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Research article

CHARACTER ASSOCIATION BETWEEN SEEDYIELD AND ITS COMPONENTS IN GREENGRAM (*Vigna radiata* (L.) WILCZEK)

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ABSTRACT: An experiment to know the nature and magnitude of association among 11 characters and their contribution towards seed yield was carried with sixty genotypes of greengram during *kharif* – 2012. The seed yield per plant showed positive and significant with plant height, numbers of pods per cluster and number of seeds per pod at genotypic and phonotypical level. Path coefficient analysis revealed that maximum direct positive effects exerted by number of pods per cluster, number of seeds per pod, pod length, plant height and 100-seed weight towards seed yield per plant. Based on correlation and path analysis, plant height, numbers of pods per cluster, number of seeds per pod, pod length and 100-seed weight were identified as the most important components of seed yield. It was noticeable from the path analysis that maximum direct positive effects were exerted by number of pods per cluster, number of seeds per pod, pod length, plant height and 100-seed weight towards seed yield per plant. This suggested that prominence should be given to these traits in selection programme for improvement of seed yield in green gram.
Keywords: Greengram, Genotypic and phenotypic correlation, Path coeffient analysis

INTRODUCTION

The seed yield of greengram is low; the productivity of this pulse crop is to be stepped up by evolving high yielding varieties. Therefore, to bring about improvement in this crop, a thorough knowledge of breeding behaviour of character is very essential. Correlation studies indicate the magnitude of association between pairs of characters and are useful for selecting genotypes with desirable combinations of characters thereby assisting the plant breeder in crop improvement. Grain yield is a complex character and is controlled by many factors. A direct selection for desirable types should not only be restricted to grain yield alone but other components related to grain yield. The knowledge of the interrelationship of grain yield with other important characters is necessary to determine which of these characters could be used for high grain yield. Correlation coefficient has been employed for this purpose. However, the correlation coefficient between two characters does not necessarily imply a cause and effect relationship. The inter-relationship could be grasped best if a coefficient could be assigned to each path in the diagram designed to measure the direct influence among them. Path coefficient analysis is a statistical technique of partitioning the correlation coefficients into its direct and indirect effects, so that the contribution of each character to yield could be estimated. Therefore, the present investigation was undertaken to find out the correlation and path coefficient of mungbean genotypes and identify the promising genotypes.

MATERIAL AND METHODS

The field experiment was laidout in RBD with three replications to evaluate 60 greengram genotypes during *kharif* 2012 at college farm located at college of agriculture, ANGRAU, Rajendra nagar, Hyderabad. Each genotype was grown in 3 rows of 5 m length with a spacing of 30 cm between rows and 10 cm between plants within row.

The replication wise mean values of ten randomly selected plants were used for computing phenotypic and genotypic correlation coefficients as well as direct and indirect effects for eleven characters *viz.*, days to 50% flowering, days to maturity, plant height (cm), number of primary branches per plant, number of clusters per plant, number of pods per cluster, number of pods per plant, number of seeds per pod, 100-seed weight (g), pod length (cm) and seed yield per plant (g). Correlation coefficients were worked out by using method described by Johnson *et al*., (1955). The path coefficient analysis was carried out according to the procedure described by Dewey and Lu (1959).

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RESULTS AND DISCUSSION

Information regarding the nature and extent of association of morphological characters would be helpful in developing a suitable plant type, in addition to the improvement of yield, a complex character for which direct selection is not very effective. Thus, it is important to explore the possibility of increasing grain yield by indirect selection of some component traits. Any unfavourable association between the desirable characters may lead to limited genetic advance. To study the inter-relationship of contributing characters and seed yield, genotypic and phenotypic correlation coefficients were computed from the estimates of variances and co variances for all possible combinations of characters studied (Table 1). Grain yield per plant was found to be positively and significantly correlated with the plant height, numbers of pods per cluster and number of seeds per pod at both genotypic level and phenotypic level.. These results are in accordance with Venkateswarlu (2001), Priya and Reddy (2008), Rahim *et al*. (2010), Reddy *et al.* (2011) and Khanpara *et al.* (2012). So improvement in seed yield is possible by taking above characters as criteria in selection scheme. Path coefficient analysis accommodate an assistance for categorizing the total correlation into direct and indirect effects. The results of path analysis showed (Table 2) that number of pods per cluster had maximum and positive direct effect on seed yield followed by seeds per pod, plant height, pod length and 100-seed weight at genotypic level. The negative direct effects on grin yield by days to 50% flowering, days to maturity, primary branches per plant and number of cluster per plant. These results are agreement with Dhuppe *et al*. (2005) for days to 50% flowering; Priya and Reddy (2008) for plant height; Dhuppe *et al.* (2005) for number of primary branches per plant; Priya and Reddy (2008) for number of pods per plant; Roopa Lavanya and Bini Toms (2009) and Priya and Reddy (2008) for number of seeds per pod; Sirohi *et al*. (2007) for pod length; and Upendra Kumar *et al.* (2005), Priya and Reddy (2008), Roopa Lavanya and Bini Toms (2009) and Reddy *et al.* (2011) for 100-seed weight. Path analysis revealed that number of pods per cluster had high direct effect, therefore, simple selection for this character would be useful to maximum seed yield. Considering all the aspects together it is apparent from path analysis that maximum effects as well as appreciable indirect influences were exerted by plant height, number of pods per cluster and number of seeds per pod towards seed yield per palnt. These characters also exhibited significant and positive association with seed yield per plant. Hence, they may be considered as the most important yield contributing characters and appropriate prominence should be placed on these components while breeding for high yielding types in green gram.

Table 1. Genotypic and Phenotypic correlation coefficients in Greengram (*Vigna radiata* (L.) Wilczek).

Character		Days to 50% flowering	Days to maturity	Plant height (cm)	Number of primary branches perplant	Number of clusters per plant	Number of pods per cluster	Number of pods per plant	Number of seeds per pod	Pod length (cm)	100-seed weight (gm)
Days to 50% flowering	G		-0.0824	0.0151	-0.1232	-0.0332	0.0061	0.0097	0.1027	0.0862	0.0637
	P		-0.0420	-0.0081	-0.1030	-0.0385	-0.0477	0.0217	-0.0328	-0.0104	0.0305
Days to maturity	G			0.4830**	-0.1869*	0.4612**	0.1275	-0.2510**	0.3505**	-0.0882	-0.1173
	P			0.4108**	-0.1399	0.3941**	0.0632	-0.1946**	0.2285**	-0.0147	-0.0996
Plant height (cm)	G				-0.1003	0.5189**	0.6505**	0.1028	0.5855**	-0.2644**	-0.1736**
	P				-0.0903	0.4571**	0.4542**	0.1055	0.4040**	-0.1696*	-0.1487*
Number of primary branches per plant	G					-0.0031	-0.1989**	-0.0677	-0.0629	0.0496	-0.0155
	P					-0.0127	-0.1248	-0.0612	-0.0293	0.0280	-0.0103
Number of clusters per plant	G						0.3918**	-0.1035	0.1222**	-0.0861	-0.1013
	P						0.2662**	-0.0883	0.1072	-0.0553	-0.0727
Number of Pods per clusters	G							0.2087	0.2752	-0.3062	-0.1389
	P							0.1350	0.1408	-0.1289	-0.1035
Number of pods per plant	G								0.0928	-0.0543	-0.1498*
	P								0.0471	-0.0416	-0.1419
Number of seeds per pod	G									0.0540	-0.0668
	P									0.1014	-0.0512
Pod length (cm)	G										0.3752**
	P										0.3334**
100-seed weight (gm)	G										
	P										
Correlation with Seed yield per plant (gm)	G	**-0.3172****	**0.0208**	**0.3136****	**-0.0323**	**0.0513**	**0.4024****	**0.0981**	**0.2811****	**-0.0252**	**-0.0011**
	P	**-0.2195****	**0.0215**	**0.2875****	**-0.0267**	**0.0493**	**0.2805****	**0.0969**	**0.1957****	**-0.0156**	**-0.0031**

*significance at 5% level ** significance at 1% level P=Phenotypic level G =Genotypic level

Table 2. Estimation of direct (bold) and indirect effects of yield and its components in greengram (*Vigna radiata* (L.) Wilczek

Character		Days to 50 flowering	Day to maturity	Plant height (cm)	Number of Primary branches per plant	Number of Clusters per plant	Number of Pods per cluster	Number of Pods per plant	Number of Seeds per pod	Pod length (cm)	100 seed weight (g)	Seed yield per plant (g)
Days to 50% flowering	G	**-0.3690**	0.0102	0.0017	0.0010	0.0043	0.0024	-0.0004	0.0212	0.0092	0.0022	**-0.3172****
	P	**-0.2161**	0.0032	-0.0020	0.0012	0.0036	-0.0084	0.0007	-0.0029	-0.0002	0.0015	**-0.2195****
Day to maturity	G	0.0304	**-0.1244**	0.0542	0.0015	-0.0602	0.0493	0.0111	0.0724	-0.0094	-0.0041	**0.0208**
	P	0.0091	**-0.0755**	0.1022	0.0016	-0.0364	0.0111	-0.0061	0.0204	-0.0003	-0.0047	**0.0215**
Plant height (cm)	G	-0.0056	-0.0601	**0.1122**	0.0008	-0.0677	0.2516	-0.0045	0.1210	-0.0281	-0.0061	**0.3136****
	P	0.0018	-0.0310	**0.2488**	0.0011	-0.0422	0.0797	0.0033	0.0361	-0.0030	-0.0071	**0.2875****
Number of primary branches per plant	G	0.0455	0.0232	-0.0112	**-0.0079**	0.0004	-0.0769	0.0030	-0.0130	0.0053	-0.0005	**-0.0323**
	P	0.0222	0.0106	-0.0225	**-0.0118**	0.0012	-0.0219	-0.0019	-0.0026	0.0005	-0.0005	**-0.0267**
Number of clusters per plant	G	0.0123	-0.0574	0.0582	0.0000	**-0.1305**	0.1516	0.0046	0.0252	-0.0091	-0.0036	**0.0513**
	P	0.0083	-0.0297	0.1137	0.0001	**-0.0923**	0.0467	-0.0028	0.0096	-0.0010	-0.0035	**0.0493**
Number of pods per cluster	G	-0.0023	-0.0159	0.0730	0.0016	-0.0511	**0.3869**	-0.0092	0.0569	-0.0325	-0.0049	**0.4024****
	P	0.0103	-0.0048	0.1130	0.0015	-0.0246	**0.1754**	0.0042	0.0126	-0.0023	-0.0049	**0.2805****
Number of pods per plant	G	-0.0036	0.0312	0.0115	0.0005	0.0135	0.0807	**-0.0440**	0.0192	-0.0058	-0.0053	**0.0981**
	P	-0.0047	0.0147	0.0262	0.0007	0.0081	0.0237	**0.0314**	0.0042	-0.0007	-0.0067	**0.0969**
Number of Seeds per pod	G	-0.0379	-0.0436	0.0657	0.0005	-0.0159	0.1065	-0.0041	**0.2066**	0.0057	-0.0023	**0.2811****
	P	0.0071	-0.0173	0.1005	0.0003	-0.0099	0.0247	0.0015	**0.0894**	0.0018	-0.0024	**0.1957****
Pod length (cm)	G	-0.0318	0.0110	-0.0297	-0.0004	0.0112	-0.1185	0.0024	0.0111	**0.1062**	0.0132	**-0.0252**
	P	0.0023	0.0011	-0.0422	-0.0003	0.0051	-0.0226	-0.0013	0.0091	**0.0175**	0.0158	**-0.0156**
100 seed weight (gm)	G	-0.0235	0.0146	-0.0195	0.0001	0.0132	-0.0538	0.0066	-0.0138	0.0398	**0.0351**	**-0.0011**
	P	-0.0066	0.0075	-0.0370	0.0001	0.0067	-0.0182	-0.0045	-0.0046	0.0058	**0.0475**	**-0.0031**

Genotypic residual effect = **0.8063** and Phenotypical residual effect **= 0.9042** P=Phenotypic level G =Genotypic level
* Significant at 5 per cent level and ** Significant at 1 per cent level

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