

EVALUATION OF GENETIC DIVERSITY IN LOCAL  
WINGED BEAN (PSOPHOCARPUS TETRAGONOLOBUS (L) DC) GERMPLASM

By

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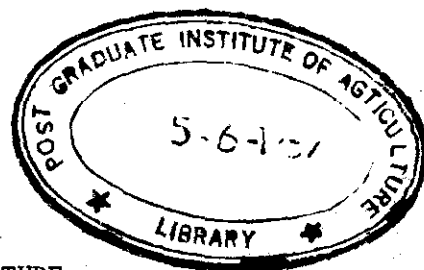
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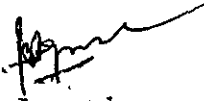
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## ABSTRACT

Six field experiments were conducted during 1983-84 at three agro-ecological zones, namely Gannoruwa (wet zone), Dodangolla (intermediate zone), and Maha Illuppallama (dry zone). The experiments were conducted to evaluate the local winged bean germplasm using qualitative and quantitative characters, to study the genotype-environmental interactions and the responses in adaptability and their genetic diversity.

There was considerable variation in several morphological and agronomic characters which could be used in the identification of accessions as a preliminary step in their evaluation. In the genotypic and phenotypic variability studies in all six experiments, the winged bean accessions exhibited highly significant differences for most of the characters. A wide range of phenotypic variation was observed for the characters studied, but the expected improvement will primarily depend upon the magnitude and nature of the genetic variability present in the population.

The present study indicated that total drymatter production and seed yield have comparatively higher genotypic coefficient of variation (GCV) than the other characters. Heritability values for the above two characters were also higher, being 0.95 and 0.93 respectively. Coupled with high heritability and comparatively high GCV, total drymatter production and seed yield showed high values for genetic advance as a percent of the mean (80% and 87% respectively). Thus, these two characters could be used in the selection and improvement of the crop.

The regression approach was used to study the genotypic-environmental interactions and adaptability of 101 winged bean accessions. The results showed that major portion of the G x E interaction was linearly related to the environmental index. To describe adaptabilities regression coefficient (b) of 1.0 was considered as having an average adaptability.

Based on regression coefficients (b) it will be possible to select accessions depending on their environmental responses and adaptability. The accessions SLS 6, 52, 57, 58, 68, 71, 87, 88, 90, 91, 101, 103, 104, 107, 113, 114, 115, 117, 129, 131, 136 and 137 showed below average phenotypic stability ( $b > 1.0$ ) and above average total drymatter production and seed yield. Although these accessions were sensitive to environmental changes they are adapted to perform well under good management practices. Twelve accessions showed above average total drymatter production and seed yield; the accessions were 7, 29, 37, 40, 47, 70, 72, 98, 109, 132, 133 and 138. Since these were stable genotypes for environmental changes and good seed yielders, it is possible to consider them specifically for dry areas or for poor environments.

The cluster analysis was performed to study the genetic relationships of the 101 SLS accessions of winged bean. The data of six experiments of 14 agronomic characters were subjected to cluster analysis using CLUSTAN - 2 computing programme. The results were explained by dissimilarity coefficients and dendrograms. The accessions were grouped at different dissimilarity coefficient levels and finally sub-groups were formed at very low dissimilarity coefficient values with each sub-group having varying number of individuals.

The cluster analysis results indicated that the SLS accessions 1, 3, 59, 65 and 131 having close genetic relationships. Similarly SLS 67, 77, 94 and 95 showed close genetic affinities between each other. Further, results indicated that there is a poor relationship between the geographical origins and the genetic diversity.

The grouping by cluster analysis appears to be a valuable technique in identifying accessions according to their genetic affinities and there by to select genetically divergent individuals for various breeding purposes.