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Mean performance of semi-pole type French bean (*Phaseolous vulgaris*) genotypes for growth, yield and quality traits

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Abstract

The present experiment was conducted at Horticulture Research Station, Pandirimamidi, East Godavari district, Andhra Pradesh during *rabi*, 2021-22. The experiment was laid out in Randomized Block Design and replicated twice. Total twenty five genotypes showing semi pole type growth habit were evaluated for growth, yield and quality traits. Out of twenty five genotypes under the present study, the genotypes EC – 512819, EC-398490, EC- 398586, EC – 530830 and EC – 398546 are found to be superior in terms of growth, yield and yield attributing traits. The genotypes EC-398546 and EC-530820 are superior for quality traits.

Keywords: French bean, *Phaseolous vulgaris*, mean performance, genotypes, growth, yield, yield attributing traits, quality traits

Introduction

French bean (*Phaseolous vulgaris* L.) it's chromosome number is $2n=22$ is an important legume crop, used as green pod vegetable. It is also known as kidney bean, haricot bean, snap bean, navy bean and string bean or for dry seeds (also known as dry beans). French beans are known to have originated from Central and South America where they are grown as an indigenous crop for the past 5,000 years. French bean evolved from a wild growing vine *viz.*, *Phaseolus aborigineus* and distributed in the highlands of Middle America and Andes is one of the oldest cultivated pulse crops. Among the 150 species of *Phaseolus*, French bean (*Phaseolus vulgaris*) is the most widely cultivated form. More than 400 cultivars of this crop are now cultivated in the world and it occupies a premier place among grain legumes in the world including India. Spanish and Portuguese explorers introduced the legume to Europe and Africa, and by the nineteenth century. It belongs to family Leguminosae (Fabaceae).

It is a multipurpose crop grown for vegetable, dry seed, fodder and as a canned vegetable (Biswas *et al.*, 2010 and Singh, 2000) ^[1, 3]. It is rich in protein (19-31%) and is closely compared with meat (Joshi and Rana, 1995) ^[4]. They are the rich sources of vitamin A, C, K, folic acid and are having heart protective calcium and fiber. There are three types of French bean based on growth habit. They are bush type with short internodes, semi-pole-type with longer internodes than those in bush type and the pole-type having longer internodes than those of the semi-pole type.

Today, French beans are a common alternative to green beans and other legumes, and are grown around the world. French beans are recognized as valued vegetables in many dietary items. They fight against protein malnutrition, especially in vegetarians. In India, French bean is extensively grown as green pod vegetable for fresh consumption, they can also be used in dry state like the dry bean types. In India, it is primarily grown in Jammu and Kashmir, Himachal Pradesh and on the hills of Uttarakhand.

French bean fetches premium price in market as compared to other vegetables and it is a popular vegetable grown under irrigated conditions almost throughout the year. It is gaining lot of importance due to its short duration and high production potential as well as its high nutritive value.

It is one of the most important leguminous vegetables, which is grown for fresh pod consumption and for processing as a frozen vegetable in many countries. The large dry seed type varieties are called as 'Rajmah' in India.

Materials and Methods

The experiment was conducted at Horticulture Research Station, Pandirimamidi, Rampachodavaram mandal, East Godavari district. Since, the temperatures and climatic conditions of higher altitude zones were preferable for the cultivation of this crop, the experiment was conducted at Pandirimamidi during *rabi*, 2021 -22. The experiment was laid out in Randomized Block Design and replicated twice.

Total twenty five genotypes showing semi pole type growth habit were evaluated for growth, yield and quality traits. All these genotypes were sourced from NBPGR, Shimla. The experimental site was well prepared and all the necessary cultural practices like ploughing, weeding, irrigation, fertilizer application and plant protection measures were followed for the healthy growth of the experimental material. Data on growth, yield and yield attributing characters were collected at appropriate stages and for the quality traits lab analysis was done.

Tables

Table 1: Analysis of variance for growth, yield and yield attributing traits in semi pole type French bean genotypes.

S. No	Characters	Mean sum of squares		
		Replication (1)	Treatment (24)	Error (24)
1	Plant height at 30 days (cm)	1.80	685.71**	1.27
2	Plant height at 60 days (cm)	2.00	3262.42**	14.99
3	Number of leaves per plant	8.78	7505.43**	20.08
4	Mean leaf area (cm ²)	9.05	987.68**	5.77
5	Chlorophyll content (SPAD values)	1.12	51.65**	0.83
6	Number of branches per plant	0.02	3.53**	0.01
7	Days t first flowering	0.36	41.88**	0.69
8	Days to fifty percent flowering	1.25	42.33**	0.79
9	Number of inflorescence per plant	0.09	35.84**	0.08
10	Length of the inflorescence	0.03	11.15**	0.01
11	Percentage fruit set (%)	0.93	459.13**	2.46
12	Number of pod clusters per plant	0.10	16.08**	0.03
13	Number of pods per plant	0.97	320.47**	0.87
14	Pod length (cm)	0.04	13.25**	0.07
15	Pod girth (cm)	0.00	0.75**	0.00
16	Mean weight of fifty pods (g)	5.50	5126.59**	6.85
17	Number of seeds per pod	0.00	4.51**	0.03
18	Hundred seed weight (g)	0.34	234.15**	0.90
19	Pod yield per plant (g)	5.56	4621.84**	3.26
20	Seed yield per plant (g)	0.60	1910.50**	2.91
21	Total soluble solids (° brix)	0.02	6.46**	0.01
22	Protein content (%)	0.08	15.75**	0.28

Table 2: Mean performance of semi pole type French bean genotypes for growth characters.

Accession number	Plant height		NOL	MLA (cm ²)	CC	NOB
	30 DAS	60 DAS				
EC-398566	39.50	118.00	119.50	86.00	37.20	3.63
EC-398563	29.50	99.00	118.50	75.92	34.60	2.97
EC-398530	32.00	132.00	79.50	95.69	34.50	3.17
EC-397836	32.00	157.00	75.00	97.68	35.45	2.97
EC-512819	38.50	128.00	145.00	41.21	38.10	5.66
EC-398490	28.00	86.50	106.00	95.12	37.45	2.71
EC-398546	45.00	153.00	122.50	40.22	37.20	5.75
EC-398525	86.50	108.00	88.00	78.15	26.50	2.75
EC-398536	29.50	212.00	240.50	69.63	32.85	5.09
EC-398355	31.00	163.00	147.50	91.67	33.30	2.53
EC-530820	58.00	143.00	102.00	61.67	37.55	4.54
EC-398586	52.00	112.00	128.00	98.76	41.25	5.17
EC-545783	24.00	132.00	185.00	54.40	34.40	3.82
IC-556443	52.00	86.60	179.00	37.75	22.50	3.89
IC-556437	65.00	121.00	219.00	78.65	34.65	3.47
EC-398533	40.00	79.00	215.50	67.00	33.82	3.64
EC-512860	33.00	142.00	117.50	74.00	34.90	3.41
EC-530830	24.00	112.00	116.00	88.96	33.20	6.27
EC-512801	42.00	119.10	221.50	74.98	35.00	4.50
IC-558172	32.00	127.00	211.50	85.34	39.75	4.40
EC-398523	66.50	98.50	122.00	90.50	37.15	4.04
EC-398562	38.50	78.00	109.50	85.50	28.75	2.65
IC-506678	33.00	98.90	114.50	96.45	34.00	3.19

IC-547532	29.50	52.00	172.50	84.13	32.45	3.37
EC-530843	44.20	119.89	76.00	83.40	28.45	2.37
Mean	41.01	119.10	141.26	77.31	34.20	3.84
SE(m)±	0.64	2.19	2.53	1.36	0.52	0.06
CD (p = 0.05)	1.85	6.36	7.36	3.94	1.50	0.17

DAS – Days after sowing

NOL – Number of leaves

MLA – Mean leaf area (cm²)

CC – chlorophyll content (SPAD values)

NOB – Number of branches per plant

Table 3: Mean performance of semi pole type French bean genotypes for yield attributing and yield attributing traits.

Accession number	DFE	DFPF	NOIPP	LOI	PFS	NOPCP	NOPP	PL (cm)	PG (cm)	MWFP (g)	NSPP	HSW	PYPP	SYPP
EC-398566	29.75	36.15	11.51	7.75	65.00	6.50	28.00	10.75	2.25	91.90	5.90	33.00	57.58	29.20
EC-398563	24.50	33.25	8.67	3.90	58.50	4.25	24.00	8.75	2.00	73.25	5.06	27.70	40.53	27.23
EC-398530	33.25	41.00	9.07	4.05	60.00	4.58	25.00	9.20	2.00	73.50	5.16	29.25	47.75	27.50
EC-397836	26.15	31.50	8.44	3.50	57.00	4.00	23.50	8.40	1.95	72.50	4.89	23.00	39.50	24.00
EC-512819	32.75	37.50	16.90	5.00	82.00	8.67	43.50	13.99	3.00	161.95	7.10	39.00	103.74	62.80
EC-398490	35.20	41.25	18.18	4.10	89.50	11.33	56.00	14.50	3.25	204.40	8.50	46.75	194.04	129.00
EC-398546	28.07	33.00	17.47	2.95	85.50	8.75	49.00	14.16	3.05	169.30	7.80	41.50	118.50	72.00
EC-398525	31.00	37.00	8.26	12.17	53.00	4.00	23.50	8.28	1.90	71.50	4.70	21.00	35.50	21.03
EC-398536	29.00	37.50	13.75	6.50	77.50	8.02	39.25	12.40	3.00	136.50	6.90	37.00	97.50	52.00
EC-398355	32.79	38.10	7.20	3.45	50.00	2.00	16.50	8.02	1.70	61.00	4.41	12.60	23.10	15.10
EC-530820	32.90	36.75	13.54	4.30	76.50	7.92	38.84	12.00	2.90	121.00	6.90	34.00	93.74	51.50
EC-398586	35.00	40.75	16.62	3.90	81.50	8.67	40.25	13.66	3.00	141.00	7.05	38.11	100.62	62.65
EC-545783	29.57	32.00	11.99	5.55	66.00	7.17	32.50	10.77	2.50	98.25	6.52	33.00	61.20	37.20
IC-556443	29.58	31.50	12.20	3.85	66.50	7.19	32.66	10.99	2.50	107.00	6.75	33.60	64.86	45.40
IC-556437	29.20	40.50	11.40	3.95	65.00	6.25	27.00	10.50	2.25	90.50	5.76	32.86	51.50	29.20
EC-398533	31.85	39.00	11.92	5.05	66.00	6.67	29.00	10.75	2.30	96.75	6.50	33.00	58.50	36.05
EC-512860	24.65	35.75	10.54	6.30	65.00	6.00	26.50	10.16	2.10	82.29	5.50	30.80	49.80	29.10
EC-530830	31.67	35.50	17.76	4.30	89.00	8.92	50.00	14.25	3.10	198.00	7.90	44.00	128.80	79.64
EC-512801	25.42	35.00	13.50	6.30	70.00	7.88	37.00	11.33	2.90	119.25	6.90	33.60	87.66	48.70
IC-558172	33.33	38.25	12.92	6.15	69.00	7.67	33.25	11.31	2.90	108.89	6.75	33.60	85.94	48.00
EC-398523	35.42	43.50	12.90	4.75	68.50	7.45	33.00	11.16	2.50	108.00	6.75	33.60	77.44	46.02
EC-398562	31.75	36.50	7.80	4.67	51.00	2.25	19.75	8.27	1.85	70.00	4.58	15.70	28.40	16.10
IC-506678	37.00	43.50	9.68	3.65	64.50	5.11	25.00	9.33	2.05	73.72	5.40	29.65	48.18	28.80
IC-547532	25.58	45.00	10.23	4.50	64.50	5.75	26.50	9.75	2.05	75.00	5.40	30.75	48.20	28.92

Accession number	DFE	DFPF	NOIPP	LOI	PFS	NOPCP	NOPP	PL (cm)	PG (cm)	MWFP (g)	NSPP	HSW	PYPP	SYPP
EC-530843	37.00	39.50	6.31	2.90	40.50	2.83	16.50	7.75	1.65	58.50	3.50	11.20	22.41	14.41
Mean	30.90	37.57	11.95	4.94	67.26	6.39	31.84	10.82	2.43	106.56	6.10	31.13	70.60	42.46
SE(m)±	0.47	0.50	0.16	0.07	0.89	0.09	0.53	0.15	0.04	1.48	0.09	0.54	1.02	0.96
CD (p = 0.05)	1.36	1.46	0.46	0.20	2.57	0.27	1.53	0.43	0.10	4.30	0.27	1.55	2.96	2.80

DFE – Days to first flowering

NOPCP – Number of pod clusters per plant

NSPP – Number of seeds per pod

DFPF – Days to fifty percent flowering

NOPP – Number of pods per plant

HSW – Hundred seed weight (g)

NOIPP – Number of inflorescence per plant (cm)

PL – Pod length (cm)

PYPP – Pod yield per plant (g)

LOI – Length of inflorescence (cm)

PG – Pod girth (cm)

SYPP – Seed yield per plant (g)

PFS – Percentage fruit set (%)

MWFP – Mean weight of fifty pods (g)

Table 4: Mean performance of semi pole type french bean genotypes for quality traits.

Accession number	Total soluble solids (° brix)	Protein content (%)
EC-398566	3.00	24.30
EC-398563	3.50	20.89
EC-398530	1.25	21.88
EC-397836	1.00	19.39
EC-512819	2.75	21.93
EC-398490	4.50	22.19
EC-398546	6.50	23.10
EC-398525	5.00	21.20
EC-398536	0.75	22.51
EC-398355	2.00	22.42
EC-530820	0.99	24.50
EC-398586	2.50	21.86
EC-545783	2.50	19.08
IC-556443	2.00	21.73

IC-556437	4.50	22.89
EC-398533	2.50	18.40
EC-512860	4.50	22.13
EC-530830	1.50	22.93
EC-512801	1.50	23.74
IC-558172	3.50	21.84
EC-398523	1.99	14.34
EC-398562	4.50	20.34
IC-506678	2.50	17.77
IC-547532	1.50	23.04
EC-530843	2.50	23.77
Mean	2.77	21.53
SE(m) \pm	0.05	0.30
CD (p = 0.05)	0.15	0.86

Results and Discussion

The mean values of all the genotypes for growth parameters are presented in the Table 2, for yield and yield attributing parameters in the Table 3 and for quality traits in the Table 4. Significant difference was found with respect to all the traits taken under the present study. The tallest plant height at 30 DAS was recorded in the genotype EC-398525 (86.50), The tallest plant height at 60 DAS was recorded with the genotype EC-398536 (212.00). The highest number of leaves was observed in the genotype EC-398536 (240.50). The highest mean leaf area was observed with the genotype EC-398586 (98.76), The highest chlorophyll content was recorded in the genotype EC-398586 (41.25), The highest number of branches EC-530830 (6.27), The earliest first flowering was recorded in the genotype EC-398563 (24.50) followed by the genotypes EC-512860 (24.65), The highest days to first flowering were recorded with the genotype IC-506678 (37.00). The earliest flowering was observed in the genotype EC-397836 (31.50), The highest number of inflorescences was recorded with the genotype EC-398490 (18.18), it was on par with EC-530830 (17.76). The highest length of inflorescence was recorded with the genotype EC-398525 (12.17), The highest percentage fruit set was observed with the genotype EC-398490 (89.50), it was on par with the genotypes EC-530830 (89.00) and EC-398546 (85.50). The highest value for number of pod clusters per plant was recorded in the genotype EC-398490 (11.33), The highest number of pods per plant was recorded with the genotype EC-398490 (56.00), The highest pod length was recorded with the genotype EC-398490 (14.50), it was on par with genotype EC-530830 (14.25) and EC-398546 (14.16). The highest pod girth was recorded with the genotype EC-398490 (3.25), The highest mean weight of fifty pods were recorded with the genotype EC-398490 (204.40). The highest number of seeds per pod were recorded with the genotypes EC-398490 (8.50), The highest seed weight was recorded with the genotype EC-398490 (46.75), The highest pod yield per plant was recorded with the genotype EC-398490 (194.40), The highest seed yield per plant was recorded in the genotype EC-398490 (129.00). The highest TSS was recorded in the genotype EC-398546 (6.50), The variation was recorded in the genotype EC-530820 (24.50), it was on par with genotypes EC-398566 (24.30), EC-530843 (23.77), EC-512801 (23.74) and EC-530820 (24.50).

Conclusion

Based on the experimental results, it was evident that the genotypes EC – 512819, EC-398490, EC- 398586, EC – 530830 and EC – 398546 are found to be superior in terms

of growth, yield and yield attributing traits. As the genotypes were evaluated for only one season, repetition of the trial is required to know the performance consistency of the genotypes. The superior genotypes can be used for the further crop improvement programme. The genotypes EC-398546 and EC-530820 can be utilized to combat malnutrition which is prevalent in the tribal zones of Andhra Pradesh due to its highest protein content.

Reference

1. Biswas MS, Hassan J, Hossain MM. Assessment of genetic diversity in French bean (*Phaseolus vulgaris* L.) based on RAPD marker. African Journal of Biotechnology. 2010;9:5073-5077.
2. Begna T, Asrat Z. Evaluation of improved common bean (*Phaseolus vulgaris* L.) Varieties for yield and yield components at West Hararghe, Eastern Ethiopia. International Journal of Research in Agronomy. 2021;4(2):50-54.
3. Singh RV. Response of French bean (*Phaseolus vulgaris* L.) to plant spacing and nitrogen, phosphorous fertilization. Indian Journal of Horticulture. 2000;57:338-341.
4. Joshi BD, Rana RS. French bean in India. National Bureau of Plant Genetic Resources. New Delhi; c1995. p. 1-4.
5. Marajan WA, Idris BEM, Ali KS, Abdalrahman AM. Effect of different NaCl concentrations on seed germination and early seedling growth of sugar beet (*Beta vulgaris* L.). International Journal of Research in Agronomy. 2021;4(1):41-46. DOI:10.33545/2618060X.2021.v4.i1a.47