Plant Archives Vol. 18 No. 1, 2018 pp. 690-692 *ISSN 0972-5210*

GENETIC DIVERGENCE IN FIELD BEAN (*LABLAB PURPUREUS* L.) GENOTYPES

S. Sadak Peer*, P. Syam Sunder Reddy, Syed Sadarunnisa, D.S. Reddy and Pandravada S.R.

*College of Horticulture, Dr. Y.S.R. Horticultural University, Anantharajupeta, Dr.Y.S.R Kadapa-516105 (A.P.) India

ABSTRACT

Genetic divergence was studied in Twenty nine genotypes of Field bean for twenty two quantitative characters by using Mahalanobis D^2 statistics. Genotypes were grouped in to six clusters on the basis of relative magnitude of D^2 values. The highest number of genotypes (13) was accommodated in cluster V. The maximum inter cluster distance was observed between cluster I and cluster VI followed by III and VI and the intra cluster distance was in cluster V followed by cluster III. Among the yield contributing characters studied, the maximum contribution towards divergence made by protein content followed by crude fibre content in seed. Hence, hybridization between cluster I (IC-261014, IC-446556) and cluster VI (IC-546350) could be utilized for getting the superior recombinants with desirable traits in segregating generations.

Key words: Field bean, Genetic divergence, D^2 Satistic.

Introduction

Field bean (*Lablab purpureus* L.) commonly known as hyacinth bean and Indian bean. Field bean is an important vegetable crop of Indian origin. It occupies a unique position for vegetable purpose among the legume vegetables (Biju *et al.,* 2001 and Rai *et al.,* 2009). Despite its importance, practically no efforts have been made to improve this crop. The knowledge of nature and degree of divergence in existing germplasm are basic pre-requisite in breeding programme of any crop including Indian bean for effective selection of superior genotypes. Hence, the present study was undertaken to provide information on nature and magnitude of genetic diversity among promising Indian bean genotypes.

Material and methods

The field experiment was comprised of 29 genotypes of field bean grown at vegetable block, College of Horticulture, Anantharajupeta, Y.S.R. Kadapa district, Andhra Pradesh during *kharif,* 2016-17. The experiment was laid out in a randomized block design with three replications. Each genotype was planted in one row of 6 m length with a spacing of 1 m between rows and 60 cm between the plants. All the recommended package of practices and plant protection measures were followed timely to raise a good crop. Five plants were randomly taken from each plot to record observations on twenty two yield components except days to first flowering, days to 50 per cent flowering, days to first pod set and 100 seed weight was recorded on whole plot basis. Genetic diversity was estimated by calculating Mahalanobis (1936) D^2 statistics between different pairs of genotypes. The method of cluster composition was done as per Tocher's method as described by Rao (1952).

***Author for correspondence :** E-mail : sadakpeer.sayyad113@ gmail.com

Results and discussion

The analysis of variance for 22 characters evaluated revealed significant differences among the genotypes.

Table 1: Clustering pattern of 29 genotypes of field bean (Tocher's method)

Cluster	No. of genotypes	Genotypes
I	2	IC-261014, IC-446556
II	8	IC-526912, IC-526943, NSJ-372, NSJ-172, IC-426988, IC-546370, IC-59849, RJR-21-2
III	3	IC-526932, IC-526944, IC-526918
IV	2	IC-526941, NSJ-246
V	13	NSJ-186, NSJ-258, NAIP-BD-ADB-70, NAIP-BD-ADB-02, IC-249525, NDS-236, PSRJ-12999-2, PSRJ-13095-1, PSRJ-13095, RJR-80-1, TFB-1, PSRJ-131-24, RJR-2-2
VI	1	IC-546350

Table 2: Average intra (bold) and inter-cluster D^2 values for six clusters in 29 genotypes of field bean. (Tocher's method)

Clusters	I	II	III	IV	V	VI
I	**4837.44**	15342.55	26753.07	37205.71	23527.88	56062.910
II		**6308.02**	16923.16	17752.99	13226.52	36989.090
III			**7404.66**	18726.76	16287.43	52962.060
IV				**5990.50**	18729.16	42116.790
V					**8833.04**	25883.410
VI						**0.00**

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

On the basis of D^2 values by estimating in all possible combinations of the genotypes, the 29 field bean genotypes were grouped into six clusters (table 1) and maximum number of genotypes (13) were accommodated in cluster V (NSJ -186, NSJ-258, NAIP-BD-ADB- 70, NAIP-BD-ADB- 02, IC -249525, NDS-236, PSRJ-12999-2, PSRJ-13095-1, PSRJ-13095, RJR-80-1, TFB-1, PSRJ-131-24, RJR-2-2) followed by cluster II with 8 genotypes (IC -526912, IC -526943, NSJ-372, NSJ -172, IC -426988, IC-546370, IC-59849, RJR-21-2). The pattern of distribution of these lines into 6 clusters confirmed the presence of variation amongst the genotypes as indicated by ANOVA it is obvious that the selection of different diverse genotypes have played a greater role in the total divergence between the clusters than the geographical diversity *i.e.* the genotypes have grouped in to 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 in field bean. Similar finding was reported by Rai *et al.* (2009).

Average intra and inter cluster distance (D^2) values are presented in table 2 revealed that the intra cluster distance varied between 0.00 (Cluster VI) to 150.00 (cluster V). The maximum divergence was observed between cluster I and VI (D^2 = 56062.91) revealing that the genotypes from these two clusters could be used as donors in hybridization programme for obtaining wide spectrum of variation among the segregants. While minimum was between cluster II and V (D^2 = 13226.52) which indicates that the genotypes of these clusters were quite close to each other. The cluster VI was solitary cluster with one genotype which indicated their independent identity and importance due to various unique characters possessed by them. Intra cluster distance being

Table 3: Mean values of clusters for twenty two characters in 29 genotypes of field bean (Tocher's method)

S. No	Character	Cluster I	Cluster II	Cluster III	Cluster IV	Cluster V	Cluster VI
1	Plant height at harvest (cm)	365.000	264.375	265.333	287.500	264.462	315.000
2	No. of 1^0 branches per plant	5.000	4.583	4.519	4.556	4.530	5.889
3	Days to first flowering	84.265	68.055	71.113	60.715	70.962	75.300
4	Days to 50 per cent flowering	91.035	71.009	73.287	62.705	74.065	77.830
5	Days to first pod set	94.400	79.580	80.480	68.223	80.637	84.403
6	No. of inflorescences per plant	12.210	19.416	22.140	22.845	23.662	15.840
7	Length of inflorescence (cm)	20.950	25.330	24.500	34.910	27.098	21.000
8	No. of pods per inflorescence	3.124	5.677	6.776	8.666	8.269	8.166
9	Length of the pod (cm)	12.562	5.614	5.290	5.207	5.426	4.867
10	Width of the pod (cm)	1.256	1.870	1.841	1.889	1.952	1.745
11	Days to first pod harvest	115.605	95.183	99.557	85.245	97.843	99.730
12	Days to last pod harvest	175.600	163.381	151.567	172.700	149.827	131.650
13	Weight of 10 green pods (g)	70.858	30.990	30.613	30.139	30.941	25.857
14	Number of pods per plant	28.166	90.416	128.873	178.312	172.712	109.431
15	No. of seeds per pod	5.171	3.863	3.637	3.668	3.829	3.440
16	Seed length (mm)	12.934	10.671	10.381	10.041	10.389	10.540
17	Seed width (mm)	7.876	7.431	7.340	7.115	7.154	7.592
18	Dry seed yield per plant (g)	48.326	91.049	113.122	150.887	151.226	97.645
19	100 seed weight (g)	33.125	26.141	23.954	23.040	23.077	25.866
20	Protein content (mg/100 g)	6.750	6.790	8.347	8.405	6.888	5.940
21	Crude fibre content in seed (%)	5.149	5.298	5.346	6.560	5.459	6.276
22	Fresh pod yield per plant (g)	149.875	230.704	347.615	487.114	489.314	233.135

Table 4: Percent contribution of different characters towards diversity field bean germplasm.

S. No.	Character	No. of times ranked 1st	Percent contribution
1	Plant height at harvest(cm)	0.000	0.01
2	Number of primary branches per plant	0.000	0.01
3	Days to first flowering	0.000	0.01
4	Days to 50% flowering	0.000	0.01
5	Days to first pod set	31.000	7.64
6	Number of inflorescences per plant	0.000	0.01
7	Length of inflorescence (cm)	23.000	5.67
8	Number of pods per inflorescence	8.000	1.97
9	Length of the pod (cm)	0.000	0.01
10	Width of the pod (cm)	0.000	0.01
11	Days to first pod harvest	0.000	0.01
12	Days to last pod harvest	38.000	9.36
13	Weight of 10 green pods	6.000	1.48
14	Number of pods per plant	4.000	0.99
15	Number of seeds per pod	40.000	9.85
16	Seed length (mm)	0.000	0.01
17	Seed width (mm)	0.000	0.01
18	Dry seed yield per plant (g)	74.000	18.23
19	100 seed weight (g)	0.000	0.01
20	Protein content (mg/100g sample)	96.000	23.65
21	Crude fiber content in seed (%)	85.000	20.94
22	Fresh pod yield per plant (g)	1.000	0.25

much lesser than inter cluster ones, suggested homogenous and heterogeneous nature of the genotypes within and between the clusters, respectively.

The mean values of cluster for various characters are presented in table 3. Almost all the clusters were highly distinct to each other with respect to all the characters. The cluster IV exhibited more or less average values for most of the traits. The cluster V exhibited the higher fresh pod yield per plant (489.31 g), seed yield per plant (151.23 g), number of inflorescences per plant (23.66) and pod width (1.95 cm). Cluster I had maximum plant height (365 cm), pod length (12.56), days to last pod harvest (175.60), weight of 10 green pods (70.86 g), number of seeds per pods (5.17), seed length (12.93 mm), seed width (7.88 mm) and 100 seed weight (33.13 g). Cluster IV exhibited less number of days to first flowering (60.71), 50% flowering (62.71), first pod set (68.22) and first pod harvest (85.24) and higher length of the inflorescence (34.91 cm), number of pods per inflorescence (8.67), number of pods per plant (178.31), higher protein content (8.40 mg/100g), and crude fibre content in seed (6.56%). Cluster VI had more number of primary branches per plant (5.89).

The percent contribution of different characters towards diversity was represented in table 4. Among the yield contributing characters studied, the maximum contribution towards divergence made by the character, protein content in seed (mg/100 g) ranked first for 96 times with a maximum contribution of 23.65% followed by crude fibre content in seed (20.94%), dry seed yield per plant (18.23%), number of seeds per pod (9.85%) and days to last pod harvest (9.36%). On the other hand, Patil *et al*. (2008), chaitanya *et al*. (2013) reported that protein content and Sureja and Sharma (2001) reported pod length contributed more towards divergence than other yield attributes in Indian bean.

On the basis of results, it can be concluded that more emphasis should be given to improve protein content, crude fibre content in seed, dry seed yield per plant, number of seeds per pod and days to last pod harvest while developing superior varieties and hybrids through pureline selection and hybridization. The maximum D^2 values existed between cluster I (IC -261014, IC -446556) and cluster VI (IC -546350) followed by cluster III (IC -526932, IC -526944, IC -526918) and VI (IC -546350) indicated that the genotypes included in these clusters may give useful superior recombinants with desirable traits in segregating generations.

References

Biju, M.G., K.P. Prasanna and S. Rajan (2001). Genetic divergence in Hyacinth bean. *Vegetable Science,* **28(2)**: 163-64.

Chaitanya, V., R.V.S.K. Reddy, S.R. Pandravada and M. Sujatha (2013). Genetic divergence in dolichos bean (*Dolichos lablab* L. Var. *Typicus prain*) genotypes for yield and yield contributing traits. *Electronic Journal Of Plant Breeding,* **4(4)**: 1340-43.

Mahalanobis, P.C. (1936). On the generalized distances in statistics. *Proceedings of National Academy of Sciences in India,* **2:** 49-55.

Patil, S.C., H.E. Patil and V.M. Jambhale (2008). Genetic divergence studies in Moth bean (*Vigna aconitifolia*). *Journal of Maharashtra Agricultural Universities,* **33(2):** 161-164.

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

Rao, C.R.V. (1952). Advanced statistical methods in biometrical research. *Jhon Wiley and Sons Inc. New York*, pp 236-272.

Sureja, A.K. and R.R. Sharma (2001). Genetic divergence in Garden Pea (*Pisum sativum* L.sub.sp.*hortense* Asch and Graebn). *Vegetable Science,* **28(1)**: 63-64.