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GENETIC VARIABILITY AND PATH ANALYSIS IN MUNGBEAN

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ABSTRACT

Genetic variability, Correlation and path coefficient were studied in 60 mungbean genotypes during *rabi* 2002-03. High estimates of GCV, PCV, heritability and genetic advance were recorded for seed yield per plant, biological yield per plant, clusters per plant and pods per plant. The estimates of genotypic correlation revealed that seed yield had positive and highly significant association with pods per plant, biological yield per plant and harvest index. Path coefficient analysis indicated that pods per plant, biological yield and harvest index had maximum direct contribution on seed yield.

INTRODUCTION

Mungbean (*Vigna radiata* L. Wilzeck) is an important pulse crop of India grown in an area of 2.53 m ha with 0.86 m.t production and productivity of 340 kg/ha (Anonymous, 2003). Yield is a complex character associated with many contributing characters which are interrelated among themselves. For developing suitable selection strategy the knowledge of genetic variability present in the available germplasm for yield and its associated characters is important. To accumulate optimum contribution of yield contributing characters, it is essential to know the association of various characters along with path coefficients. The present study was undertaken to examine the nature and magnitude of genetic variability and associations among characters in mungbean germplasm.

MATERIAL AND METHODS

Sixty promising genotypes of mungbean were evaluated in a randomized block with two replications during *rabi* 2002-2003 at RARS, Lam, Guntur. Each plot consisted of two rows of four-meter length with plant-to-plant and row-to-row distances of 10 cm and 30 cm respectively. Data were recorded on five randomly selected plants in each row for the characters *viz.*, days to 50% flowering, days to maturity, plant height (cm), branches per plant, clusters per plant, number of pods per plant, pod length (cm), seeds per pod, 100 seed weight (g), total dry matter per plant (g), harvest index (%) and yield per plant (g). The mean values were used for estimation of genotypic and phenotypic coefficients of variation, heritability in broad sense and genetic advance as percent of mean following standard procedures where as correlation and path analysis according to Dewey and Lu (1959).

RESULTS AND DISCUSSION

The analysis of variance revealed highly significant differences among all genotypes for all characters except for seeds per pod. Burton (1952) has suggested that GCV together with heritability would give best picture of amount of advance to be expected from selection. Seed yield per plant, biological yield per plant, clusters per plant and pods per plant exhibited high estimates of GCV, PCV, heritability as well as genetic advance as % of mean. These traits can be used for selection as they respond well because of their high genetic variability. Venkateswarlu (2001) [b] indicated that greengram seed yield expressed high genetic advance coupled with high heritability and genotypic coefficient of variation.

High heritability with low GCV, PCV and genetic advance are noticed for days to 50% flowering and days to maturity (Table 1). High heritability and genetic advance with moderate GCV and PCV for 100 seed weight

Table 1. Estimates of genetic parameters for seed yield and its components in mungbean

Character	Mean±SE	Range	Coefficient of variation (%)		Heritability (in broad sense %)	Genetic advance (as % of mean)
			PCV	GCV		
Days to 50% Flowering	35.89±0.45	33.50-40.50	4.53	4.36	92.47	8.63
Days to maturity	69.11±0.50	64.00-75.50	4.06	3.99	96.80	8.11
Plant height (cm)	35.96±3.85	22.00-48.50	16.10	12.04	55.88	18.54
Branches per plant	3.06±0.45	1.50-5.00	27.77	23.64	72.47	41.45
Clusters per plant	8.76±1.28	4.50-19.00	34.09	30.80	87.57	57.30
Pods per plant	16.36±2.16	5.00-28.50	29.17	26.00	89.47	47.75
Pod length (cm)	7.24±0.63	5.50- 9.75	9.98	6.83	38.03	8.68
Seeds per pod	10.63±0.91	6.50-12.50	9.42	5.99	33.05	7.09
100 Seed weight (g)	4.07±0.12	2.94 - 5.33	14.69	14.39	95.85	29.02
Biological yield per plant	17.68±1.21	7.80-27.74	22.17	21.08	90.41	41.30
Harvest index (%)	37.86±2.45	19.43-50.08	18.14	16.94	84.28	32.61
Seed yield per plant (g)	6.74±0.55	2.32-13.53	32.10	31.05	93.58	61.87

PCV = Phenotypic coefficient of variation;
GCV = Genotypic coefficient of variation.

Table 2. Direct and indirect effects of different characters on seed yield per plant

Character	Days to 50% flowering	Days to maturity	Plant height (cm)	Branches per plant	Clusters per plant	Pod length (cm)	Seeds per pod	100 seed weight (g)	Pods/ plant	Biological yield per plant	Harvest index (%)
Days to 50%Flowering	**-0.109**	-0.086	-0.0137	0.002	0.013	-0.005	-0.006	0.011	0.002	0.001	0.009
Days to maturity	0.075	**0.095**	0.016	-0.014	-0.018	-0.001	0.006	-0.022	0.002	-0.018	0.004
Plant height (cm)	-0.015	-0.021	**-0.119**	-0.021	-0.056	-0.030	-0.051	-0.012	-0.044	-0.065	-0.025
Branches per plant	-0.004	-0.031	0.037	**0.202**	0.011	-0.116	-0.056	0.002	0.049	0.028	0.026
Clusters per plant	0.009	0.015	-0.038	-0.004	**-0.080**	-0.054	-0.018	-0.017	-0.009	-0.037	-0.008
Pod length (cm)	0.012	-0.003	0.057	-0.130	0.153	**0.225**	0.017	0.115	-0.049	0.081	-0.001
Seeds per pod	-0.009	-0.018	0.008	0.001	0.016	0.038	**0.174**	0.001	-0.003	0.037	0.008
100 Seed weight (g)	-0.007	0.005	0.111	0.073	0.032	-0.066	-0.001	**0.076**	-0.011	0.154	0.219
Pods/plant	-0.007	0.005	0.110	0.073	0.032	-0.065	-0.005	-0.045	**0.296**	0.154	0.219
Biological yield per plant	-0.008	-0.108	0.299	0.076	0.258	0.196	0.138	0.268	0.286	**0.547**	0.170
Harvest index (%)	-0.027	0.015	0.066	0.040	0.033	-0.001	0.029	0.034	0.231	0.096	**0.311**
Correlation with seed yield per plant:											
Genotypic	-0.017	-0.124	0.499	0.175	0.405	0.198	0.228	0.412	0.749**	0.869**	0.732**

Residual effect = 0.1344;
Bold diagonal figures are the direct effects;
** Significant at 1% probability level.

and harvest index indicate their limited scope in the improvement through selection due to presence of moderate variability. Result revealed that coefficients of phenotypic variability were always higher than their corresponding genotypic variability indicating the presence of environmental component. The occurrence of high heritability coupled with high genetic advance for seed yield, pods per plant, clusters per plant, biological yield per plant

and 100 seed weight indicate preponderance of additive gene action in controlling gene expression. Plant height had moderate estimates of heritability, GCV, PCV and genetic advance indicating reasonable improvement under selection. Low genetic advance coupled with low heritability for pod length and seeds per pod is indicative of non additive gene effect resulting in low genetic gain from selection.

Path coefficient analysis revealed that the trait biological yield per plant had high positive direct effect on seed yield, followed by harvest index and pods per plant (Table 2). These traits also recorded strong positive genotypic correlation with seed yield per plant which are in accordance with the results of Venkateswarlu (2001)[(a)]. The residual effect is low (0.134) indicating appropriateness of characters chosen. Plant height and clusters per plant recorded negative direct effects inspite of their high positive correlation with seed yield which may be attributed to their positive indirect effect on yield through biological yield per plant. The traits days to 50% flowering and days to maturity recorded negative correlation with seed yield at genotypic level. Pods per plant recorded high positive indirect effects on seed yield via biological yield per plant and harvest index. However, plant height via biological yield per plant made negative indirect contribution towards seed yield. These findings are in agreement with Yadav *et al*. (2001) in urdbean. Hence biological yield per plant, harvest index and pods per plant are the most important yield contributing components as they recorded high direct and indirect effects towards seed yield in mungbean.

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