



## Research Note

### Genetic divergence in dolichos bean (*Dolichos lablab* L.)

Devendra Upadhyay<sup>1</sup>, Nandan Mehta<sup>2\*</sup>, Jitendra Singh<sup>1</sup> and Mayuri Sahu<sup>2</sup>

<sup>1</sup>Department of Horticulture, Indira Gandhi Krishi vishwavidyalaya, Raipur-492006, Chhattisgarh, India

<sup>2</sup>Department of Plant Breeding and Genetics, Indira Gandhi Krishi vishwavidyalaya, Raipur-492006, Chhattisgarh, India

\*Email: mehta.igkv@gmail.com

(Received: 09 Aug 2011; Accepted: 22 Aug 2011)

#### Abstract:

Genetic divergence was studied in 32 genotypes of dolichos bean (*Dolichos lablab* L.). Nine yield and its contributing characters were measured by Mahalanobis's  $D^2$  analysis. Thirty two genotypes were grouped in five clusters the highest intra cluster distance was observed for cluster III followed by cluster V, cluster IV and cluster II. The highest inter cluster distance was observed between the clusters III and cluster I followed by cluster IV and I and cluster V and I. The minimum inter cluster distance was noted in between IV and II. The genotypes collected from same geographical location fall in different clusters, revealed that geographical distance do not contribute to genetic divergence.

**Key words:** Dolichos lablab, genetic divergence, variability

Indian bean commonly called as Sem (*Dolichos lablab*) is an important vegetable crop widely grown in south and eastern India. Its green pods are used as vegetables and dry seeds as pulse. Though this crop has originated in India, very little work has been done to study the varietal characters and to improve the quality of pod and yield of the local strain available. Great range of variation exists in the plant and pod characters among the cultivars grown all over the country. A successful hybridization programme for varietal improvement depends mainly on the selection of the parents having high genetic divergence. Multivariate analysis by means of Mahalanobis (1936)  $D^2$  statistics is a powerful tool in quantifying the degree of divergence among genotypes, biological populations at genotypic level to assess the relative contribution of different characters to the total variation. Hence present study was undertaken to provide information on nature and magnitude of genetic diversity among promising genotypes.

The experiment was conducted at Horticulture Research Farm Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) during Rainy season 2007-08. Thirty two genotypes of Dolichos bean *viz.*, IS-1, IS-2, IS-3, IS-4, IS-5, IS-6, IS-7, IS-8, IS-9, IS-10, IS-11, IS-12, IS-13, IS-14, IS-15, IS-16, IS-17, IS-18, IS-19, IS-20, IS-21, IS-22, IS-23, IS-24, IS-25, IS-26, TRC-1, TRC-2, IIVR-SEM-11, IIVR-SEM-186, JDL-79-1 and Swarna Utkrishti were grown in a completely randomized design with three

replications. These were planted in a two row plot. The plot size and spacing were 3 x 3.6 m<sup>2</sup> and 60 x 30 cm<sup>2</sup> respectively. Five plants from each replication were taken for recording observation on nine characters *viz.*, length of inflorescence, number of flowers/ inflorescence, number of pods/ inflorescence, pod length (cm), pod width (cm), marketable pod weight (g), number of seeds/pod, 100 seed weight(g), Green pod yield/ plant (kg). The data were subjected to analysis of variance and multivariate analysis of  $D^2$  statistics according to Mahalanobis (1936).

Present result of cluster analysis (Table 1) revealed that the genotypes of Dolichos bean under the study were grouped into five different clusters showing significant variability for choosing different genotypes for further breeding programmes. Cluster II was the biggest cluster with thirteen genotypes. Whereas, cluster I, III, IV and V comprised 1, 4, 6 and 8 genotypes, respectively. The intra and inter cluster distance were computed for all the traits and are presented in Table 2. Experimental findings revealed that the highest intra cluster distance was observed for cluster III (2.105) followed by cluster V (2.061), cluster IV (1.905) and cluster II (1.889). The highest inter cluster distance was observed between the clusters III and cluster I (5.708) followed by cluster IV and I (5.526) and cluster V and I (5.313). The minimum inter cluster distance was noted in between IV and II (2.712).

Mean performance of individual cluster for different characters are presented in Table 3, which showed that cluster I is most suitable to select better genotypes for number of pods per inflorescence and green pod yield per plant whereas, cluster V was found reasonably good for average pod length (12.4), marketable pod weight (7.40), number of seeds/ pod (5.50), and number of flowers/ inflorescence (15.36). Moreover, cluster II recorded largest inflorescence (18.51) and cluster III showed highest pod width (2.62) and hundred seed weight (53.24). The pattern of distribution of dolichos bean genotypes in various clusters expressed existence of considerable genetic diversity in the material. The highest intra cluster distance was observed in cluster III. Hence, genotypes belong to this cluster *viz.*, IIVR-SEM-11, IIVR-SEM-186, JDL-79-1 and Swarna Utkrishti may be utilized as parents in future breeding programmes and fresh crosses can be made with IS-1 genotype belonging to cluster I as the maximum inter cluster distance was noted in between the cluster III and cluster I. The genotypes collected from same geographical location fall in different clusters, indicating that geographical distance do not contribute to genetic divergence (Upadhyay, 2009; Patel, 2010). These results are in general agreement with the findings of Baswana *et al.* (1980), Nandi *et al.* (2000), Borah and Khan (2001), Golani *et al.* (2006), Upadhyay(2009) and Patel (2010) Hence, genotypes *viz.*, IIVR-SEM-11, IIVR-SEM-186, JDL-79-1 and Swarna Utkrishti may be utilized for making diallel cross combination as parents in future breeding programmes and fresh crosses can be made with IS-1 genotype for chattisgarh plains conitions for betterment of vegetable growers of chattisgarh.

#### References:

- Baswana, S., Pandita, S., Partap, P.S. and Dhankhar, B.S. 1980. Genetic divergence for yield and its components in *Hyacinth bean*. *Haryana J. Hort. Sci.*, **9** (3/4), 184-187.
- Borah, H.K. and Khan, A.K.F. 2001. Genetic divergence in fodder cowpea (*Vigna unguiculata* (L.) Walp). *Madras Agri. J.*, **88**(10/12): 625-628.
- Golani, I.J., Naliyadhara, M.V., Mehta, D.R., Purohit, V.L. and Pandya, H.M. 2006. Genetic divergence in Indian bean (*Lablab purpureus* L.). *Legume Res.*, **29**(4):286-288.
- Mahalanobis, P.C. 1936. On the generalized distance in statistics. *Proc. Nat. Inst. Sci., India*, 21: 49-55.
- Upadhyay, D. 2009. Genetic divergence in dolichos bean. M.Sc.(Ag) thesis IGKV Raipur (C.G.).
- Patel, K.L. 2010. Genetic variability and divergence studies in dolichos bean. M.Sc.(Ag) thesis IGKV Raipur (C.G.).

**Table 1. Clustering pattern of Dolichos bean genotypes on the basis of Mahalanobis D<sup>2</sup> statistics**

Cluster No.	No. of genotypes	Accession numbers
I	1	IS-1
II	13	IS-6, IS-7, IS-8, IS-9, IS-10, IS-11, IS-13, IS-14, IS-15, IS-16, IS-22, IS-24, IS-25
III	4	IIVR-SEM-11, IIVR-SEM-186, JDL-79-1, Swarna Utkrishti ( St. Check)
IV	6	IS-5, IS-18, IS-19, IS-20, IS-21, IS-23
V	8	IS-2, IS-3, IS-4, IS-12, IS-17, IS-26, IS-27, IS-28

**Table 2. Average inter and intra-cluster distance in Dolichos genotypes**

Cluster	I	II	III	IV	V
I	<b>0.000</b>	4.475	5.708	5.526	5.313
II		<b>1.889</b>	4.33	2.712	3.290
III			<b>2.105</b>	3.827	3.090
IV				<b>1.905</b>	3.620
V					<b>2.061</b>

Note: Bold figures shows intra-cluster distance.

**Table 3. Mean cluster values for different traits in Dolichos bean**

Clusters	Length of inflorescence (cm)	Pod length (cm)	Pod width (cm)	Hundred seed weight (g)	Marketable pod weight (g)	Number of seeds/pod	Number of flower per inflorescence	Number of pod/inflorance	Green pod yield/plant (kg)
I	11.79	6.00	2.43	18.01	3.57	2.67	14.44	10.78	2.72
II	18.51	6.95	1.52	33.70	5.34	4.51	13.81	9.41	1.60
III	11.21	11.59	2.62	53.24	6.89	5.00	12.47	7.72	2.40
IV	13.77	7.77	1.42	35.40	5.01	5.28	10.16	6.33	1.60
V	14.37	12.42	1.69	32.26	7.40	5.50	15.36	9.12	2.32