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TRAIT ASSOCIATION STUDIES FOR YIELD, DROUGHT AND THEIR COMPONENT TRAITS IN MUNGBEAN (*Vigna radiata* (L.) WILCZEK)

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ABSTRACT

An experiment to know the nature and magnitude of association among various yield and drought related traits and their contribution towards seed yield was carried out with thirty five mungbean genotypes during *kharif*, 2014-15. Estimates of correlations revealed that seed yield had positive and significant correlation with number of pods per plant, number of clusters per plant, number of seeds per pod, 100 seed weight, relative water content and SCMR, which indicated that improvement in seed yield coupled with drought tolerance in greengram could be brought through selection of component characters like number of pods per plant, number of clusters per plant, number of seeds per pod, 100 seed weight, SCMR and relative water content.

Keywords: Mungbean, drought and correlation

INTRODUCTION

Mungbean (*Vigna radiata* (L.) Wilczek) is an important pulse legume and ranks third after chickpea and pigeon pea in India. It is a cheap and rich source of vegetable protein, and therefore, commonly used as a supplement to the normal diet of many people. Mungbean occupies an important position due to its suitability to various agro-climatic conditions, rich in essential aminoacids specially lysine, high seed protein content (22 to 24%) and ability to restore the soil fertility through symbiotic nitrogen fixation. Despite its importance in several aspects, the mungbean yields are considered to be low and needs to be improved to meet its demand. However, the productivity in mungbean is being hampered by different biotic and abiotic stresses of which drought could be considered as the major one. Since seed yield and drought tolerance are complex in nature and expression of these traits are largely depends upon the interplay of a number of component traits, knowledge of associations of these traits on various component traits is always helpful. Hence, the present investigation is aimed at estimating the correlation coefficients of a number of yield and drought related components in mungbean with an objective to develop high yield coupled with drought tolerant genotypes.

MATERIAL AND METHODS

The experimental material comprised at thirty five diverse genotypes of mungbean. All these thirty five genotypes were evaluated using randomized block design (RBD) with three replications during *kharif,* 2014-15 at dry land farm, Sri Venkateswara Agricultural College, Tirupati.

The inter and intra- row spacing adapted was 30cm x 10cm. Each genotype was sown in three rows of 4m length and observations were recorded on five randomly selected plants of each genotype in each replication for the characters *viz.,* plant height, number of clusters per plant, number of pods per cluster, number of pods per plant, number of seeds per pod, hundred seed weight, harvest index, SPAD Chlorophyll Meter Reading (SCMR), Relative Water Content (RWC), Relative Injury (RI), Specific Leaf Area (SLA) and seed yield per plant. However, the data for days to 50% flowering and days to maturity were recorded on plot basis. Recommended cultural practices and plant protection measures were followed to raise a healthy crop. Genotypic and phenotypic correlations were calculated as per the procedure described by Johnson *et al*., (1955).

RESULTS AND DISCUSSION

Analysis of variance revealed that the genotypes differed significantly for all the characters indicating the existence of considerable amount of variation among the genotypes studied (Table 1) and hence the data were subjected to analysis of genotypic and phenotypic correlations.The phenotypic and genotypic correlation coefficients between all pairs of characters were presented

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Table 1. Analysis of variance for fourteen quantitative characters in thirty five genotypes of mungbean

Sl. No.	Characters	Mean sum of squares		
		Replications (df: 2)	Treatments (df: 34)	Error (df: 68)
1.	Days to 50% flowering	0.58	15.88**	1.22
2.	Days to maturity	2.08	12.41**	1.33
3.	Plant height (cm)	21.72	67.51**	7.21
4.	No. of clusters per plant	0.11	4.14**	0.27
5.	No. of pods per cluster	0.31	0.37**	0.09
6.	No. of pods per plant	4.60	41.73**	5.28
7.	No. of seeds per pod	0.56	0.79**	0.12
8.	100 seed weight (g)	0.04	1.69**	0.08
9.	Harvest index (%)	6.45	53.07**	3.34
10.	SPAD Chlorophyll Meter Reading	5.58.	31.61**	2.74
11.	Relative water content (%)	0.18	35.94**	2.65
12.	Specific leaf area (cm^2 g^{-1})	59.68	2556.38**	50.69
13.	Relative injury (%)	177.11	376.67**	8.13
14.	Seed yield per plant (g)	0.17	5.18**	0.11

**: Signifiant at 1% level

in Table 2. The perusal of the data indicated that the enotypic correlations were greater than the corresponding phenotypic correlations in all most all the cases, indicating the preponderance of genetic variance in expression of different characters (Table 2). Genetic correlation between different characters of plant could arise because of linkage, pleiotropy or developmentally induced functional relationships. Seed yield per plant possessed highly significant positive correlation with number of clusters per plant, number of pods per plant, number of seeds per pod, 100 seed weight, SCMR and relative water content. This indicates that selection based on these characters may result in yield improvement under drought conditions. Similar kind of results were also reported by Reddy *et al*. (2011), Khanpara *et al.* (2012) and Swathi (2013).

The inter-se correlations among yield and drought related traits were also studied and found that, days to 50% flowering showed positive association with days to maturity and plant height. Similarly, days to maturity with plant height; number of clusters per plant with number of pods per plant; Number of pods per cluster with number of pods per plant; Number of pods per plant with relative water content; 100 seed weight with SCMR; harvest index with SCMR and SCMR with relative water content showed positive and significant association suggesting the interdependency of these characters on each other.

Days to 50% flowering had positive and significant association with days to maturity at both genotypic and phenotypic levels and is of an important component in identifying and deciding the duration of the crop. Thus, it indicated that flowering time was an important indicator of maturity. Both these traits *i.e.* days to 50% flowering and days to maturity were also found to have positive and significant correlations with plant height and negative associations with 100 seed weight and seed yield per plant.

Hence, such type of associations could be exploited for development of high yield coupled with early types. These results were also observed by Swathi (2013) and Rekha (2014). In case of drought related traits, SCMR had significant positive correlation with relative water content and negative correlation with specific leaf area.

By and large, from the present study it is evident that improvement in seed yield coupled with drought tolerance in green gram could be brought through selection of component characters like number of clusters per plant, number of pods per plant, number of seeds per pod, 100 seed weight, SCMR and relative water content, which showed highly significant positive association with seed yield.

Table 2. Phenotypic (r_p) and genotypic (r_g) correlation coefficients among fourteen characters in thirty five genotypes of mungbean

Character		Days to 50% flowering	Days to maturity	Plant height (cm)	No. of clusters plant^{-1}	No. of pods cluster^{-1}	No. of pods plant^{-1}	No. of seeds pod^{-1}	100 seed weight (g)	Harvest index (%)	SCMR	Relative water content (%)	Specific leaf area (cm^2 g^{-1})	Relative injury (%)	Seed yield plant^{-1} (g)
Days to 50% flowering	r_p	1.000	0.974**	0.576**	0.127	0.079	0.072	0.098	-0.455**	-0.076	-0.250*	-0.405**	0.059	-0.258**	-0.312**
	r_g	1.000	0.994	0.636	0.136	0.040	0.077	0.133	-0.465	-0.074	-0.245	-0.435	0.064	-0.264	-0.329
Days to maturity	r_p		1.000	0.578**	0.119	0.110	0.074	0.151	-0.466**	-0.071	-0.204*	-0.362**	0.021	-0.220*	-0.275**
	r_g		1.000	0.651	0.128	0.091	0.084	0.189	-0.481	-0.072	-0.198	-0.401	0.031	-0.225	-0.288
Plant height (cm)	r_p			1.000	0.163	-0.006	0.103	0.060	-0.302**	-0.342**	0.022	-0.057	0.128	-0.179	-0.017
	r_g			1.000	0.165	-0.031	0.084	0.039	-0.317	-0.388	-0.003	-0.077	0.146	-0.191	-0.018
No. of clusters plant^{-1}	r_p				1.000	-0.172	0.616**	0.175	-0.096	-0.018	0.177	0.184	-0.085	-0.115	0.436**
	r_g				1.000	-0.220	0.652	0.178	-0.099	-0.011	0.185	0.192	-0.090	-0.122	0.451
No. of Pods cluster^{-1}	r_p					1.000	0.394**	-0.019	-0.115	0.089	0.148	0.025	-0.129	-0.094	0.044
	r_g					1.000	0.432	-0.034	-0.125	0.163	0.202	0.021	-0.153	-0.106	0.050
No. of Pods plant^{-1}	r_p						1.000	0.168	-0.303**	-0.001	-0.085	0.262**	-0.037	-0.118	0.342**
	r_g						1.000	0.147	-0.337	0.003	0.078	0.276	-0.030	-0.130	0.357
No. of Seeds pod^{-1}	r_p							1.000	-0.147	-0.004	0.089	0.065	-0.135	-0.015	0.224*
	r_g							1.000	-0.165	-0.009	0.076	0.080	-0.147	-0.013	0.230
100 seed weight (g)	r_p								1.000	0.025	0.386**	0.015	-0.196*	-0.094	0.214*
	r_g								1.000	0.019	0.405	0.029	-0.203	-0.102	0.218
Harvest index (%)	r_p									1.000	0.350**	0.108	-0.326**	-0.015	0.086
	r_g									1.000	0.367	0.112	-0.338	-0.024	0.098
SCMR#	r_p										1.000	0.260*	-0.091	0.060	0.563**
	r_g										1.000	0.282	0.089	0.064	0.590
Relative water content (%)	r_p											1.000	-0.056	0.083	0.577**
	r_g											1.000	-0.059	0.089	0.601
Specific leaf area (cm^2 g^{-1})	r_p												1.000	0.165	-0.007
	r_g												1.000	0.168	-0.006
Relative injury (%)	r_p													1.000	-0.058
	r_g													1.000	-0.063

#: SPAD chlorophyll meter reading

*, **: Significant at 5% and 1% levels, respectively

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