

Assessment of Genetic Diversity in Selected Accessions of Dolichos Lablab Using Various Morphometric Traits

Abstract

Morphometric studies were carried in six selected accessions of Dolichos lablab using nine quantitative traits like seed length, seed width, seed thickness, seed hilum length 100 seeds weight, pod length, pod width, and number of seeds per pod. For all nine the quantitative traits studied, statistical analysis viz. analysis of variance (ANOVA), coefficients of genotypic, phenotypic and environmental variance, heritability and genetic advance were carried out. All computations were carried out using NYSYS -pc version 2.0. Variability for 100 seeds weight was quite significant in two genotypes in Dolichos lablab and the variability in hilum length remained almost insignificant. Heritability estimates (broad sense) in Dolichos lablab genotypes were also found to be high for some other traits and high heritability values were associated with high value of expected genetic advance as percent of mean for seed length, pod width, seed thickness. Study revealed adequate genetic variability within the germplasm evaluated for overall improvement in the genotypes of these three genera by hybridization and genetic manipulation.

Keywords: Genetic diversity, Morphometric, Hetatiblty, Traits

Introduction

Dolichos bean is a multipurpose legume crop grown for food, fodder, medicine, green manure. However, the major limitation to the use of legumes in animal diets is the presence of anti-nutritional factors. Schaffhausen (1963b) reports that the leaves of Dolichos bean do not contain tannins, making them a good feed for monogastric animals. The seeds however, do contain anti-nutritional factors such as tannins and trypsin inhibitors. Activity of these compounds could be reduced by processing methods such as removing the seed coat, soaking and cooking (Lambourne and Wood 1985, Deka and Sarkar 1990). For a proper nutritional assessment of anti-nutritional factors like haemagglutinins and other toxic substances in Dolichos lablab seeds, more research is required (Deka and Sarkar 1990).

Dolichos lablab is a climbing or erect perennial herbaceous crop often grown as an annual. It grows up to 40 inches (1 m) tall, with long stems in climbing types extending as much as 25 ft (6 m) from the base of the plant. The leaves are trifoliate, and the flowers are purple or white. It has a strong taproot with many lateral and adventitious roots. It grows rapidly in fertile soil. Both determinate (bush) and indeterminate (vining) varieties exist. It has an approximate growing cycle of 60 days. The fruit is a flat, broad pod, with wavy margins 4–5 inches long. When immature, the pods and their nutritious seeds can be eaten.

Aim of the Study

To carry out Assessment of Genetic diversity in selected accessions of Dolichos lablab using various Morphometric traits.

Material and Methods

The present research work was carried out during 2013-2014. The field observations were taken at RBS College Botanical garden and Research Farm Khandari, Agra. The Geographical location of the experimental station is in semiarid and subtropical zone of Uttar Pradesh at 27.2° North latitude and 77.9° East latitude and 163 meters above mean sea level. The summers are extremely hot and dry. The land was prepared for sowing of, Dolichos lablab cultivars by ploughing to ensure moisture conservation and ruling out sheltering to pests and termites.

One plot of size 8.5-3.5 meter square was prepared to accommodate all the twenty two bean genera. All the genotypes

were sown in five rows; each containing five accessions with spacing of 45 cm. Plant to plant distance of 10 cm was maintained. Data collected from morphological (quantitative) characters of seeds and pods in Dolichos lablab were subjected to statistical analysis (Steel and Torrie, 1984) to assess the extent of variations for various phenotypic, genotypic & environmental parameters in statistical terms. For all nine the quantitative traits studied, statistical analysis viz. analysis of variance (ANOVA), coefficients of genotypic, phenotypic and environmental variance, heritability and genetic advance were carried out. All computations were carried out using NYSYS –pc version 2.0.

Result and Discussion

A critical statistical evaluation of quantitative traits in seed and pods of Dolichos lablab under present investigation provided very interesting results. Out of 9 parameters scrutinized for all the genotypes viz. seed length, seed width, seed thickness, hilum length, 100 seeds weight, pod length, pod width, pod thickness and seeds per pod, the last parameter, i.e. number of seeds per pod remained insignificant for all the genotypes.

The variability in hilum length remained almost insignificant. Variability for 100 seeds weight was quite significant in two genotypes. Significant variability in pod length was represented by single genotype in each genus, showing thereby greater effect of environment in determining the length of the pod. Significant variability in pod length was represented by single genotype showing thereby greater effect of environment in determining the length of the pod. This was further supported by very less

Remarking An Analisation

percentage of genetic advance. Such observations were also taken by earlier workers (Kabir & Sen 1987 in Dolichos; Vadival et al., 1997 in Canavalia, Vadivel and Janardhanan 2000 in Mucuna, Lal et al. 2009, in Hyacinth bean, Mamatha et al. 2010 in Mucuna utilis, and Dada et al. 2012 in Canavalia species). Significantly high correlation between seed thickness and seed width (0.9302) and for pod thickness and pod width (0.9416) reflected positive relationship between these traits which could be valuable during selection of varieties for breeding programmes.

At the same time significantly low correlation was observed between 100 seeds weight and hilum length (0.1035).

These results were in conformity with work of Lal et al. (2005), Rai et al. (2010) and Singh (2011) in some genotypes of Hyacinth bean. Present study revealed that positively correlated characters should result in correlated response for related traits and this positive correlation among characters show simple and indirect selection criteria in the development of superior varieties.

Conclusion

In the present investigation Heritability estimates (broad sense) in Dolichos lablab genotypes were also found to be high for some other traits and high heritability values were associated with high value of expected genetic advance as percent of mean for seed length, pod width, seed thickness. Study revealed adequate genetic variability within the germplasm evaluated for overall improvement in the genotypes of these three genera by hybridization and genetic manipulation.

Table No. 1 Coefficient of Environmental Variance, Genotypic Variance, Phenotypic Variance, Heritability, Mean and Genetic Advances (GA) in Dolichos Genotypes

Dolichos	Coefficient of Environmental variance	Coefficient of Genotypic variance	Coefficient of phenotypic variance	Heritability %	Mean	GA (as % of mean)
Seed Length	8.69	25.52	26.91	89.57%	12.60	49.66
Seed Width	5.47	10.76	11.78	81.82%	8.90	19.86
Seed Thickness	3.46	12.50	13.45	93.75%	5.95	25.97
Hilum Length	2.71	12.66	12.87	92.31%	8.72	24.86
100 seeds weight	0.43	16.35	16.35	99.93%	31.06	33.66
Pod Length	2.11	6.84	7.17	91.22%	71.43	13.47
Pod Width	4.54	21.22	21.70	95.63%	20.92	42.74
Pod Thickness	5.13	3.40	5.84	33.33%	6.63	4.01
Number of seeds per pod	7.50	11.24	13.51	69.30%	4.78	19.29

Table No. 2 Showing the Correlation between the Different Phenotypic Traits of Seeds and Pods in Dolichos Genotypes

	Seed Length	Seed Width	Seed Thickness	Hilum Length	Weight of 100 Seeds	Pod Length	Pod Width	Pod Thickness	Number of Seeds Per Pod
Seed Lenth	1								
Seed Width	0.8246**	1							
Seed Thickness	0.7921**	0.832**	1						
Hilum Length	0.7718**	0.7585**	0.7304**	1					
Weight of 100 Seeds	0.7701**	0.853**	0.8415**	0.7343**	1				
Pod Length	0.7623**	0.7839**	0.8121**	0.897**	0.8404**	1			
Pod Width	0.7312**	0.7157**	0.658**	0.8731**	0.6405**	0.8075**	1		
Pod Thickness	0.3917**	0.4525**	0.5124**	0.0444	0.4469**	0.3292**	0.1653**	1	
Number of Seeds Per Pod	0.7605**	0.7907**	0.8807**	0.7371**	0.7461**	0.8461**	0.6779**	0.5203**	1

**. Correlation is significant at the 0.01 level

*. Correlation is significant at the 0.05 level

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