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Variability and Character Association in New Genotypes of French bean

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Abstract

In 18 genotypes of French bean (*Phaseolus vulgaris* L.) the phenotypic and genotypic variation indicated that selection may be made for number of pods/plant. The value of heritability and genetic advance showed that effective selection may be made for hundred seed weight and total green pod yield respectively. Number of pods/plant had strong positive correlation with pod girth and pod yield and demonstrated ample scope for pod yield through selection of this trait.

Key words : French bean, New genotypes, Variability, Character asociation.

French bean (*Phaseolus vulgaris* L.) is an important legume vegetable grown for fresh pod consumption which provide protein and calories in human diet. Although it is an important vegetable in India and Orissa, but non-availability of suitable genotypes and lack of improved package of practices are the major constraints in expansion of area under this crop. Breeding and improvement of this crop has been limited to examination of varietals differences and selection within available stains. Improved varieties with high productivity, disease pest resistance are to be identified or developed for boosting the yield of French bean. Yield is polygenic in nature. Therefore, selection of high yielding cultivars should be based on the yield components in addition to yield. The knowledge of the nature and extent of character association is obviously indispensable. In French bean, the inheritance of yield and its component characters and the association between them need to be assessed for initiating improvement program involving selection of plants for high yield. Hence, a study was conducted to estimate genetic variability and genetic advance and to work out correlation among the yield and its component of this important winter vegetable crop.

Methods

Eighteen French bean genotypes were grown in randomized block design with three replications during *rabi* season of 2006-07 at the experimental field of Horticulture Research Station, OUAT, Bhubaneswar. The spacing was maintained at 40 cm between rows and 30 cm between plants. Fertiliser was applied at the rate of 50 : 80 : 80 kg/ha of N, P_2O_5 and K_2O respectively along with FYM. All the recommended cultural practices were followed for raising the crop. Other routine operations were attended as and when required. Observations were recorded on 10 random plants in each replication for various characters namely days to 50% flowering, plant height, number of branches/plant, compound leaves /plant, number of pods/plant, pod length, pod girth, number of seeds/pod, 100-seed weight, green pod weight and total green pod yield.

Data were analyzed statistically following Panse and Sukhatme (1) The phenotypic and genotypic coefficient of variation and heritability in broad sense were computed by methods given by Singh and Choudhury (2). Genetic advance was estimated (3). Correlation coefficient was computed following Singh and Choudhury (2).

Results and Discussion

Table 1 reveals that total green pod yield, days to 50% flowering hundred-seed weight and plant height showed wide variation. Total green pod yield and days to 50% flowering showed highest mean whereas pod length recorded the lowest. Total green pod yield showed maximum genotypic and phenotypic variance. The value of phenotypic variance (6^2_p) were little higher than that of genotypic variance (6^2_p)

Table 1. Range, mean, phenotypic variance, genotypic variance PCV, GCV, heritability (h^2) and genetic advance (GA) for quantitative characters in genotypes of French bean.

	Character	Range	Mean	Pheno-typic variance	Geno-typic variance	PCV (%)	GCV (%)	h^2 (%)	GA	GA (%)
1	Days to 50% flowering	37.00-52.33	45.52	24.28	22.49	10.83	10.42	92.63	9.403	20.66
2	Plant height (cm)	29.37-48.47	34.58	23.00	21.99	13.87	13.56	95.60	9.444	27.31
3	Number of branches/plant	3.57-6.70	5.45	0.97	0.87	18.02	17.11	90.12	1.825	33.46
4	Compound leaves /plant	6.20-12.23	8.23	2.76	2.58	20.19	19.53	93.58	3.204	38.93
5	Number of pods/plant	10.63-22.87	15.00	12.42	10.08	23.48	21.15	81.12	5.887	39.24
6	Pod length (cm)	10.40-17.65	13.69	4.89	4.12	16.16	14.84	84.33	3.842	28.06
7	Pod girth (cm)	2.80-4.87	3.43	0.30	0.29	16.04	15.80	96.92	1.097	32.10
8	Number of seeds/pod	5.06-9.31	6.82	1.83	1.73	19.71	19.14	94.34	2.613	38.29
9	100-seed weight (g)	25.40-53.44	35.94	35.79	35.42	16.65	16.56	98.98	12.197	33.94
10	Green pod weight (g)	5.22-10.23	7.16	1.98	1.65	19.64	17.92	83.32	2.413	33.70
11	Total green pod yield (q/ha)	127.79-239.12	178.70	1582.19	1060.29	22.26	18.22	67.01	54.911	30.73

for all the characters studied. the phenotypic co-efficient of variation (PCV) ranged from 10.83% for days to 50% flowering to 23.48% for number of pods/plant.The values of genetic co-efficient of variation were moderate to high for all traits except days for 50% flowering and plant height which indicates existence of sufficient genetic variability among the strains suggesting their efficacy in improvement programme of this crop. High heritability along with high genetic advance was observed for 100-seed weight, no. of seeds/pod, no. of pods/plant, total green pod yield indicating that these characters are more likely to be governed by additive genes and selection would be rewarding. Total green pod yield recorded lowest estimate of heritability and highest genetic advance.

Number of pods per plant had strong positive co-relation with total green pod yield. Plant height exhibited significant positive co-relation with green pod weight. Number of pod exhibited significant positive co-relation with pod girth. Days to 50% flowering exhibited significant negative corelation with pod girth, pods per plant green pod weight and green pod yield. Similarly number of seeds/pod showed negative association with green pod weight.

Number of pods per plant showing significant positive correlation with total green pod yield and having higher estimates of heritability and hundred seed weight having more genetic advances demonstrate ample scope for increasing pod yield indirect

Table 2. Genotypic correlation coefficient (r_g) among different characters in French bean. * Significant at 5% level, ** Significant at 1% level.

	Character	Correlation	Plant height (cm)	Number of branches/ plant	Compound leaves/ plant	Number of pods/ plant	Pod length (cm)	Pod girth (cm)	Number of seeds/ pod	100-seed weight (g)	Green pod weight (g)	Total green pod yield (q/ha)
1	Days to 50% flowering	(r_g)	-0.165	-0.261	-0.466	-0.495*	0.076	-0.521*	-0.326	-0.445	-0.039*	-0.586*
2	Plant height (cm)	(r_g)		0.370	0.371	-0.203	0.363	-0.201	-0.371	0.078	0.591**	0.475*
3	Number of branches/ plant	(r_g)			0.373	0.089	-0.038	-0.383	0.056	0.233	0.091	0.230
4	Compound leaves/plant	(r_g)				0.212	-0.076	0.022	0.180	0.097	0.034	0.322
5	Number of pods/plant	(r_g)					-0.083	0.706**	0.471	0.340	-0.542*	0.599**
6	Pod length (cm)	(r_g)						-0.376	0.135	-0.328	0.095	0.030
7	Pod girth (cm)	(r_g)							0.362	0.455	-0.408	0.292
8	Number of seeds/pod	(r_g)								0.169	-0.651**	-0.193
9	100-seed weight (g)	(r_g)									-0.150	0.187
10	Green pod weight (g)	(r_g)										0.325

selection of this trait which find support from the findings of Singh et al. (4), Singh et al. (5) and Dahiya et al. (6).

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