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Research Note

Study of genetic variability and heritability in Indian bean (*Lablab purpureus* L.)

U. C. Gamit, L. L. Jivani*, H. P. Ponkia, A. Balas and A. T. Vadavia

*Vegetable Research Station, Junagadh Agricultural University, Junagadh- 362001, Gujarat, India
E-Mail: lljivani@jau.in/lljivani@gmail.com

Abstract
The investigation was carried out at Vegetable Research Station, Junagadh Agricultural University, Junagadh (Gujarat) during late *Kharif* 2017-18 in Randomized Block Design with three replications to assess genetic variability in Indian bean comprised of 36 genotypes and 4 check varieties. The analysis of variance revealed that the mean sum of squares due to genotypes were highly significant for all the twelve characters. High phenotypic and genotypic coefficients of variations and high heritability coupled with high genetic advance as per cent of mean were observed for the number of primary branches per plant, the number of pods per plant, pod length, 10- green pod weight, green pod yield per plant and length of twig.

Keywords
Genetic variability, heritability, GCV, PCV, Indian bean

*Lablab purpureus*L. (*Syn. Dolichos lablab* L., 2n=22) is one of the important legumes as well as vegetable crops cultivated in the tropical region of Asia, Africa and America. As most of the species of Indian bean are endemic to Africa and only a few are native in India, most probably Africa is the main centre and India is the secondary centre of origin for this crop (Dana, 1976). This is one of the excellent pod vegetable crops with multipurpose used grown in India. The green pods and tender leaves are popular vegetables. It is one of the major sources of protein in the dietary of the working class, especially of whole Gujarat. It is commonly called Hyacinth bean, Bonavist bean, Indian bean, Field bean, Egyptian bean, 'Walpapadi or Valor' in Gujarat state. It has anti-diabetic property and is good for natural cure of bladder burns and cardiac problems, diarrhoea, sciatica and tenesmus. Being a legume, it can fix atmospheric nitrogen in the soil to the extent of 170 kg/ha.To develop high yielding varieties for a systematic breeding programme, information on genetic variability is basic pre-requisite. The success of any breeding programme depends upon the amount of genetic variability present in the available germplasm of a particular crop. Wider the genetic variability, more the chances of improvement through selection. Pod yield and seed yield are governed by polygenic genes control and are highly influenced by the fluctuations in the environments. Hence, the selection of plants based directly on pod yield would not be very much reliable in many cases. Therefore, the present study was conducted to estimate genetic variability, heritability and genetic advance for pod yield and yield contributing characters.

The present investigation was carried out to assess the genetic variability in Indian bean (*Lablab purpureus* L.). The experiment was conducted at Vegetable Research Station, Junagadh Agricultural University, Junagadh (Gujarat) during late *Kharif* 2017-18. The 36 genotypes + four check varieties of Indian bean were raised in randomized block design with three replications. Five randomly selected plants from each genotype were considered for observation on different characters *viz.,* days to first flowering, days to 50% flowering, days to first picking, days to the last picking, the number of pickings, twig length (cm), the number of primary branches per plant, the number of pods per plant, pod length (cm), pod width (cm), 10- green pod weight (g) and green pod yield per plant (g). The analysis of variance for Randomized Block Design (RBD) was done for each character as per Panse and Sukhatme (1985). Phenotypic Coefficient Variation (PCV) and Genotypic Coefficient Variation (GCV) were calculated as per the formula suggested by Burton and De Vane (1952). Heritability and the genetic advance was estimated using the formula suggested by Allard (1960). The analysis was done using Indostat software.

Results of analysis of variance for green pod yield and its component traits indicated (Table 1) that mean squares due to genotypes were found to be significant for all the traits and indicated the presence of sufficient amount of variability among the genotype for green pod yield and its component characters in Indian bean. This result was in accordance with reports of several workers like Pan *et al.* 2001; Hotti, 2010; Dewangan *et al.,* 2017, Hadvani, 2018; Sadak Peer, 2018.

Table 1. Analysis of variance for twelve characters in 40 genotypes of Indian bean

		Mean squares					
Source	**d. f.**	**No. of branches per plant**	**No. of pods per plant**	**Pod length (cm)**	**Pod width (cm)**	**10 green pod weight (g)**	**Green pod yield per plant (g)**
Replications	2	0.0630	2097.7443	0.7024	0.0156	1.5890	36427.0234*
Genotypes	39	17.9871**	44090.7498**	22.9708**	0.2525**	417.5826**	253396.7864**
Error	78	0.0513	1922.9515	0.4067	0.0098	10.1721	9540.4024

Table 1. C*ontd.*

		Mean Squares					
Source	**d. f.**	**Days to first flowering**	**Days to 50 % flowering**	**Days to first picking**	**Days to the last picking**	**No. of pickings**	**Length of twig (cm)**
Replications	2	2.4508	3.9083	7.6972	22.9043	0.2810	121.6029
Genotypes	39	73.2413**	94.7658**	98.0542**	32.6382**	2.8504**	5441.6095**
Error	78	4.9815	3.4126	7.2071	9.0479	0.2038	82.5506

The value of the phenotypic coefficient of variation was higher than corresponding genotypic coefficient of variation (Table 2) (Hotti, 2010; Hadvani, 2018; Sadak Peer, 2018) indicating the influence of environmental factors. The number of primary branches per plant exhibited the maximum values for genotypic and phenotypic coefficients of variation (Maharnavar, 2013) followed by the number of pods per plant (Chattopadhyay and Dutta, 2010 and Hadvani, 2018), pod length (Inamdar, 2014), 10-green pod weight, green pod yield and length of twig (Inamdar, 2014; Hadvani, 2018). Moderate values of genotypic and phenotypic variations were observed for pod width and the number of pickings. The lowest value of genotypic and phenotypic variation was observed for days to 50% flowering followed by days to first flowering, days to first picking and days to the last picking.

Table 2. Mean, range of variation, coefficient of range, phenotypic and genotypic coefficients of variation, heritability (broad sense), genetic advance and genetic advance expressed as percentage of mean for 12 characters in 40 genotypes of Indian bean

Characters	**Mean**	**Range**	**Coefficient of range (%)**	**Phenotypic coefficient of variation (PCV) (%)**	**Genotypic coefficient of variation (GCV) (%)**	**Heritability (Broad sense) (%)**	**Genetic advance**	**Genetic advance expressed as per cent of mean (%)**
Days to first flowering	59.39	74.73- 46.40	23.38	8.31	8.03	93.20	9.48	15.97
Days to 50 % flowering	62.29	77.00- 50.33	26.76	9.52	9.34	96.40	11.16	18.90
Days to first picking	89.55	106.43-81.40	13.32	6.38	6.14	92.65	10.91	12.18
Days to last picking	138.45	143.00- 127.60	4.81	2.38	2.02	72.28	4.91	3.54
No. of pickings	6.49	8.27- 3.73	38.11	15.00	14.43	92.85	1.86	28.70
Length of twig(cm)	162.17	263.87- 60.40	62.74	26.26	26.06	98.48	86.40	53.27
No. of primary branches per plant	4.13	17.87- 2.33	74.62	59.25	59.17	99.71	5.02	121.71
No. of pods per plant	305.50	629.47- 98.93	72.83	39.68	38.80	95.64	238.84	78.17
Pod length (cm)	8.43	15.81- 4.39	56.59	32.81	32.52	98.23	5.59	66.40
Pod width (cm)	1.78	2.35- 1.21	31.42	16.27	15.95	96.10	0.57	32.21
10- green pod weight (g)	39.41	65.10- 19.65	53.64	30.71	30.33	97.56	23.71	61.73
Green pod yield per plant (g)	1083.02	1643.67- 410.00	60.07	26.84	26.33	96.23	576.15	53.19

In the present study, high heritability (> 60%) was observed for all the 12 characters studied. The maximum heritability estimates were observed for the number of primary branches per plant (Magalingam *et al.,* 2013) followed by twig length, pod length (Hadvani, 2018), 10 green pod weight (Inamdar, 2014), days to 50% flowering (Dewangan *et al.,* 2017), green pod yield per plant (Inamdar, 2014 and Verma *et al*., 2014), pod width (Sadak Peer *et al.,*2018), the number of pods per plant (Verma *et al*., 2014 and Hadvani, 2018), days to first flowering (Venkatesha *et al*., 2016 and Sadak Peer *et al.,*2018), the number of pickings, days to first picking (Chaitanya *et al*., 2014) and days to last picking (Hadvani, 2018). Genetic advance expressed as per cent of mean was the highest for the number of primary branches per plant (Chaitanya *et al*., 2014) followed by the number of pods per plant (Chattopadhyay and Dutta, 2010), pod length (Sadak Peer *et al*. (2018)), 10 green pod weight (Patel, 2014), twig length (Chaitanya *et al.* 2014), green pod yield per plant (Hadvani, 2018), pod width and the number of pickings. The moderate magnitude of genetic advance expressed as per cent of mean was observed for characters like; days to 50% flowering, days to first flowering, and days to first picking. Whereas, days to the last picking had a low magnitude of genetic advance expressed as per cent of mean.

It can be concluded from the present investigation that high heritability coupled with high genetic advance expressed as per cent of mean was exhibited by the number of primary branches per plant, the number of pods per plant, pod length, twig length, 10- green pod weight and green pod yield per plant suggesting the existence of sufficient amount of heritable variation and wider scope for effective selection. Therefore, obtaining higher-yielding lines, the maximum weightage should be given to these attributes while making the selection.

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