Electronic Journal of Plant Breeding, 9 (2) : 424-428 (June 2018) DOI: 10.5958/0975-928X.2018.00052.2
ISSN 0975-928X

Research Article

Association analysis in the interspecific derivatives of *Vigna mungo x Vigna mungo var. sylvestris* for yield and its components

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(Received: 25 May 2018; Revised: 31 May 2018; Accepted:26 Jun 2018)

Abstract
The present investigation was carried out with 54 interspecific derivatives of F_8 generation from the cross *Vigna mungo* x *Vigna mungo* var. *sylvestris* at National Pulses Research Centre, Vamban during *rabi* 2017-18 season for nine different yield and its contributing traits. Correlation studies showed that all the characters had significant and positive correlation with seed yield per plant. Number of pods per plant had significant and positive association with plant height, number of branches per plant, number of clusters per plant and number of pods per cluster. Path analysis revealed that, number of pods per plant had high positive direct effect on seed yield per plant. Based on correlation and path analysis, it may be concluded that number of pods per plant may be considered as selection index for seed yield per plant in blackgram.

Keywords
Blackgram, interspecific crosses, correlation, path analysis, seed yield.

Introduction

Blackgram (*Vigna mungo* (L.) Hepper) is an important food legume crop of Indian sub-continent. It is an important short duration crop widely cultivated in India which gives an excellent source of easily digestible protein and ability to restore the fertility of soil through symbiotic nitrogen fixation. Seeds are highly nutritious with protein (24-26%), carbohydrates (60%), fat (1.5%), minerals, amino acids and vitamins. The biological value improves greatly, when wheat or rice is combined with blackgram because of the complementary relationship of the essential amino acids such as arginine, leucine, lysine, isoleucine, valine and phenylalanine etc., (Mehra *et al.*, 2016). The major constraints in achieving higher yield are the lack of genetic variability, poor harvest index, suitable varieties and genotypes with adaptation to local condition. Yield is a highly complex trait which is controlled by polygenes and interlinked with other yield components. Hence it is often very difficult to improve yield directly. It can be achieved by improving closely related traits (Roopalakshmi *et al*., 2003). The knowledge on interrelationship of component characters with seed yield and among themselves is of paramount importance to the breeder for making improvement in complex character like seed yield per plant, for which direct selection is not much effective. Hence, the present investigation was undertaken to assess the nature and magnitude of association of different yield attributes with seed yield as well as among themselves in the interspecific cross between *Vigna mungo* x *Vigna mungo* var. s*ylvestris.*

Material and Methods

A total of 54 progenies in F_8 generation from the interspecific cross of *Vigna mungo* x *Vigna mungo* var. *sylvestris*(BDU 1 x *Vigna mungo* var. *sylvestris*) formed the genetic material for the present study. All the 54 F_8 progenies were evaluated along with six check varieties *viz.*,VBN(Bg)4, VBN 6, VBN 8,Mash 114, Mash 1008 and MDU 1 during *rabi* 2017-18 season at National Pulses Research Centre, Vamban. Recommended package of practices were followed. Observations were recorded on nine quantitative traits *viz*., plant height (cm), number of branches per plant, number of clusters per plant, number of pods per cluster, number of pods per plant, pod length (cm), number of seeds per pod, 100 seed weight (g) and single plant yield (g). Observations were recorded in all the single plants of each progenies. Variance observed in the check variety VBN 8 was used as environmental variance. The simple correlation between seed yield and its component traits was worked out as per the method suggested by Johnson *et al.* (1955). Path coefficient analysis was

carried out as suggested by Dewey and Lu (1959). The data were subjected to statistical analysis *viz*., correlation and path analysis as per the standard procedure using statistical software TNAUSTAT statistical package(Manivannan,2014).

Result and Discussion

Knowledge on the association of component characters with yield has great importance to the plant breeders, as it helps in the selection with more precision and accuracy. The degree of relationship and association of these components with yield can be measured by correlation coefficients. But selection based on correlation without taking into consideration of the interactions between the component characters may sometimes mislead (Codawat, 1980).

The simple correlation between yield and its component traits for the interspecific cross *Vigna mungo* x *Vigna mungo* var. s*ylvestris* has been presented in the Table 1. In the present study, yield parameters *viz*., plant height, number of branches per plant, number of clusters per plant, number of pods per cluster, number of pods per plant, number of seeds per pod and 100 seed weight had significant and positive association with yield per plant. The present results are in accordance with the findings of Madhivathana *et al.(*2015) and Katiyar *et al.*(2015).

Among the inter correlations, number of pods per plant recorded positive and significant association with plant height, number of branches per plant, number of clusters per plant and number of pods per cluster. Number of clusters per plant was positively correlated with number of pods per plant, pod length. Similar results were reported by Bandi *et al.*(2018).

The estimates of correlation coefficients revealed only the relationship between yield components but did not show the direct and indirect effects of different traits on yield. In order to get direct and indirect effects, path coefficient analysis was carried out. The path analysis revealed that, number of pods per plant alone has high positive direct effect on yield per plant. It also recorded moderate to high indirect effects for most of the traits.The present results are in accordance with the findings of Praveen *et al.* (2011), Miah *et al.* (2016), Shivade *et al.*(2011), Shoel *et al.*(2016) and Suguna *et al*. (2017). These results clearly indicated that major emphasis can be given on number of pods per plant for the improvement of blackgram.

Based on the results of the present investigation, it is clear that all the yield component traits *viz.*, plant height, number of 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 and 100 seed weight were correlated with seed yield per plant and also among themselves. However, the results of path analysis revealed that number of pods per plant alone recorded high direct and indirect effects. Therefore, it is suggested that on the basis of correlation and path analysis, number of pods per plant, pod length, number of seeds per pod and 100 - seed weight and can be given topmost priority while framing a selection strategy for the improvement of blackgram yield particularly through interspecific hybridization between *Vigna mungo* x *Vigna mungo* var. *sylvestris.*

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Table 1. Simple correlation coefficient for seed yield per plant and component traits in interspecific derivatives of *Vigna mungo x Vigna mungo* var. *sylvestris*

	Plant height(cm)	**Number of branches per plant**	**Number of clusters per plant**	**Number of pods per cluster**	**Number of pods per plant**	**Pod length(cm)**	**Number of seeds per pod**	**100 seed weight(g)**	**Seed yield per plant(g)**
Plant height(cm)	1.00								
Number of branches per plant	0.31**	1.00							
Number of clusters per plant	0.40**	0.55**	1.00						
Number of pods per cluster	0.28**	0.07	-0.01	1.00					
Number of pods per plant	0.46**	0.52**	0.77**	0.43**	1.00				
Pod length(cm)	0.11**	0.03	0.20**	-0.03	0.03	1.00			
Number of seeds per pod	0.19**	0.15**	0.04	0.35**	0.29**	0.01	1.00		
100 seed weight(g)	0.24**	0.07	-0.03	0.24**	0.11**	0.07	0.30**	1.00	
Seed yield per plant(g)	0.43**	0.48**	0.64**	0.41**	0.87**	0.08	0.39**	0.31**	1.00

** -Significance at 1% .

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Table 2. Path coefficients on seed yield per plant in interspecific derivatives of *Vigna mungo x Vigna mungo* var. *sylvestris*

	Plant height(cm)	Number of branches per plant	Number of clusters per plant	Number of pods per cluster	Number of pods per plant	Pod length(cm)	Number of seeds per pod	100 seed weight(g)	Simple correlation with seed yield per plant(g)
Plant height(cm)	**-0.012**	0.011	-0.021	-0.011	0.400	0.005	0.018	0.045	0.434**
Number of branches per plant	-0.004	**0.037**	-0.028	-0.003	0.454	0.001	0.013	0.012	0.483**
Number of clusters per plant	-0.005	0.020	**-0.052**	0.001	0.665	0.009	0.004	-0.006	0.635**
Number of pods per cluster	-0.003	0.003	0.001	**-0.042**	0.375	-0.001	0.032	0.045	0.409**
Number of pods per plant	-0.005	0.019	-0.039	-0.018	**0.868**	0.001	0.026	0.021	0.874**
Pod length(cm)	-0.001	0.001	-0.010	0.001	0.027	**0.045**	0.001	0.013	0.08*
Number of seeds per pod	-0.002	0.005	-0.002	-0.015	0.251	0.001	**0.091**	0.056	0.385**
100 seed weight(g)	-0.003	0.003	0.002	-0.010	0.099	0.003	0.027	**0.185**	0.306**

Residual effect: 0.4