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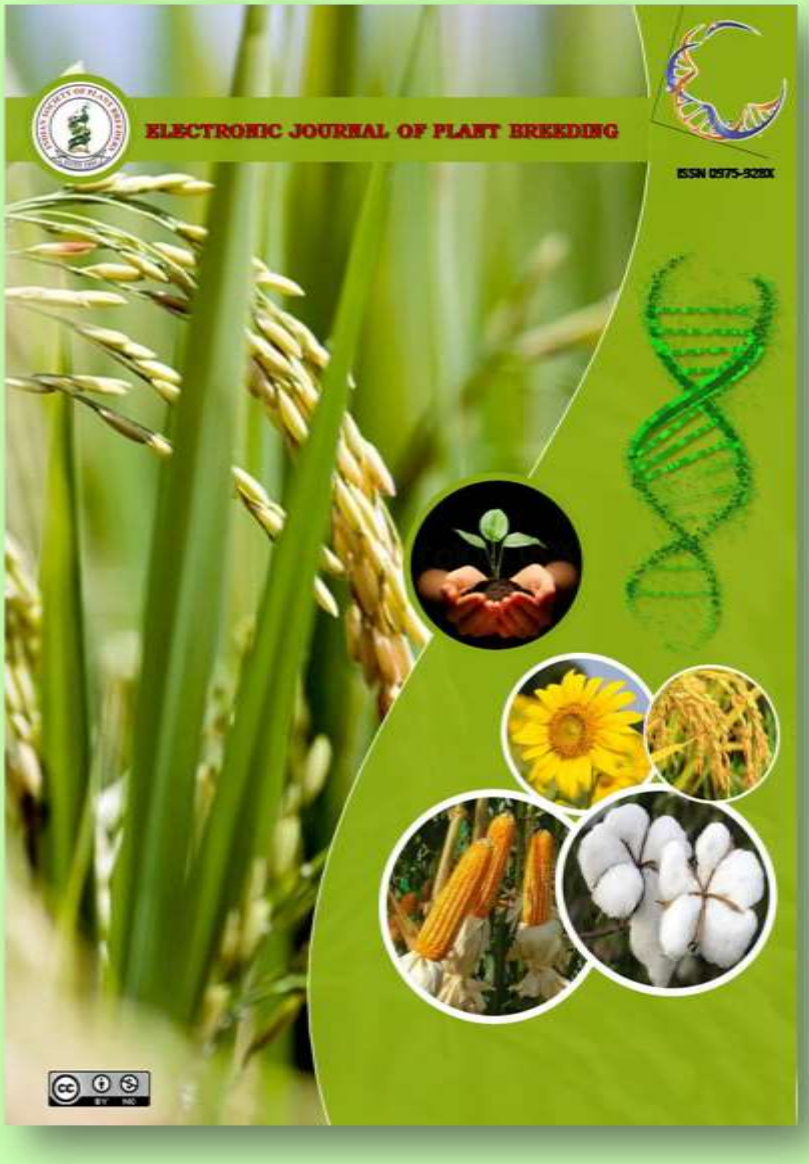

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Research Article

Genetic diversity studies in Lablab (*Lablab purpureus* L.) genotypes

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Abstract
Mahalanobis D^2 statistics was used to study the genetic divergence for 12 characters among 30 genotypes of Indian bean. Genotypes were grouped into four clusters on the basis of relative magnitude of D^2 values. The maximum inter cluster distance was observed between cluster III and IV (86.42) followed by cluster IV and cluster I (69.74). Maximum intra cluster distance was exhibited in cluster I (27.91) followed by cluster II (22.58). The mean value for most of the traits was maximum in cluster IV. Among the yield contributing characters, the maximum contribution towards divergence was made by pod length (34.25), average pod weight (31.26), pod yield per plant (21.15). Maximum D^2 values between cluster III (3 genotypes) and cluster IV (1 genotype) followed by cluster I (19 genotypes) and IV (1 genotype) indicated that the genotypes included in these clusters may give useful superior recombinants with desirable traits in segregating generations.

Keywords
Lablab, genetic diversity, D^2 values

Introduction

Lablab (*Lablab purpureus* L.) commonly known as Indian bean or sem or hyacinth bean or field bean is one of the most ancient crops among cultivated plants. It belongs to the family Fabaceae with the somatic chromosome number of 2n=22. It occupies an unique position for vegetable purpose among the legumes Biju *et al.* (2001) and Rai *et al.* (2009). Despite its importance, practically no efforts have been made to improve this crop. Knowledge of the nature and degree of divergence in the existing germplasm form the basic prerequisites in breeding programme for effective selection of superior genotypes. Hence, the present study was undertaken to provide information on magnitude of genetic diversity among promising lablab genotypes.

Materials and Methods

The field experiment comprising of 30 genotypes of Indian bean was conducted at Department of Vegetable Crops, Horticulture College and Research Institute, TNAU, Coimbatore during rabi season of 2018-2019 in Randomized Block Design with two replications. Every genotype in each replication was grown in a plot of 3 x 3 m with a spacing of 45 cm between rows and 30 cm between plants. All the recommended package of practices and necessary plant protection measures were followed timely to raise a good crop. Three plants were randomly taken from each plot to record observations on 12 yield and yield contributing components *viz.*, plant height(cm), number of primary branches, days to 50% flowering, number of pod per cluster, days to first fruit setting, days required from pod set to maturity, days to first fruit harvest, pod length(cm), pod width(cm), average pod weight(g), number of seed per pod, pod yield per plant(kg). Genetic diversity was estimated as per Mahalanobis (1928) D^2 statistics between different pairs of genotypes (Lenglet *et al.*, 2006), and cluster composition was estimated using Tocher's method by (Rao, 1952).

Results and Discussion

The analysis of variance revealed significant differences among the genotypes for all the traits studied. Lablab genotypes were clustered based on Tocher's method. Among the four clusters, cluster I had the maximum number of genotypes (19), cluster II had seven genotypes, cluster III had three genotypes, cluster IV had one genotype. From clustering behavior of genotypes in the present study (Table 1), it is obvious that the genotypes have grouped into different clusters irrespective of their geographical origins. It means that the genetic constitution of the varieties was more dominant than their geographical origin while forming a cluster.

The intra and inter cluster distances are presented in Table 2. Maximum inter cluster distance was observed between cluster III and IV (86.42) followed by cluster IV and cluster I (69.74) as well as cluster II and III (53.95). On the other hand cluster III (21.90) displayed the lowest degree of divergence suggesting close genetic makeup of the genotypes included in these groups.

Maximum intra cluster distance was observed in cluster I (27.91) followed by cluster II (22.58).The cluster VI comprised of only one genotype with its unique character. Intra cluster distance being much lesser than inter cluster ones, suggested homogenous and heterogeneous nature of the genotypes within and between the clusters, respectively.

Almost all the clusters were highly distinct to each other with respect to all the characters (Table 3). The cluster IV exhibited maximum plant height (66.65), number of primary branches per plant (6.3), pod length (18.50), pod width (3.0) and average pod weight (8.25). The cluster II recorded the highest number of pods per clusters (7.87), number of seeds per pod (4.21) and pod yield per plant (3.24). On other hand, cluster IV registered the lowest number of days taken for 50% flowering (45).The per cent contribution of different characters towards diversity is represented in Table 4. Among the yield contributing characters, the maximum contribution towards divergence was by pod length (34.25), average pod weight (31.26), pod yield per plant (21.15). Similar results in lablab have been reported by (Verma *et al.*, 2016) and (Chaitanya *et al.*, 2013) . On the other hand, (Patil *et al.*, 2008) reported protein content and pod length respectively contributed more towards divergence than other yield attributes in Indian bean.

From the study it can be concluded that more emphasis should be given to improve pod length, average pod weight, pod yield per plant during selection of high yielding genotypes of lablab. Maximum D^2 values existed between cluster III (three genotypes) and cluster IV (one genotype) followed by cluster I (19 genotypes) and IV (one genotype) indicating that the genotypes included in these clusters may give useful superior recombinants with desirable traits in segregating generations.

References

Biju, M., Prasanna, K., and Rajan, S. (2001). Genetic divergence in hyacinth bean. *Veg Sci*, **28**(2), 163-164.

Chaitanya, V., Reddy, R., Pandravada, S., and Sujatha, M. (2013). Genetic divergence in dolichos bean (*Dolichos lablab* L. var. *typicus*) genotypes for yield and yield contributing traits. *Asian J Hort*, **8**(2), 733-736.

Lenglet, C., Rousson, M., Deriche, R., Faugeras, O., and Vision. (2006). Statistics on the manifold of multivariate normal distributions: Theory and application to diffusion tensor MRI processing. *J Math Imaging Vis*, **25**(3), 423-444.

Patil, S., Patil, H., and Jambhale, V. (2008). Genetic divergence studies in Moth bean (*Vigna aconitifolia*). *J Maharashtra Agric Univ*, **33(**2), 161-164.

Rai, N., Asati, B., and Singh, A. (2009). Genetic divergence in Indian bean. *Legume Res*, **32**(2), 166-172.

Rao, C. (1952). *Advanced statistical methods in biometric research* (Vol. 23(1)): A Division Of Macmillan Publishing Co, Inc New York; Collier-Macmillan ….

Verma, A. K., Jyothi, K. U., Singh, R., and Jhade, R. (2016). Genetic divergence studies in hyacinth bean (*Lablab purpureus* L.) genotypes. *Envir Ecol*, **32***(2)*, 162-166.

Table 1. Clustering pattern of 30 genotypes of Lablab (Tocher's method)

Clusters	Number of genotypes	Genotypes
I	19	Davangare Local, Hebbal Avarae 1, Hebbal Avarae 2, Karnataka Local 1, Thalavadi Local, Dharmapuri Local, Salem Local, Theni Local, Aruppukottai Local, EC Patti, Perundurai Local, Thevaram Local, Namakkal Local, Virudhunagar Local 2, Karnataka Local 2, Krishnagiri Local, Hosur Local, Angur Gold, Arka Jay
II	7	Erode Local, Neelamangala Local, Dobbspet Local, Kallumadam Local, Karumandurai Local, Tumkur Local, COGB 14
III	3	Mecheri Local,Virudhunagar Local 1,Madurai Local
IV	1	Chinnamannur Local

Table 2. Average intra (bold) and inter-cluster D^2 values for four clusters in 30 genotypes of lablab (Tocher's method)

Clusters	I	II	III	IV
I	**27.91**	38.93	35.72	69.74
II		**22.58**	53.95	45.15
III			**21.9**	86.42
IV				**0**

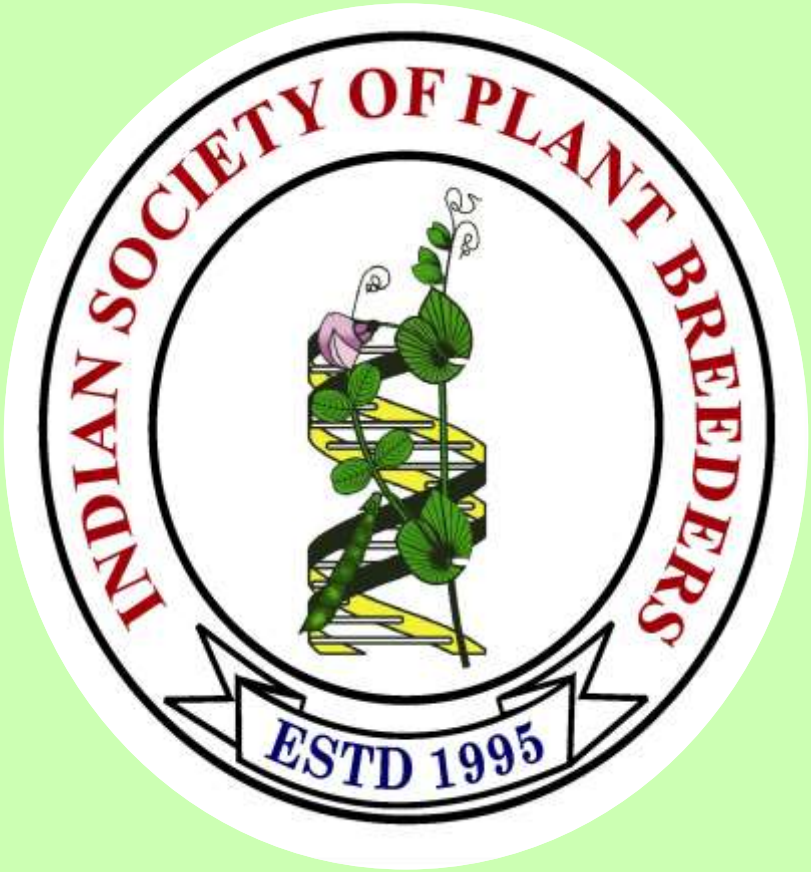
*Bold diagonal values indicate intra cluster distance, rest of the values show the inter cluster distances.

Table 3. Mean values of clusters for 12 characters in 30 genotypes of lablab (Tocher's method)

Clusters	I	II	III	IV
Plant height(cm)	62.11	58.99	58.58	66.65
No. of primary branches per plant	4.7	5.86	4.17	6.3
Days to 50 % flowering	51.58	46.07	50	45
No. of pods per clusters	6.53	7.87	7.07	5.3
Days to first pod setting	60.06	54.25	58.63	55.15
Days required from pod set to maturity	69.24	63.49	67.78	63.6
Days to first pod harvest	71.54	65.56	71.07	65.6
Pod length (cm)	7.76	10.81	5.33	18.5
Pod width (cm)	2.05	2.36	1.68	3
Average pod weight (g)	7.39	8.05	5.8	8.25
No. of seeds per pod	4.05	4.21	4.08	2.75
Pod yield per plant (kg)	2.3	3.24	2.62	3.16

Table 4. Per cent contribution of different characters towards diversity in lablab genotypes

Characters	Times ranked 1st	Contribution %
Plant height (cm)	32	7.36
No. of primary branches per plant	1	0.23
Days to 50 % flowering	6	1.38
No. of pods per cluster	6	1.38
Days to first pod setting	6	1.38
Days required from pod set to maturity	0	0
Days to first pod harvest	1	0.23
Pod length (cm)	149	34.25
Pod width (cm)	6	1.38
Average pod weight (g)	136	31.26
No. of seeds per pod	0	0
Pod yield per plant (kg)	92	21.15



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