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Research Paper

Comparative assessment and genetic variability studies for yield and various yield contributing traits in broad bean (*Vicia faba* L.)

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ABSTRACT

The present investigation was planned to evaluate seventy broad bean (*Vicia faba* L.) genotypes for various yield and yield contributing traits. The experiment was carried out in the experimental field of Division of Vegetable Science during the year *Rabi* 2021-2022 and *Rabi* 2022-2023 in randomized complete block design (RCBD) with three replications, consisting of three rows of each genotypes in each replication at a spacing of 45cm× 30cm. Observations were recorded on traits *viz*., days to 50% flowering, days to maturity, leaflet size, number of branches per plant, number of flowers per cluster, number of pods per cluster, plant height, number of pods per plant, pod length, number of seeds per pod, average pod weight, 100-seed weight , seed yield and pod yield per plant. The analysis of variance revealed mean sum of squares due to genotypes was significant for all the traits that were studied, indicating the presence of sufficient variability among the genotypes. The phenotypic coefficient of variation (PCV) was higher than the genotypic coefficient of variation (GCV) for all the traits studied, indicating the role of environment in the expression of traits under observation. The overall mean performance depicted sufficient amount of variation in the available germplasm. Based on the mean performance of all the genotypes for various traits studied, genotypes *viz*., L. Selection, SK-BB-2, 225620, SK-B-4, SK-BB-3, SK-BB-7, NBPGR-909 and KD-4 were found superior in terms of pod yield per plant and should be used in further breeding programmes.

Key words: Genotypic coefficient of variation, phenotypic coefficient of variation, variability, *Vicia faba* L.

Broad bean, botanically known as *Vicia faba* L.; with chromosome number 2n = 2x = 12, belongs to the bean family (Fabaceae). It is also known as Bakala, Kala Matar, Field bean, Bell bean, Faba bean and Baegla (Kashmiri name). It is one of the oldest crops, cultivated worldwide, and it is native to the Mediterranean–West Asia region (Avramidou *et al*., 2023). It is broadly cultivated in temperate areas both for human consumption and as animal feed. The global area under broad bean cultivation has almost halved from 5.4 million ha in 1961 to 2.6 million ha in 2019, but its productivity has increased from 0.9 t/ha to 2.1 t/ha in the corresponding years (FAOSTAT, 2021).

Broad bean is an important grain legume with high protein content (25–37%) and high nutritional value (Warsame *et al*., 2020). It includes 13–14% of the cell wall slightly lignified, 3% saturated sugars, 6.5% oligosaccharides, while starch makes up about 45% of the total dry mass (Ayed., 2011). Broad bean also have medicinal value as it acts as a component for applications to soften stiff limbs. The seeds of broad bean are good source of L-DOPA, a precursor of dopamine, which is used for the treatments of Parkinson's disease. It also contain vicine and co-vicine that causes hemolytic anemia due to oxidation of erythrocytes. However, the activity of anti-nutritional factors may be reduced by heat treatment in boiling water as well as presoaking (Koli *et al*., 2022). Furthermore, apart from being a crucial food crop, it also contributes to the provision of animal feed and fodder and has a good impact on soil productivity due to its ability to fix free nitrogen and to grow in

different climatic zones. In cooler climates, broad bean has advantages compared to other legumes such as soybean because it is better adapted to growth under low temperatures (Gutierrez and Tores 2019). Though, Jammu and Kashmir represents an excellent biodiversity region for broad bean but the crop is underutilized in the area and at the same time there exists no proper scientific documentation of this valuable crop. The purpose of the study was a comparative assessment and variability studies regarding yield and yield contributing traits of broad bean accessions.

MATERIALS AND METHODS

The experimental material for present study consisted of seventy genotypes of broad bean collected all over India and procured through NBPGR, New-Delhi. The germplasm was evaluated at Experimental Field of Division of Vegetable Science, SKUAST-Kashmir, Shalimar for 2 years during *Rabi* 2021-2022 and *Rabi* 2022-2023. During the first year crop was sown on 11 November, 2021 and during second year the crop was sown on 29 October, 2022 at the Experimental Field. The experiment was laid in Randomized Block Design with three replications. The plots of size 1.5m × 1.5m, consisted of three rows of each genotypes in each replication at a spacing of 45cm× 30cm. The experimental field was well prepared and standard agronomic practices were followed to ensure healthy crop growth. The observations were recorded for fourteen quantitative traits *viz.,* days to 50% flowering, days to maturity, leaflet size, number of branches per plant, number of flowers per cluster, number of pods per cluster, plant height, number of pods per plant, pod length, number of seeds per pod, average pod weight, pod yield per plant, 100-seed weight and seed yield . Observations were recorded on five randomly selected plants of each genotype from all the three replications and mean was worked out. The data was subjected to statistical analysis using WINDOSTAT software package. The data was statistically analyzed as per the method lined by Gomez and Gomez (1983) for estimating the analysis of variance.

RESULTS AND DISCUSSION

Analysis of Variance: Analysis of variance (ANOVA) depicted significant differences among all the genotypes for all the traits that were studied during present investigation (Table 1) hence, depicting the presence of adequate genetic variability among these broad bean genotypes and substantial scope of improvement for these traits.

Mean Performance of different Genotypes: Perusal of Table 2 reveals the variation in mean performance for fourteen yield and yield contributing traits. The germplasm under investigation showed a wide range of variability. The minimum days to 50% flowering was recorded for SK-BB-4 (156.67) followed by EC-243626 (157.17) while maximum days to 50% flowering was recorded for NBPGR-918 (165.17) followed by NBPGR-902 (165.00). The minimum days to maturity was recorded for KD-1 (224.83) followed by EC-25085 (225.16) while maximum days to maturity were recorded for EC-243036 (232.50) followed by SK-BB-1 (231.67). The maximum value for leaflet size was observed for 225620 (7.04 cm) followed by KD-1 (6.72 cm) while minimum value was observed for HFB-1 (4.19 cm) followed for SK-BB-5 (4.47 cm). The maximum value for number of branches per plant was recorded for KD-1 (7.10) followed by SK-BB-7 (6.78) while minimum value was recorded for L-Selection (3.23) followed by EC-628930 (3.68). Maximum value for number of flowers per cluster was recorded in 226540 (4.23) followed by SK-BB-8 (4.21) while minimum value was recorded in EC-25085 (1.43) followed by EC-287710 and EC-628966 (2.06 each). Number of pods per cluster was found maximum in EC-628925 (3.73) followed by EC-311564 (3.61) while minimum value was observed in EC-25085 (1.23) followed by EC-287710 (1.71). The maximum plant height was observed in SK-BB-3 (85.95 cm) followed by SK-BB-7 (81.85cm) while minimum plant height was observed in HB-90 (40.83cm) followed by EC-287710 (41.50cm). The maximum number of pods were found in EC-628922 (50.00) followed by EC-628989 (47.21) while minimum number of pods per plant were observed in 226539 (23.46) followed by KD-3 (26.25). The maximum pod length was recorded in 226540 (11.01cm) followed by 226521 (10.28cm). The minimum pod length was recorded in HB-90 (4.85 cm) followed by EC-591755 (5.16 cm). The maximum number of seeds per pod was observed in KD-3 (3.06) followed by SK-BB-3, SK-BB-7 and EC-628925 (2.93 each) while minimum number of seeds per pod was recorded for KD-3 (2.23) followed by EC-243793 (2.25). The maximum average pod weight was recorded in 226543 (12.75 g) followed by NBPGR-909 (12.41 g). The minimum average pod weight was recorded in EC-363781 (2.16 g) followed by EC-293820 (2.61 g). The maximum pod yield per plant was found in L-Selection (255.16 g) followed by SK-BB-2 (242.67 g) while minimum pod yield per plant was observed in EC-628935 (83.00 g) followed by EC-363781 (95.66 g).

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Table 1: Analysis of variance for various yield and yield contributing traits in broad bean (*Vicia faba L.*) genotypes

Source of variation	D.f	Mean sum of squares													
		Days to 50% Flowering	Days to Maturity	Leaflet size (cm)	Number of branches per plant	Plant height (cm)	Number of pods per plant	Pod length (cm)	Number of seeds per pod	Number of flowers per cluster	Number of pods per cluster	Pod yield per plant (g)	Average pod weight (g)	100-seed weight (g)	Seed yield (g)
Replication	2	1.63	0.26	2.39**	0.86	142.46*	85.31*	6.81**	0.92**	0.54	0.21	96.63	12.04**	236.08	55.93
Seasons	1	4.20	1.37	2.20	1.92	1.19	0.06	4.95**	0.02	0.45	0.00	2545.61**	5.11**	11.73	174.00**
Interaction	2	2.40	5.94	0.70	0.50	23.04	12.18	0.46	0.19	0.20	0.12	3.09	0.07	33.36	8.71
Overall sum	5	2.45	2.75	1.68**	0.93*	66.44*	39.01*	3.90**	0.45**	0.39	0.13	549.01	5.87**	110.12	60.66
Genotypes	69	15.62**	13.77**	0.74**	2.92**	470.35**	66.41**	8.65**	0.12*	1.45**	1.00**	6233.82**	36.20**	2460.25**	543.40**
Error	345	2.63	3.36	0.32	0.32	23.54	16.55	0.75	0.08	0.22	0.16	635.05	1.43	95.75	27.23

*, **- Significant at 5% and 1% level of significance respectively

The maximum value for 100-seed weight was observed for KD-3 (103.83 g) followed by NBPGR-925 (102.13 g) while minimum value was observed for EC-628935 (20.39 g) followed by EC-293596 (23.46 g). The maximum seed yield was recorded in NBPGR-925 (56.43 g) followed by SK-BB-2 (51.94 g). The minimum seed yield was recorded in EC-293596 (12.57 g) followed by EC-591755 (15.04 g).

Range: There was a broad range of variation in the traits studied as revealed by the range and coefficient of variation (Table 3). Days to 50% flowering ranged from 156.67 to 165.16 days with an overall mean of 162.20 days. Days to maturity ranged from 224.83 to 232.50 days with an overall mean of 228.71 days. Leaflet size ranged from 4.19 to 7.04 cm with an overall mean of 5.23 cm. Number of branches per plant in all the genotypes ranged from 3.23 to 7.10 with an overall mean of 4.96 branches per plant. Plant height of all the genotypes ranged from 40.83 to 85.95 cm with an overall mean of 57.72 cm. Number of pods per plant ranged from 23.46 to 50.00 with an overall mean of 35.81 pods per plant. Pod length in all the genotypes ranged from 4.85 to 11.01 cm with an overall mean of 7.15 cm. Number of seeds per pod ranged from 2.23 to 3.06 with an overall mean of 2.59 seeds per pod. Number of flowers per cluster ranged from 1.43 to 4.23 with an overall mean of 3.08 flowers per cluster. Number of pods per cluster ranged from 1.23 to 3.73 with an overall mean of 2.61 pods per cluster. Pod yield per plant ranged from 83.00 to 255.16 g with an overall mean of 147.21 g. Average pod weight in all the genotypes ranged from 2.16 to 12.75 g with an overall mean of 6.27 g. 100-seed weight in all the genotypes ranged from 20.39 to 103.83 g with an overall mean of 56.21g. Seed yield ranged from 12.57 to 56.43 g/plant with an overall mean of 32.81 g/plant.

Coefficient of variation: The simplest measures for assessment of variability are genotypic and phenotypic coefficient of variation. The values of these coefficients give an idea about the magnitude of variability present in a population. Thus, the component of variation such as genotypic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV) were computed. The phenotypic coefficients of variation were slightly higher than the corresponding genotypic coefficients of variation indicating the little influence of environment in the expression of the character under study. Phenotypic coefficient of variation and genotypic coefficient of variation showed a wide range from low to high value for different traits. High phenotypic and genotypic coefficient of variation was recorded in traits *viz*., pod yield per plant (26.68 and 20.58), average pod weight (41.24 and 36.92), 100-seed weight (38.57 and 34.59) and seed yield (30.29 and 26.40). Moderate phenotypic and genotypic coefficient of variation was recorded in traits *viz*., number of branches per plant (17.69 and 13.42) and plant height (17.10 and 14.90) while as low phenotypic and genotypic coefficient of variation was recorded in traits *viz*., days to 50% flowering (1.36 and 0.91), days to maturity (0.99 and 0.58). Three traits *viz.,* pod length, number of flowers per cluster and number of pods per cluster showed high phenotypic coefficient of variation but moderate genotypic coefficient of variation (20.03 and 15.79), (21.08 and 14.52) and (20.02 and 13.64) respectively. Two traits *viz*., leaflet size and number of pods per plant showed moderate phenotypic coefficient of variation but low value for genotypic coefficient of variation (12.19 and 5.09) and (13.88 and 8.02) respectively. Similar results were reported by Kosev *et al*., 2023; Kumar *et al.*, 2023; Chaurasia *et al*., 2022; Hamza *et al*., 2017; Sheelamary and Shivani 2015

Since no genotype could be identified to have superior performance for all the characters, all the genotypes showed a wide range of variation for all the traits studied. Hence, based on the mean performance of all the genotypes, the genotypes *viz*., L. Selection, SK-BB-2, 225620, SK-B-4, SK-BB-3, SK-BB-7, NBPGR-909 and KD-4 were found superior in terms of pod yield per plant and should be used in further breeding programmes

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Table 2: Mean performance of broad bean (*Vicia faba* L.) genotypes for various Yield and Yield contributing traits (Data pooled overs years)

S. No	Genotype	Days to 50% Flowering	Days to Maturity	Leaflet size (cm)	No. of Branches from basal node	Plant height (cm)	Number of pods per plant	Pod length (cm)	No. of seeds per pod	No. of flowers per cluster	No. of pods per cluster	Pod yield per plant	Average pod weight (g)	100- seed weight	Seed yield (g)
1	KD-4	159.83	229.16	5.23	3.76	55.53	31.15	7.15	2.58	3.90	3.15	206.33	9.97	76.51	43.30
2	SK-BB-5	163.17	226.66	4.47	3.83	68.36	33.56	9.15	2.80	3.60	2.90	157.50	8.64	67.27	39.24
3	L-SELECTION	159.17	227.50	5.27	3.23	60.43	31.28	8.25	2.83	3.51	2.20	255.16	11.88	75.21	41.26
4	NBPGR-902	165.00	229.16	5.02	4.23	63.38	32.18	6.88	2.55	2.96	2.31	116.00	7.01	56.59	34.00
5	NBPGR-918	165.17	228.00	5.17	4.93	61.93	41.27	6.80	2.43	3.85	2.60	126.83	6.48	56.34	34.53
6	226539	161.50	230.84	5.44	4.48	67.35	23.46	9.00	2.91	2.45	2.11	196.83	6.62	77.20	36.13
7	EC-243626	157.17	230.84	4.77	5.23	53.58	34.41	6.81	2.80	2.98	2.41	112.84	6.67	69.25	43.91
8	SK-BB-4	156.67	228.67	5.04	4.96	61.08	36.01	9.33	2.48	3.90	2.85	220.34	7.57	84.01	50.84
9	SK-BB-6	160.17	230.84	5.56	4.86	62.96	39.30	7.35	2.88	3.80	2.95	110.50	8.63	92.46	44.02
10	226537	161.17	227.84	5.68	4.28	61.55	40.86	8.18	2.34	4.15	3.53	114.34	7.22	78.95	39.12
11	KD-3	162.84	229.84	4.94	4.36	72.70	26.25	8.81	2.23	3.23	2.58	201.00	9.35	103.83	48.49
12	226521	164.00	229.34	5.31	5.40	70.63	28.67	10.28	2.40	2.55	2.10	204.50	10.52	85.81	43.41
13	NBPGR-912	159.50	228.00	4.70	5.61	56.76	34.20	9.94	2.86	2.98	2.38	157.83	11.46	87.15	42.27
14	226540	163.67	229.33	5.25	5.40	71.08	31.50	11.01	2.58	4.23	3.21	136.00	7.05	72.14	38.42
15	NBPGR-925	163.34	231.00	5.09	4.26	64.50	31.75	9.41	2.86	2.53	2.28	141.83	10.58	102.13	51.94
16	NBPGR-915A	161.50	229.67	5.08	4.96	67.68	35.81	7.43	2.56	3.00	2.55	157.34	6.25	77.36	41.20
17	226518	162.84	229.67	4.74	4.38	65.46	32.56	6.76	2.46	3.30	2.91	119.67	6.32	56.64	38.25
18	SK-BB-2	161.16	228.50	4.99	5.67	70.64	34.41	7.53	2.40	3.18	2.68	242.66	10.55	81.70	56.43
19	SK-BB-1	158.00	231.67	5.63	6.16	74.40	39.18	7.70	2.45	2.98	2.45	113.00	8.05	78.03	46.61
20	NBPGR-909	163.34	229.83	5.65	5.80	77.98	39.81	8.10	2.51	3.61	2.40	208.34	12.41	67.40	45.99
21	SK-BB-8	158.50	225.67	5.98	5.43	66.25	37.50	9.58	2.66	4.21	3.36	197.83	10.63	83.90	38.34
22	226543	160.67	227.67	4.78	6.26	66.60	34.01	9.73	2.61	3.15	2.83	166.83	12.75	80.73	42.11
23	SK-BB-3	161.83	228.67	5.37	6.41	85.95	32.16	8.76	2.93	4.11	3.23	213.83	8.94	65.74	46.99
24	KD-1	162.83	224.83	6.71	7.10	77.08	40.75	7.95	3.06	3.55	3.08	208.00	10.00	84.69	46.41

Table 2 continued

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25	SK-BB-7	164.33	229.34	5.99	6.78	81.85	40.40	9.43	2.93	3.31	2.71	210.16	11.70	99.59	46.06
26	225620	162.83	229.34	7.04	6.25	71.56	36.53	8.18	2.70	3.53	3.00	224.34	10.79	94.71	46.36
27	VIKRANT	164.00	229.84	5.29	5.25	53.68	36.98	6.23	2.75	3.01	2.25	163.00	4.04	40.00	27.02
28	EC-17761	160.34	226.83	4.74	5.71	55.55	41.25	7.35	2.68	2.25	2.21	168.50	5.60	48.96	30.55
29	EC-591784	162.67	228.34	5.25	4.81	53.85	39.98	6.55	2.71	2.30	1.95	135.50	4.07	40.54	28.33
30	HFB-1	163.17	226.67	4.19	5.31	52.93	41.56	5.75	2.86	2.66	2.43	161.16	4.71	42.73	26.89
31	EC-628938	163.00	227.84	5.27	4.67	52.71	39.50	5.88	2.68	2.55	2.25	161.50	4.08	38.05	33.57
32	EC-628922	164.16	230.16	5.10	5.34	52.10	50.00	6.81	2.40	3.48	2.88	146.00	3.09	63.60	32.80
33	EC-628937	164.16	226.00	4.97	4.78	50.55	37.46	6.40	2.61	2.40	2.06	128.16	3.76	49.03	30.48
34	EC-25085	161.00	225.16	5.87	4.26	54.30	29.58	8.68	2.90	1.43	1.23	162.50	6.05	59.72	19.94
35	EC-628934	163.50	225.16	5.52	4.00	55.60	40.36	6.35	2.61	3.38	2.95	135.16	4.45	37.82	26.09
36	EC-628989	161.50	229.17	5.23	4.00	57.96	47.21	6.11	2.48	3.08	2.78	122.50	4.93	64.29	28.71
37	EC-218745	162.34	231.34	5.02	4.26	50.18	35.60	6.65	2.46	2.98	2.55	114.50	4.80	36.97	28.88
38	EC-117744	161.16	229.83	5.67	3.96	52.50	39.11	6.83	2.70	3.36	3.13	141.00	4.08	52.58	28.03
39	EC-243036	163.84	232.50	5.35	4.85	55.01	29.43	7.30	2.70	2.56	2.28	105.50	6.74	37.05	16.22
40	EC-329681	163.67	228.67	5.02	6.25	42.65	33.41	5.31	2.55	3.34	3.05	126.34	4.35	42.63	38.49
41	EC-32905	162.83	228.00	4.92	4.23	49.91	30.45	6.98	2.41	4.00	3.55	106.34	4.10	66.09	47.43
42	EC-628919	161.67	227.00	5.38	4.26	47.63	34.61	6.60	2.58	2.95	2.71	110.50	3.26	44.26	31.25
43	EC-628925	161.50	226.83	5.38	4.34	55.26	33.83	6.41	2.93	2.85	2.65	122.00	4.58	48.40	24.85
44	EC-591818	160.50	228.66	5.52	5.30	51.54	41.51	6.78	2.40	4.18	3.53	126.84	6.22	64.84	31.51
45	EC-591787	163.16	229.83	5.43	5.10	53.90	34.83	6.23	2.55	3.36	3.06	102.16	3.05	34.40	24.84
46	EC-591662	161.34	230.67	5.05	4.30	49.03	28.85	6.68	2.51	2.96	2.50	119.66	4.51	37.85	24.66
47	EC-628971	161.67	228.33	5.46	5.63	46.55	33.10	6.30	2.35	2.88	2.61	107.50	4.80	98.62	20.97
48	EC-628930	163.16	228.83	4.92	3.68	50.36	30.60	6.96	2.58	3.23	2.73	104.83	6.71	35.58	20.96
49	EC-293596	163.17	227.66	4.61	5.16	43.50	34.91	7.15	2.56	3.48	3.11	129.16	4.55	23.46	12.57
50	EC-351587	162.83	230.00	5.48	4.68	58.48	33.84	7.01	2.48	3.21	2.83	120.67	7.59	39.94	24.63
51	EC-628972	164.16	228.84	4.83	4.87	59.88	36.25	6.84	2.40	3.43	2.96	138.34	3.97	43.41	29.13
52	HFB-2	162.00	227.34	4.90	4.53	56.95	35.48	6.34	2.58	3.40	3.11	144.16	2.99	33.04	31.12
53	EC-628925	161.67	226.84	4.64	5.28	57.30	38.21	6.93	2.71	4.20	3.73	154.00	4.42	45.11	31.69
54	EC-311564	162.83	228.34	5.18	5.41	58.13	38.15	5.86	2.66	4.08	3.61	147.50	4.05	36.59	30.62

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Table 2 continued

55	EC-628940	162.34	226.84	5.45	5.18	50.96	39.20	6.10	2.53	3.16	2.78	135.50	5.32	33.03	27.74
56	EC-361485	162.34	228.17	5.89	5.08	55.56	36.05	5.85	2.66	2.50	2.26	170.50	6.84	38.74	32.41
57	EC-628966	162.83	229.34	5.25	4.60	47.16	42.34	5.43	2.56	2.06	1.81	124.00	5.05	44.88	21.23
58	EC-363781	162.66	230.84	5.19	4.98	47.21	38.93	6.06	2.38	2.46	2.20	95.66	2.16	36.44	27.67
59	EC-293820	162.00	229.84	4.70	4.75	57.78	36.34	6.05	2.51	2.81	2.46	100.50	2.61	31.16	22.90
60	EC-628935	165.00	229.00	4.86	4.88	48.26	37.15	5.88	2.38	2.80	2.43	83.00	2.98	20.39	19.42
61	EC-243793	162.67	229.50	5.25	5.20	53.15	37.95	5.65	2.25	2.48	2.16	168.83	4.07	33.76	17.14
62	EC-287710	162.50	230.67	5.23	5.10	48.25	30.30	5.90	2.51	2.06	1.71	113.16	4.23	40.12	25.99
63	EC-32976	163.00	230.00	5.28	4.18	48.73	36.68	6.25	2.61	2.75	2.36	103.50	2.55	31.15	25.67
64	EC-628941	164.84	227.50	5.30	4.08	41.50	32.45	5.88	2.40	2.10	1.81	106.50	3.90	40.95	32.22
65	EC-32905	160.00	227.34	4.61	5.08	54.16	35.11	5.95	2.51	2.51	2.08	108.83	3.40	36.21	30.86
66	EC-628955	162.16	229.83	5.62	5.20	48.96	30.41	8.98	2.73	2.26	2.03	107.33	4.81	49.82	17.06
67	EC-366272	162.84	228.34	5.50	5.15	58.08	40.06	5.85	2.26	2.60	2.26	161.33	4.94	40.60	24.20
68	EC-628939	163.83	229.83	5.05	5.11	54.45	38.33	5.85	2.51	2.35	2.18	158.00	6.20	28.73	21.63
69	EC-591755	163.34	229.50	5.21	4.96	49.30	31.03	5.16	2.56	2.58	2.10	189.67	6.69	32.69	15.04
70	HB-90	161.16	226.83	5.02	5.23	40.83	39.25	4.85	2.56	2.85	2.68	154.16	5.81	35.36	27.70
C.D at 5%		0.92	1.53	0.63	0.57	5.34	4.32	0.99	0.35	0.54	0.48	5.58	0.69	3.86	4.05
S.E.Diff		0.33	0.54	0.22	0.20	1.91	1.54	0.35	0.12	0.19	0.17	1.99	0.25	1.38	1.45

Table 3: Estimate of mean, range, phenotypic and genotypic coefficients of variation for various yield and yield contributing traits in broad bean (*Vicia faba* L.) genotypes

S. No	Parameters	Mean	Range	Phenotypic coefficient of variation (PCV)	Genotypic coefficient of variation (GCV)
1	Days to 50% Flowering	162.20	156.67 - 165.16	1.36	0.91
2	Days to Maturity	228.71	224.83 - 232.50	0.99	0.58
3	Leaflet Size (cm)	5.23	4.19 - 7.04	12.19	5.09
4	Number of branches per Plant	4.96	3.23 - 7.10	17.69	13.42
5	Plant Height (cm)	57.72	40.83 - 85.95	17.10	14.90
6	Number of pods per plant	35.81	23.46 - 50.00	13.88	8.02
7	Pod Length (cm)	7.15	4.85 - 11.01	20.03	15.97
8	Number of seeds per Pod	2.59	2.23 - 3.06	11.55	3.15
9	Number of flowers per clusters	3.08	1.43 – 4.23	21.08	14.52
10	Number of pods per cluster	2.61	1.23 – 3.73	20.02	13.64
11	Pod yield per plant (g)	147.21	83.00 – 255.16	26.68	20.58
12	Average pod weight (g)	6.27	2.16 – 12.75	41.24	36.92
13	100-seed weight(g)	56.21	20.39 – 103.83	38.57	34.59
14	Seed yield (g/plant)	32.81	12.57 – 56.43	30.29	26.40

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CONCLUSION

Conclusively, it can be stated that analysis of variance (ANOVA) depicted significant variation among the characters studied. Mean performance depicted that no single genotype was identified to be superior performing for all the characters studied and all the genotypes showed a wide range of variation. Hence for yield improvement in future breeding programmes genotypes *viz.,* L. Selection, SK-BB-2, 225620, SK-B-4, SK-BB-3, SK-BB-7, NBPGR-909 and KD-4 should be given due attention. The phenotypic coefficient of variation showing slightly higher value than the corresponding genotypic coefficient of variation values indicates the little influence of environment in the expression of the character under study.

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