Association of traits among mungbean genotypes (Vigna radiata L. Wilczek) based on morphological markers

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Abstract

The present research consists of 21 genotypes of mungbeans that were assessed to study Kharif 2010-11 and 11 related features of yield. The variance analysis showed statistically significant variations ($p<0.05$) that signify the presence of genetic heterogeneity for all the characteristics analyzed among the 21 genotypes. The 100-seed weight demonstrated a strong and important association with the seed yield per plant among all the characters tested. The findings of the correlation showed that the number of pods/plant and grain yield is associated with each other very strongly and favourably. This close relationship between these two characters showed that the number of pods is the most significant factor and directly proportional to the yield of crops. The grain yield can also be improved by increasing the number of pods per plant and vice versa. Plant height had a negative significant correlation with days to maturity, but the number of primary branches per plant, the number of clusters per plant, the number of pods per plant and the length of the pod had a positive non-significant correlation, while the number of seeds per pod, the seed index and the yield of seeds per plant had a negative non-significant correlation.

Keywords: Mungbean, Genotypes, Correlation, Trait

Introduction

Mungbean [Vigna radiata L.Wilczek] is an essential, globally grown, high nutritional and economic value, protein rich pulse crop. Genetic variation estimation is the key to any program for crop improvement. Mungbean is a legume, an annual food. It is one of the important crops that are well suited to dry areas and irrigated conditions in particular. It is historically grown in tropical, subtropical and temperate areas of Asia, including India, Pakistan, Bangladesh, Sri Lanka, Nepal, Thailand, China, Korea and Japan, by small landholders. It has a limited maturity period, since (60-75days). Under various cropping systems, mungbeans are grown. Contributing therefore to the increase of the income of the small land holder as well as to the improvement of soil conditions (Fernandez and Shanmungasundarm, 1988). In South Asia, the dall is made with mungbean. The most popular dish that is made from different types of split legumes is Dall. It is used to produce various forms of candy, bean jam; sweetened bean soup, vermicelli and bean sprout in South-East and East Asian countries. The correlation coefficient is the mutual interaction between variables without suggesting any connection between cause and effect (Mehandi et al. 2019)

Materials and Methods

In order to study the genetic parameters, association and genetic diversity, the current investigation was carried out to investigate the 21 mungbean genotypes along with one check (Samrat). The experiment was performed in Randomized Block Design with three replications at the Field Experimental Centre, Department of Genetics and Plant Breeding, Sam Higginbottom Institute of Agriculture Technology and Sciences, Allahabad during Kharif 2010-11. For 10 quantitative characters, variance analysis revealed highly significant variations between 21 genotypes of mungbean. The coefficient of correlation is the reciprocal association between variables without suggesting any connection between cause and effect. The coefficient of correlation is the reciprocal association between variables without suggesting any connection between cause and effect. At genotypic and phenotypic levels, simple correlation coefficients were computed between pairs of characters adopting formulas provided by Al-Jibouri et al. (1958).

Results

Crop yield per pant showed a positive and substantial correlation with the seed index, with a significant negative correlation between days to 50 percent flowering and days to maturity. Whereas plant height, number of clusters per plant, number of pods per plant and length of pods showed a negative non-significant seed yield association. However, the number of branches per plant and the number of seeds per pod showed a positive, non-significant seed yield association.

A strong and meaningful association with the seed index was seen for crop yield per pant, with a strong negative correlation between days to 50 percent flowering and days to maturity. Whereas the height of the plants, the number of clusters per plant, the number of pods per plant and the length of the pods were correlated with a negative non-significant seed yield. However, a positive, non-significant seed yield association was shown by the number of branches per plant and the number of seeds per pod. While the number of seeds per pod, the seed index and the yield of seeds per plant showed a negative, non-significant association. There was a strong non-significant association between primary branches per plant and seed yield per plant, seed index and pod weight, while days to maturity showed a negative significant correlation. Number of clusters per plant, number of pods per plant and number of seeds per plant, with a non-significant negative association. The number of clusters per plant revealed a positive significant correlation with pods per plant, with a positive non-significant correlation between pod length and number of seeds per pod, 100 seed weight and seed yield per plant reported a negative non-significant association during the days to maturity. The number of pods per plant showed a positive non-significant correlation with the days to maturity, the length of the pod, the number of seeds per pod and the yield of seeds per plant, while the seed index showed a negative non-significant correlation. The length of the pod showed a positive, non-significant association with the number of seeds per pod, seed index and yield of seeds per plant. The number of seeds per pod showed a negative non-significant seed index correlation, while the seed yield per plant showed a positive non-significant seed index correlation. Days to maturity revealed a negative, non-significant association between the seed index and the seed yield per plant. The duration of the pod showed a significant negative correlation, while the number of seeds per pod recorded a significant positive correlation.

Discussion

Correlation studies will provide accurate knowledge, scope and direction of selection for the selection of an appropriate plant type, especially when the breeder wants to balance high yield potential with suitable agronomic characteristics and grain quality. The genotypic correlation coefficient of different characters with seed yield per plant and interrelationship between themselves was determined in the current analysis (Table 1 and 2). Grain yield depends in either a negative or positive way on the variety, supply of plant nutrients, crop management and its supporting variables. The grain yield was greatly influenced by various genotypes, and all varieties behaved differently in terms of grain production. Crop yield per pant demonstrated a strong and substantial association with the seed index, with a significant negative correlation between days to 50 percent flowering and days to maturity. Chakraborthy and Haque (2019), Vikas et al. (2016), Rajan et al. (2000) and Afiah Muhammad have previously recorded a positive correlation of seed yield per plant with the seed index (2000). Whereas plant height, number of clusters per plant, number of pods per plant and length of pods displayed a negative non-significant seed yield association. However, the number of primary branches per plant and the number of seeds per pod displayed a positive, non-significant seed yield association. Miah and Bhadra (1989) and Reddy et al. are in accordance with these reports (1991).

Flowering days at 50 percent showed a positive significant correlation with maturity days, while seed yield per plant showed a negative significant correlation. Positive non-significant correlation was reported for the number of pods per plant, while negative non-significant correlation was registered for plant height, number of primary branches, and number of clusters per plant and pod weight. A negative non-significant relationship between these two characters was seen in the correlation studies between the grain yield and the number of days taken to maturity given in Table 1, which implies that the rise in days to maturity will minimize the final grain yield in the mungbean. Saleem 1982 and Aslam et al. 1992, which observed a favourable correlation of grain yield with days to maturity, did not confirm these observations. Different genetic makeup of cultivars may be responsible for the disparity in outcomes. Plant height had a negative significant correlation with days to maturity, but the number of primary branches per plant, the number of clusters per plant, the number of pods per plant and the length of the pod had a positive non-significant correlation, while the number of seeds per pod, the seed index and the yield of seeds per plant had a negative non-significant correlation. There was a positive, non-significant association between primary divisions per plant and seed yield per plant, Seed index and pod volume, though negative meaningful correlation was recorded by days to maturity. Number of clusters per plant, number of pods per plant and number of seeds per plant, with a non-significant negative association. The number of clusters per plant showed a positive significant correlation with pods per plant, whereas the length of the pod and the number of seeds per pod showed a positive non-significant correlation, while the days to maturity showed a negative non-significant correlation of 100 seed weight and seed yield per plant. The number of pods per plant showed a positive non-significant correlation with the days to maturity, the length of the pod, the number of seeds per pod and the yield of seeds per plant, while the seed index showed a negative non-significant correlation. Miah and Bhadra 1989 and Reddy et al. 1991 have reported variations in pod development by different mungbean cultivars. The length of the pod showed a positive, non-significant association with the number of seeds per pod, seed index and yield of seeds per plant. The number of seeds per pod showed a negative non-significant seed index correlation, while the seed yield per plant showed a positive non-significant seed index correlation. Days to maturity revealed a negative, non-significant association between the seed index and the seed yield per plant. The duration of the pod showed a significant negative correlation, while the number of seeds per pod recorded a significant positive correlation. The seed index demonstrated a strong positive association with the seed yield per plant.

Conclusion

The findings of the correlation showed that the number of pods/plant and grain yield is associated with each other very strongly and favourably. This close relationship between these two characters showed that the number of pods is the most significant factor and directly proportional to the yield of crops. The grain yield can also be improved by increasing the number of pods per plant and vice versa.

Table 1: Estimates of correlation coefficient at genotypic level for nine component characters with seed yield

Characters	DF	PH	PBP	CP	PP	DM	PL	SP	SI	SYP
DF	**1.00**	-0.3334	-0.0407	-0.0223	0.0255	0.6575**	-0.1595	0.3449	-0.4688	-0.3364**
PH		**1.00**	0.2925	0.1480	0.2400	-0.5630**	0.1881	-0.3115	-0.0714	-0.1811
PBP			**1.00**	-0.1867	-0.1187	-0.3694*	0.0862	-0.2571	0.3927	0.0861
CP				**1.00**	0.5811**	-0.1652	0.0082	0.0671	-0.0193	-0.1951
PP					**1.00**	0.0103	0.1415	0.0606	-0.1206	-0.1871
DM						**1.00**	-.6731*	0.4346*	-0.3269*	-0.1547*
PL							**1.00**	-0.1104	-0.0726	-0.0348
SP								**1.00**	-0.1606	0.1825
SI									**1.00**	0.4339**
SYP										**1.00**

*** & ** Significant at 5% level and 1% level of significance**

Table 2: Estimates of correlation coefficient at phenotypic level for nine component characters with seed yield

Characters	DFF	PH	PBP	CP	PP	DM	PL	SP	SI	SYP
DF	**1.00**	-0.2475	0.1135	-0.0492	0.0176	0.4856**	-0.0245	0.1658	-0.4547	-0.2057**
PH		**1.00**	0.1491	0.1298	0.2332	-0.5038**	0.0711	-0.2273	-0.0583	-0.1783
PBP			**1.00**	-0.1200	-0.0846	-0.2717*	0.0024	-0.1911	0.1013	0.1303
CP				**1.00**	0.5722**	-0.1543	0.0139	0.0633	0.0407	-0.1563
PP					**1.00**	0.0093	0.0660	0.0438	-0.1026	-0.1603
DM						**1.00**	-0.3121*	0.2711*	-0.2727*	-0.1702*
PL							**1.00**	-0.0376	0.0250	-0.1325
SP								**1.00**	-0.0623	0.1248
SI									**1.00**	0.3285*
SYP										**1.00**

*** & ** Significant at 5% level and 1% level of significance**
DFF=Days to 50 % flowering, PH= Plant height (cm), CP= Clusters/ Plant, PBP=Primary branches/ Plant PP=Pods/ Plant, DM= Days to maturity, PP= Pod length (cm), SP= Seeds/ Pod, SI= Seed index, SYP= Seed yield/ Plant (g)

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