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Correlation and Path Analysis for Yield Components in Blackgram

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ABSTRACT

One hundred genotypes of blackgram were studied in augmented completely randomized block design with three replications for correlations, direct and indirect effects for thirteen quantitative characters. The yield contributing characters v*iz*., plant height, number of clusters per plant, number of pods per plant, pod length, number of seeds per pod, 100 seed weight and days to maturity had strong positive association with seed yield per plant at phenotypic level. The characters days to 50% flowering and SPAD had negative relationship with seed yield per plant at phenotypic level. Path analysis revealed that number of pods per plant, number of clusters per plant, plant height, 100 seed weight, number of seeds per pod and days to maturity had true relationship by establishing significant positive associations and positive direct effects on seed yield per plant.

Key words: *Correlation, path analysis, YMV and Blackgram*

Blackgram (*Vigna mungo* L.) is one of the nutritious pulse crops, popularly known as urdbean. It is an important short duration pulse crop and self pollinated grain legume grown in many parts of India. This crop is grown in cropping systems as a mixed crop, catch crop, sequential crop besides growing as sole crop under residual moisture conditions after the harvest of rice and also before and after the harvest of other summer crops under semi irrigated and dry land conditions. Its seeds are highly nutritious with protein (25-26%), carbohydrates (60%), fat (1.5%), minerals, amino acids and vitamins. It also enriches the soil fertility and improves the soil structure. Lack of stable varieties for higher yield is a major bottleneck for growing of this crop. For breeding of any crop plant, selection of promising genotype is important. Association studies give an idea about the contribution of different characters towards seed yield and it reveals the type, nature and magnitude of correlation between yield components with yield and among themselves. Knowledge of inter-relationships existing among yield components is essential when selection for improvement is to be effective. Path analysis identifies the yield components which directly and indirectly influence the yield. Hence, the present research work was carried out to study the correlation coefficients and path coefficients in order to formulate selection criteria for evolving high yielding genotypes in blackgram.

MATERIAL AND METHODS

The experimental materials consisted of 100 blackgram genotypes obtained from different research station and material available at Regional Agricultural Research Station, Lam, Guntur (A.P.). The experiment was conducted during *Kharif*-2015 in augmented completely randomized block design with three replications with a spacing of 30 cm x 10 cm at RARS, Lam, Guntur and the recommended cultural practices were followed. Observations were recorded on five randomly selected plants from each replication for thirteen quantitative traits *viz.,* days to 50% flowering, days to maturity, plant height, number of branches per plant, number of clusters per plant, number of pods per plant, number of seeds per pod, pod length, 100 seed weight, leaf area, SPAD, chlorophyll content and seed yield per plant. The phenotypic association among the traits was estimated according to the formulae described by Falconer (1964). The path coefficient analysis was done according to Dewey and Lu (1959) for assessing the direct and indirect effects of each trait on seed yield.

RESULTS AND DISCUSSION

The correlation coefficient provides a measure of the relationship between traits and serves to assess the chance for mutual improvement of two traits by common selection. The estimates of correlation coefficients between different characters of urd-bean genotypes are presented in Table 1. Seed yield per plant had highly significant positive correlation with number of pods per plant (0.8931**), number of clusters per plant (0.8086**), plant height (0.6129**), 100 seed weight (0.5427**), number of seeds per pod (0.3738**), pod length (0.2366**) and number of branches per plant (0.1609*). Similar kind of positive significant association was reported earlier by Kumar *et al*. (2015) for plant height, number of branches per plant, number of branches per plant, number of pods per plant, number of seeds per pod, Singh *et al*. (2014) for pod length, Kanimoli *et al.* (2015) for 100 seed weight,

Table 1. Phenotypic (rp) correlation coefficients for different traits in blackgram (*Vigna mungo* L.)

Character	Days to 50% flowering	Plant height	No. of branches / plant	No. of clusters / plant	No. of pods / plant	Pod length	No. of seeds / pod	100 seed weight	Days to maturity	Leaf area	SPAD	Chlorophyll content	Seed yield/ plant
Days to 50% flowering		-0.135	-0.0687	-0.0918	-0.11	-0.0007	-0.0301	0.0255	0.2423**	0.4156**	-0.0137	-0.0369	-0.0695
Plant height			0.3317**	0.4048**	0.4710*	0.2553**	0.1924*	0.6808**	0.3700**	-0.0457	-0.1154	0.0188	0.6129**
No. of branches / plant				-0.0054	0.0364	0.0345	-0.0095	0.2290*	0.1665*	-0.104	-0.1028	0.0369	0.1609*
No. of clusters / plant					0.8855**	0.1929*	0.149	0.2584**	0.1913*	-0.0267	0.0386	-0.0942	0.8086**
No. of pods / plant						0.1664	0.1719*	0.3697**	0.2243*	-0.026	0.0295	-0.0982	0.8931**
Pod length							0.2931**	0.3246**	0.0884	-0.038	-0.0994	-0.0145	0.2366**
No. of seeds/ pod								0.0936	0.0043	-0.1376	-0.0124	0.1787*	0.3738**
100 Seed weight									0.3157**	0.0946	-0.1792*	0.0501	0.5427**
Days to maturity										0.076	-0.1251	-0.0096	0.3009**
Leaf area											-0.1289	-0.0978	-0.0844
SPAD												-0.0153	-0.0178
Chlorophyll content													0.0059

*significant at 5% level **significant at 1% level

Table 2. Phenotypic direct and indirect effects of different traits on seed yield per plant in blackgram (*Vigna mungo* L.)

Character	Days to 50% flowering	Plant height	No. of branches / plant	No. of clusters / plant	No. of pods / plant	Pod length	No. of seeds / pod	100 seed weight	Days to maturity	Leaf area	SPAD	Chlorophyll content	Seed yield/ plant
Days to 50% flowering	0.0459	-0.0062	-0.0032	-0.0042	-0.0050	0.0000	-0.0014	0.0012	0.0111	0.0191	-0.0006	-0.0017	-0.0695
Plant height	-0.0071	0.0528	0.0175	0.0214	0.0249	0.0135	0.0102	0.036	0.0195	-0.0024	-0.0061	0.0010	0.6129**
No. of branches / plant	-0.0047	0.0225	0.0678	-0.0004	0.0025	0.0023	-0.0006	0.0155	0.0113	-0.0071	-0.007	0.0025	0.1609
No. of clusters / plant	-0.0164	0.0724	-0.001	0.1789	0.1584	0.0345	0.0267	0.0462	0.0342	-0.0048	0.0069	-0.0168	0.8086**
No. of pods / plant	-0.0657	0.2813	0.0217	0.5289	0.5973	0.0994	0.1027	0.2208	0.1340	-0.0156	0.0176	-0.0586	0.8931**
Pod length	0.0000	-0.0131	-0.0018	-0.0099	-0.0085	-0.0513	-0.0150	-0.0167	-0.0045	0.0020	0.0051	0.0007	0.2366*
No. of seeds/ pod	-0.0066	0.0419	-0.0021	0.0325	0.0375	0.0639	0.2180	0.0204	0.0009	-0.0300	-0.0027	0.039	0.3738**
100 Seed weight	0.0055	0.1462	0.0492	0.0555	0.0794	0.0697	0.0201	0.2148	0.0678	0.0203	-0.0385	0.0108	0.5427**
Days to maturity	0.0078	0.0119	0.0054	0.0061	0.0072	0.0028	0.0001	0.0101	0.0321	0.0024	-0.004	-0.0003	0.3009**
Leaf area	-0.0273	0.003	0.0068	0.0018	0.0017	0.0025	0.0090	-0.0062	-0.0050	0.0657	0.0085	0.0064	-0.0844
SPAD	0.0000	-0.0004	-0.0003	0.0001	0.0001	-0.0003	0.0000	-0.0006	-0.0004	-0.0004	0.0033	-0.0001	-0.0178
Chlorophyll1 content	-0.0008	0.0004	0.0009	-0.0022	-0.0023	-0.0003	0.0041	0.0012	-0.0002	-0.0023	-0.0004	0.023	0.0059

Residual effect: 0.2838 diagonal values indicates direct effects

*significant at 5% level **significant at1% level

Shanmugasundaram and Sreerangaswamy (1995) for days to maturity. Days to 50% flowering showed non-significant negative association with seed yield per plant (-0.0695) indicating the importance of days to 50% flowering in deciding the seed yield *i.e.,* the genotypes with longer duration exhibited low seed yield per plant. Similar kind of negative non-significant association was recorded earlier by Govindaraj and Subramanian (2001) and Parameswarappa and Kumar (2005) for seed yield per plant. The characters, leaf area and SPAD had negative non significant association with seed yield per plant.

On the basis of correlation studies more emphasis is to be given on number of pods per plant, number of clusters per plant, plant height, 100 seed weight, number of seeds per pod, days to maturity, pod length and number of branches per plant as yield contributing characters based on their strong correlation with seed yield per plant.

When more number of variables were considered in correlation, the association becomes more complex and does not have the meaningful interpretation. Hence, phenotypic correlation partitioned into direct and indirect effects to specify the cause and their relative importance (Table 2). Path coefficient analysis revealed that maximum positive direct effect was exhibited by number of pods per plant (0.5973**)**, followed by number of seeds per pod (0.2180), 100 seed weight (0.2148), number of clusters per plant (0.1789), plant height (0.0528**)** and days to maturity (0.0321**)** which showed true relationship with seed yield per plant by establishing significant positive associations and positive direct effects. Hence, these traits are to be considered during selection of genotypes for improving the dependent variable *i.e.,* seed yield per plant. However, the character pod length recorded negative direct effect **(**-0.0513**)** coupled with significant positive correlation with seed yield per plant. The residual effect permits precise explanation about the pattern of interaction of other possible components of yield. In other words, residual effect measures the role of the possible independent variables which were not included in the study on the dependent variable. In the present study, the residual effect is 0.2838 indicating that the characters included in present investigation had contributed around 72 per cent of variability pertaining to the dependent variable *i.e.,* seed yield per plant.

CONCLUSION

In the present investigation, path analysis revealed that number of pods per plant, number of clusters per plant, plant height, 100 seed weight, number of seeds per pod and days to maturity showed true relationship with seed yield per plant by establishing significant positive associations and positive direct effects. Hence, these traits are to be considered during selection of genotypes for improving the dependent variable *i.e.,* seed yield per plant.

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