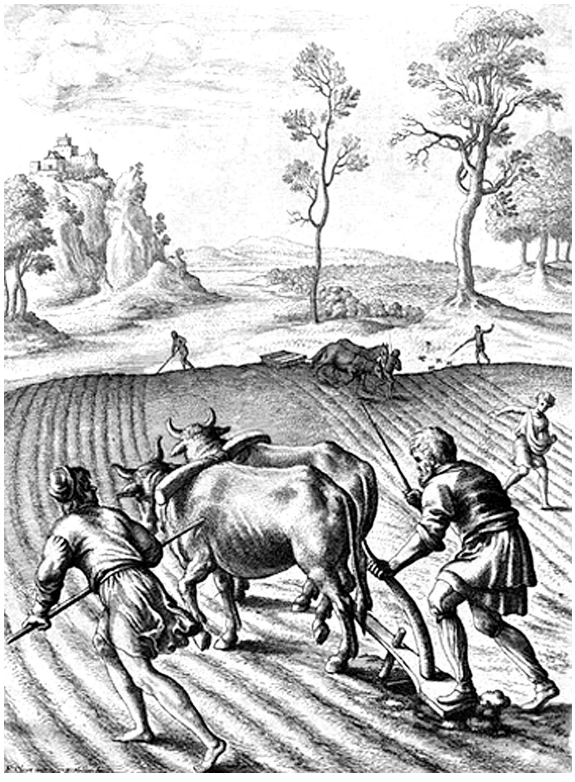

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Genetic Variability and Correlations Studies on Yield and its Components in Mungbean (*Vigna radiata* (L.) Wilezek)

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Abstract: Twenty diverse mungbean (*Vigna radiata* L. Wilkeezek) genotypes were evaluated for the estimation of genetic variability, heritability, genetic advance, correlation coefficient and path coefficient analysis for ten quantitative characters. The genotypes differed significantly for all characters studied. Higher genotypic and phenotypic coefficient of variation was observed for seed yield and number of pods per plant. Maximum heritability values were recorded in seed protein content, plant height and test weight. High heritability coupled with high genetic advance was observed in pods per plant, plant height and test weight indicating the importance of additive gene effect for expression of these characters. Character association indicated that pods per plant and plant height have significant positive correlation with seed yield. Maximum direct effect on seed yield was observed through pods per plant, test weight and plant height.

Key words: Mung bean, correlation coefficient, genetic variability, protein content etc

INTRODUCTION

Mung bean is one of the leading pulse crops in India. It is one of the important food legumes of many tropical and sub-tropical parts of the world. India is considered as its land of origin (Lawn and Ahn, 2002). Among the wide array of pulse cultivation in India, Mung bean holds key position; it has established itself as highly valuable short duration crop having many desirable characters like high protein content, wider adoptability, low input requirement and ability to improve soil fertility. One of the important considerations in any crop improvement programme is the study of genetic variability. The estimates of heritable and non-heritable variance give clue on possible improvement for the characters under study.

Correlation and path studies give an idea about the contribution of different characters to seed yield. (Vandana and Dubey, 1993).

Therefore, the present study was undertaken to assess the genetic variability, heritability, genetic advance, correlation and path analysis in respect of various desirable characters in 20 genotypes of Mung bean, which will help in isolating promising lines for hybridization programmes and to explore yield potential and quality of Mung bean.

MATERIALS AND METHODS

The experiment was conducted at Field Experimental Centre, Department of Genetics and Plant Breeding, College of Agriculture, Allahbad Agricultural Institute-Deemed University, Allahabad in randomized block design with three replications of 2×1 m^2 size plot and width row to row spacing of 30 cm and plant to plant spacing 10 cm during Kharif 2004-2005. The region comes under sub-tropical climate receiving the mean annual rainfall of about 1100 mm, situated at (57° 25N; 60° 81 E; 98 m altitude) and the temperature ranges between 0 to 34.5°C. The experimental material of the present study comprised of 20 diverse genotypes of Mung bean collected from different sources. Observations were recorded on ten randomly selected plants from each genotype, in each replication for 10 characters viz., day to 50% flowering, days to maturity, plant height, number of pods per cluster, number of pods per plant, pod length, number of seed per pod, test weight, seed protein content and seed yield. Mean values were computed and data was analyzed for analysis of variance as suggested by Panse and Sukhatme (1967) and coefficient of variances as suggested by Burton (1952), heritability (in broad sense), Davane (1953), further, genotypic and phenotypic correlation coefficients and path coefficient analysis were estimated adopting the procedure suggested by Dewey and Lu (1959).

RESULTS AND DISCUSSION

In the present study the analysis of variance revealed highly significant differences for all 10 characters among the genotypes, indicating a good deal of variation among 20 varieties of green gram (Table 1).

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The magnitude of Phenotypic Coefficient of Variation (PCV)and Genotypic Coefficient of Variation (GCV) was observed highest in case of seed yield followed by pods per plant and pods per cluster (Table 2). Similar findings were reported by Natarajan *et al.* (1988) and Byregowada *et al.* (1997). The magnitudenal differences in GCV and PCV were minimum in case of days to maturity, days to 50% flowering and pod length suggesting the little role of environment in the expression of these characters. High estimates of heritability (in broad sense) was observed in seed protein content, plant height and test weight (Table 2) indicates preponderance of additive gene action in the expression of these traits and they can be improved through individual plant selection. These finding are in agreement with the findings of Chaudhury *et al.* (1998) and Patil and Deshmukh (1988). High genetic advance (as per cent mean) were observed for seed yield followed by number of pods per plant, number of cluster per plant and plant height. Similar findings of high genetic advance were reported by Byregowda *et al.* (1989).

The degree of correlation observable among attributes will depend on the development relations between them and on genes which contribute to the variation. Positive correlation occur due to changes of genes supplying precursors. On the other hand negative correlation arises due to competition among the traits for a common precursor which is restricted supply (Madhur and Jinks, 1974).

The genotypic and phenotypic correlation among yield and yield contributing traits revealed that seed yield was positively correlated with number of pods per plant and plant height at both genotypic and phenotypic level (Table 3). These results are in consonance with the

Table 1: Analysis of variance for 10 characters of Green gram

	MSS		
Characters	Replications	Treatments	Error
Days to 50% flowering	2.85	7.77**	0.99
Days to maturity	3.27	19.23**	2.76
Plant height	139.70**	134.13**	13.02
Number of pods per cluster	0.70**	1.21**	0.13
Number of pods per plant	71.06	261.44**	45.25
Pod length	0.06	0.32**	0.07
Number of seeds per pod	0.01	1.45**	0.18
Test weight	0.15	0.41**	0.05
Seed protein content	5.27**	7.52**	0.68
Seed yield	1.44	73.17**	3.31

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

Table 2: Estimates of components of variance and genetic parameters for 10 character in 20 genotypes of green gram

		Range						
Characters	Mean	Min	Max	ECV (%)	GCV(%)	PCV(%)	h2 (%)	GA (% M)
Days to 50% flowering	36.50	33.33	39.67	2.73	4.12	4.94	69.54	7.08
Days to maturity	65.57	61.33	70.33	2.53	3.57	4.38	66.57	6.01
Plant height	48.80	39.47	71.47	7.39	13.02	14.97	75.62	23.32
Number of pods per cluster	3.92	2.92	4.95	9.23	15.35	17.91	73.44	27.09
Number of pods per plant	38.02	25.47	66.27	17.69	22.33	28.49	61.44	36.05
Pod length	7.06	6.38	7.62	3.77	4.07	5.55	53.75	6.14
Number of seeds per pod	11.90	9.73	12.40	3.83	5.80	6.95	59.63	9.96
Test weight	35.5	27.3	41.1	6.12	9.75	11.51	71.76	17.02
Seed protein content	20.17	17.06	23.88	4.10	7.49	8.54	76.97	13.53
Seed yield	15.64	10.86	18.30	11.64	30.85	32.97	59.57	59.46

Table 3: Estimation of genotypic (rg) and phenotypic (rp) correlation coefficient for 10 characters in 20 genotypes of green gram.

Characters	Phenotype	Days to 50% flowering	Days to maturity	Plant height (cm)	Number pods cluster	Number pods plant	Pod length (cm)	No. of seeds per pod	Test weight	Seed protein content	Seed yield (q ha^{-1})
Days to 50%	rg		0.981**	0.636**	0.393	0.206	0.444*	0.569**	0.407*	-0.112	0.450*
	rp		0.801**	0.422*	0.056	0.069	0.288	0.308	0.258	-0.042	0.249
Days to maturity	rp			0.600*	0.789**	0.286	0.637**	0.701**	0.189	0.141	0.464*
	rg			0.353	0.050	0.044	0.373	0.381	0.167	0.120	0.179
Plant height	rp				0.679**	0.704**	0.683**	0.460*	0.165	-0.320	0.733*
	rg				0.128	0.471*	0.282	0.149	0.122	-0.243	0.545*
Number of pods	rp					0.297	0.951**	0.577*	-0.058	0.733**	0.249
	rg					0.427*	0.156	0.161	0.257	0.112	0.446*
Number of pods	rp						0.695**	0.297	0.162	-0.290	0.956**
	rg						0.142	0.044	0.154	-0.058	0.880**
Pod length	rp							0.868**	-0.323	0.103	0.673**
	rg							0.643**	0.054	0.015	0.274
Number of seeds	rp								-0.247	0.254	0.446*
	rg								-0.006	0.010	0.168
Test weight	rp									0.118	0.421*
	rg									0.27	0.390
Seed protein	rp										-0.059
	rg										0.044

*And ** Significant at 5 and 1%, respectively

findings of Rathanaswamy *et al.* (1986), Han and Li, (1998) and Anwari and Sochandi (1999). But the traits seed protein content was observed negatively correlated with seed yield at genotypic level.

In order to understand the true significance of the correlation studies the data were subjected to path coefficient analysis. Pods per plant depicted maximum direct effect on seed yield followed by test weight and protein content. Other traits like Days of 50% flowering, days to maturity, plant height (cm) Number of pods per cluster, number of pods plant, plant length (cm), no. of seeds/pod also showed moderate to low positive effect on seed yield, except days to maturity, which shows negative direct effect on seed yield. These findings are in accordance with findings of Singh *et al.* (1988) and Gupta *et al.* (1982). These results clearly indicates that for improvement in yield of green gram major emphasis should be placed on pods per plant, test weight and plant height.

On the basis of genetic parameter correlation and path analysis it can be concluded that traits, pods per plant, plant height, test weight and number of seeds per pod were identified as major components of seed yield and should be given top priority while formulating a selection strategy for improvement of yield in green gram.

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