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Research Note

Genetic variability for yield and yield attributing traits in F_4 generation of Lablab bean (*Lablab purpureus* L. Sweet)

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Abstract
Ninety one progenies from F_4 generation along with one check of Lablab bean were evaluated to study the genetic variability for yield and yield attributing traits. The highest and lowest coefficient of variation was observed for hundred seed weight and days to maturity respectively. Little or close deviation was noticed in between PCV and GCV in the expression of various traits *viz;* days to maturity, days to 50 per cent flowering and number of seeds per plant. A wide range of variation exhibited for yield and yield attributing traits among the progenies under study. In general PCV was higher in magnitude than GCV. The traits *viz;* hundred seed weight, number of pods per plant, seed yield per plant, plant height and number of peduncles per plant recorded high magnitude of GCV and PCV along with high to moderate estimates of heritability. The high estimates of heritability coupled with high genetic advance as per cent of mean was noticed for hundred seed weight and plant height which indicate additive gene action and more reliable for effective selection in improvement of lablab bean.

Keywords
Genetic variability, GCV, PCV, heritability, genetic advance

Lablab bean (*Lablab purpureus* L. Sweet) 2n=22, is one of the most ancient legume species widely grown throughout the country and distributed in Maharashtra, Madhaya Pradesh, Tamil Nadu North eastern states. It is mainly grown for its young pods, green and immature seeds for vegetable purpose while, dry seeds were used in many food preparations. Lablab bean is popularly known as Field bean, Hyacinth bean, Bonavist bean, Indian bean, Egyptian bean, Country bean and locally in Marathi called as 'Wal', 'Pavta', and in hindi as 'Sem'. Productivity of pulses in *rabi* season in India during 2011-2012 was 831kg/hectare whereas in Maharashtra it was 743kg/hectare (Anonymous 2013). The improvement in yield which is a complex character depends upon dimension of variability present in breeding material. Such information on variability in a segregating population would be more meaningful and of immediate practical utility. Keeping this view, the present investigation was carried out to study variability, heritability genetic advance as per cent of mean among the ninety one progenies of lablab bean.

The ninety one F_4 progenies were selected along with one local check for the present studies derived from nine different crosses. Theses progenies were evaluated randomized block design with three replication at the Research farm, College of agriculture, Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli during *rabi* 2014-15. Each genotype was accommodated in plot of single row of 3 m length at spacing of 45 x 30 cm. recommended package of practices and plant protection measures were followed so as to keep healthy crop condition. Observations were recorded on all the plants of a progeny in each replication for various eleven quantitative traits *viz.*, days to first flowering, days to 50 per cent of flowering, days to maturity, plant height, number of primary branches per plant, number of peduncles per plant, number of pods per plant, pod length, number of seeds per pod, hundred seed weight and seed yield per plant. The plot means were used to compute analysis of variance as described by Panse and Sukhatme (1978). The various variability parameters were worked out as per Burton (1952). The broad sense heritability and genetic advance was estimated according to Allard (1960).

The analysis of variance (Table 1) revealed significant differences among the 92 genotypes for all the characters studied indicating the presence of sufficient amount of variability. These results are similar with the findings of Rai *et al.* (2008) and Verma *et al.* (2014). A wide range of variation was observed for pods per plant, seed yield per plant, hundred seed weight, peduncles per plant, primary branches per plant, plant height, and seeds per pod indicating good scope for improvement of these traits through simple selection. Out of 92 genotypes, L-219 recorded highest seed yield per plant followed

by L-209 and L-207 due to maximum pods per plant and other components like number of peduncles per plant, primary branches per plant and hundred seed weight were also recorded maximum in these genotypes. Lowest seed yield was registered by the genotype L-134. Among the other genotypes, L-123 had taken minimum days for initiation of flowering and fifty per cent flowering while, the genotype L-128 recorded minimum days to maturity. Hence, these genotypes could be serve as donar parent for improvement in respective traits. Similar pattern of variability for different traits were also reported in dolichos bean by Parmar *et al.* (2013).

Estimates of variability, heritability and genetic advance are presented in Table 2. Among the characters studied, high PCV and GCV were observed for hundred seed weight, number of pods per plant, seed yield per plant, plant height and peduncles per plant suggesting the high genetic variability available in the material under study for these characters for further improvement. A close proximity between PCV and GCV was found for hundred seed weight and days to maturity indicating little influence of environment on the expression of these characters. This was in confirmation with the results reported by Mishra *et al.* (2008) and Upadhyay and Mehta (2010). Moderate PCV and GCV were observed for number of primary branches per plant where as lower PCV and GCV were observed for days to maturity, days to fifty per cent flowering and days to first flowering indicated that the extent of response of these characters for selection would be lesser than that of other characters. Similar findings were reported by Magalingam *et al.* (2013).

High GCV alone is not sufficient for determination of the heritable variation, as it simply measures the extent of genetic variability present for a character. Hence, GCV tighter with the heritability estimates would give best picture of advance to be expected by selection. In the present investigation, high heritability estimates were deserved for hundred seed weight and plant height. High magnitude of heritability for these characters suggested that these traits might be governed by additive gene action and hence, phenotype could provide fairly reliable for genotypic effect and selection could be exercised on the phenotypic performance. Moderate heritability was recorded in number nodes per plant, number of peduncles per plant, seed yield per plant, number of primary branches per plant, number of seeds per plant and pod length.

Higher estimates of genetic advance as per cent of mean were observed for five characters *viz.*, hundred seed weight, plant height, number of pods per plant, seed yield per plant and number of peduncles per plant while moderate GAM was observed for number of primary branches per plant.

Heritability estimates in broad sense alone do not serve as the true indicator of genetic potentiality of the genotypes, since the scope is restricted by their interaction with environment. High heritability coupled with high genetic advance as per cent of mean was observed for hundred seed weight and plant height. These characters had also high GCV which indicates the presence of additive gene action and ample scope of improving these characters by simple selection. Moderate heritability coupled with high GAM was observed for number of pods per plant, number of peduncles per plant, seed yield per plant, number of primary branches per plant, number of seeds per plant and pod length, indicate the presence of dominance and epistatic gene action in governing these characters. This is in accordance with the findings of Bendale *et al.* (2004) in lablab bean.

From present investigation it can be concluded that, presence of variability within the genotypes evaluated for all the characters under study. The genotypes, L-219, L-209, L-207, L-215and L-204 was found to be superior for high seed yield. Wide variability was observed for hundred seed weight, plant height, number of pods per plant, number of peduncles per plant and number of primary branches per plant. All these characters also recorded high heritability and genetic advance as per cent of mean which can be utilised for further improvement through selection.

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Table 1.Analysis of variance for different characters in F_4generation of lablab bean

S. No.	Characters	Mean sum of squares		
		Replication (df=2)	Genotypes (df=10)	Error (df=20)
1.	Days to first flowering	15.754	24.381**	11.472
2.	Days to fifty % flowering	1.446	13.086**	7.310
3.	Days to maturity	11.489	9.696**	5.068
4.	Primary branches per plant	0.674*	0.644**	0.190
5.	Plant height (cm)	89.608*	271.134**	24.983
6.	Peduncles per plant	0.081	3.493**	0.780
7.	Pod length (cm)	0.075	0.168**	0.052
8.	Pods per plant	70.260*	97.913**	19.534
9.	Seeds per pod	0.026	0.125**	0.037
10.	Hundred seed weight (g).	1.919	31.693**	0.878
11.	Seed yield per plant (g).	11.269	20.1667**	4.685

*, ** Significant at 5 and 1 % levels of significance respectively.

Table 2. Estimation of genetic parameters for various characters in F_4 generation of lablab bean

Characters	Range		Mean	Variance		GCV (%)	PCV (%)	h^2 (%)	GA	GAM
	Minimum	Maximum		(σ_p^2)	(σ_g^2)					
Days to 1st flowering	53.00	65.33	58.99	15.77	4.3	3.52	6.73	27.28	2.23	3.78
Days to 50 % flowering	58.00	67.67	63.95	9.24	4.30	2.17	4.75	20.85	1.31	2.04
Days to maturity	102.00	112.00	107.66	6.61	1.54	1.15	2.39	23.34	1.24	1.15
Primary branches per plant	3.23	5.30	4.03	0.34	0.15	9.66	14.50	44.38	0.53	13.26
Plant height (cm)	44.47	82.90	63.93	107.03	82.05	14.17	16.18	76.66	16.34	25.56
Peduncles per plant	4.70	9.20	7.09	1.68	0.90	13.41	18.29	53.71	1.44	20.24
Pod length (cm)	3.59	4.65	3.95	0.09	0.04	4.97	7.61	42.67	0.26	6.69
Pods per plant	20.15	43.83	31.23	45.66	26.13	16.37	21.64	57.22	7.96	25.50
Seeds per pod.	3.28	4.20	3.80	0.07	0.03	4.51	6.78	44.22	0.23	6.18
Hundred seed weight (g)	12.50	24.33	17.16	11.15	10.27	18.67	19.45	92.12	6.34	36.92
Seed yield per plant(g)	9.21	22.36	15.87	9.85	5.16	14.31	19.77	52.41	3.39	21.34