

## Genetic variability in dwarf French bean (*Phaseolus vulgaris* L.)

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### ABSTRACT

Twenty six genotypes of French beans (*Phaseolus vulgaris* L.) were evaluated during *Kharif* 2008 to estimate the genetic variability parameters. Phenotypic and genotypic coefficients of variation for most of the traits were found moderate to high except for protein content per cent. High heritability along with high genetic gain was observed for green pod yield plot<sup>-1</sup>, followed by green pod yield plant<sup>-1</sup> and number of pods per plant indicating that these traits could be exploited for further improvement through selection procedures.

**Key words :** French bean, Variability, Heritability.

French bean (*Phaseolus vulgaris* L.) is one of the principal vegetable crops grown throughout the world. It is grown for their edible pods both as dry as well as green vegetable. Pods and seeds are rich in proteins and are excellent source of vitamins and minerals. Shelled beans are widely used as pulse and are a good source of vitamin A, B and C. Besides being used as vegetable, French beans help in fixing atmospheric nitrogen in the soil, thereby improving soil fertility. The development of an efficient plant breeding programme is dependent upon the existence of genetic variability as the efficiency of selection largely depends upon the magnitude of genetic variability present in the plant population. Hence, an insight into the magnitude of variability present in the gene pool of a crop species is of utmost importance to a plant breeder for starting a judicious plant breeding programme and selection of parents for a hybridization programme. Present investigation was, therefore, conducted to assess genetic variability in French bean under temperate conditions of Kashmir valley.

### MATERIALS AND METHODS

Twenty six varieties/genotypes of French bean were evaluated for various yield and yield attributing traits at the experimental field of the Division of Olericulture, SKUAST-K Shalimar, Srinagar, during *Kharif* 2008. The experiment was laid out in a Randomised Block Design with three replications at plant spacing of 30 x 15 cm. The experimental block was well prepared and standard cultural, manurial and plant protection practices were followed to ensure a healthy crop growth. Ten random sample plants were tagged in each plot and used for

recording the observations of characters. Mean values for all characters were worked out. The parameters of variability were estimated as per Burton and Devane (1953) and Johnson *et al.* (1955).

### RESULTS AND DISCUSSION

Analysis of variance revealed highly significant differences among genotypes used in the present study for all the characters studied. Maximum range of mean values was observed for green pod yield per hectare (77.33-175.19) followed by green pod yield plant<sup>-1</sup> (34.19-78.85). The minimum range of mean values was recorded in harvest index (0.36-0.47) followed by pod girth (0.83-1.22) (Table 1). In general, the phenotypic coefficients of variation were higher than the corresponding genotypic coefficients of variation for all traits indicating the predominant role of environment in the expression of traits under study. The highest estimates of phenotypic and genotypic coefficients of variability were recorded for green pod yield per plot and hectare followed by green pod yield per plant and number of pods per plant, whereas moderate coefficients of phenotypic and genotypic variability were recorded for pod length and average pod weight. Similar observations were made by Seth *et al.* (1972), Nandi *et al.* (1996) and Rai *et al.* (2004). However, rest of the traits exhibited low estimates of phenotypic and genotypic coefficients of variation. The range of heritability varied from 68.50 per cent for protein content to 99.20 per cent for average pod weight. Heritability along with genetic advance is more helpful in predicting the gain under selection than heritability alone. High heritability associated with high genetic gain was

**Table 1 : Estimates of variability parameters for different characters in french bean**

Sr. No.	Characters	Mean	Range	Coefficient of Variability		Broad sense Heritability (%)	Genetic Advance	Genetic Gain (%)
				Phenotypic	Genotypic			
1.	Days to 50 per cent flowering	48.54	42-54	6.48	6.39	97.3	6.31	13.00
2.	Days to 1 <sup>st</sup> picking	59.09	54.33-65.67	5.41	5.30	96.1	6.33	10.71
3.	Plant height (cm)	42.27	35-48	8.50	8.19	92.8	6.87	16.25
4.	Plant spread (cm)	31.61	29-37.17	7.86	7.03	80.1	4.10	12.97
5.	No. of branches plant <sup>-1</sup>	5.30	4.53-6.13	7.85	7.58	93.1	0.80	15.09
6.	Pod length (cm)	10.77	8.77-12.20	9.20	9.03	96.5	1.97	18.29
7.	Pod girth (cm)	1.09	0.83-1.22	9.62	8.22	73.1	0.16	14.67
8.	No. of pods plant <sup>-1</sup>	14.24	9-18	16.60	14.34	74.6	3.64	25.56
9.	Average pod weight (g)	4.34	3.61-5.16	8.84	8.81	99.2	0.78	17.97
10.	Green pod yield plant <sup>-1</sup> (g)	62.25	34.19-78.85	17.36	16.93	95.0	21.16	33.99
11.	Green pod yield plot <sup>-1</sup> (kg)	2.49	1.39-3.16	17.90	17.77	98.6	0.91	36.54
12.	Green pod yield hectare <sup>-1</sup> (q)	138.37	77.33-175.19	17.90	17.77	98.6	50.30	36.35
13.	No. of pickings plant <sup>-1</sup>	2.22	2-2.47	7.70	6.77	77.3	0.27	12.16
14.	Harvest index	0.40	0.36-0.47	8.34	7.96	90.9	0.06	15.00
15.	Protein content of dried seeds(%)	18.72	17.63-20.48	4.15	3.44	68.5	1.10	5.87

recorded for the traits namely green pod yield plot<sup>-1</sup>, green pod yield plant<sup>-1</sup>, number of pods per plant and pod length. The value of genetic gain varied from 5.87 for protein content of dry seeds to 36.54 per cent for green pod yield plot<sup>-1</sup>. From the above results it is obvious that the characters which exhibited high estimates of heritability along with high genetic gain could be considered reliable tools for selection as such characters indicate dominance of additive gene effect.

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