Environment & Ecology 35 (4B) : 3131—3134, October—December 2017
Website : environmentandecology.com ISSN 0970-0420

Evaluation of French Bean (*Phaseolus vulgaris* L.) Genotypes under Hill Zone of Karnataka

Heena M. S. , Devaraju, Srinivasa V, Praveen Yadahalli

Received 30 December 2016; Accepted 1 February 2017; Published online 20 February 2017

Abstract An experiment on evaluation of French bean genotypes under hill zone of Karnataka was carried out in randomized block design during *rabi* season in 2014. All the twelve genotypes of French bean showed significant variation in respect of growth, yield and yield parameters. Among the genotypes, Arka Komal and Arka Suvidha were the early maturity varieties, whereas Sunil and Jyothi were the late maturity varieties. Arka Anoop recorded maximum plant height (45.33 cm), number of primary branches (9.00), number of clusters per plant (10.06) number of pods per plant (44.33) and pod length (17.00 cm). The maximum pod yield per plant was recorded in Arka Anoop (82.00 g) which was on par with Arka Suvidha (79.93 g) and lowest was recorded in Sunil and Anuradha (35.13 and 35.30 g respectively).

Keywords French bean, Genotype, Pods, Yield.

Heena M. S*, Devaraju, Srinivasa V,
Praveen Yadahalli
Department of Vegetable Science,
College of Horticulture, Mudigere 577132, India
e-mail : heenams92@gmail.com
*Correspondence

Introduction

French bean (*Phaseolus vulgaris* L.) is the most important leguminous vegetable crop belongs to the family Fabaceae with a diploid chromosome number 2n = 22. It has many synonyms like snap bean, kidney bean, haricot bean and also called rajmash in Hindi. It is originated from Central America and Peruvian Andes in South America. This crop was introduced to India during 17th century from Europe. Considering the nutritive value 100 g of green pod contains 1.7 g protein, 0.1g fat, 4.5 g carbohydrate, 1.8 g fiber and rich in minerals and vitamins. In India, it is mainly grown in Himachal Pradesh, Punjab, Haryana, Uttar Pradesh, Bihar, Gujarat, Madhya Pradesh, Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu. Annually, it is grown in an area of 2.2 lakh ha with an annual production of 6.2 lakh tonnes [1]. In Karnataka, the crop is grown in an area of 11,986 ha with an annual production of 1,38,137 tonnes [2]. Performance of genotypes varies with region, season and other growing conditions. As a result, a prominent cultivar performing well in one region may fail to perform better in another region due to varying climatic conditions. Hence the present study was undertaken to study the performance of French bean genotypes under hill zone condition.

Materials and Methods

The present investigation was carried out during *rabi* season of 2014 at College of Horticulture Mudigere in medium sandy loam soil. Experimental site is lo-

Table 1. Performance of French bean genotypes for growth parameters.

Sl. No.	Genotypes	Plant height (cm)	Number of primary branches per plant	Number of secondary branches per plant	Leaf area (cm^2)	Leaf area index	Chlorophyll content (mg/g)
1	Mridula	42.47	7.33	2.33	34.97	2.38	1.68
2	Arka Komal	40.97	6.67	3.33	38.67	5.41	1.13
3	Selection-9	43.93	7.34	3.73	43.76	3.48	1.52
4	Arka Suvidha	43.87	8.67	4.17	40.97	5.63	1.64
5	Arka Anoop	45.33	9.00	4.46	38.80	4.20	1.49
6	Arka Bold	38.33	5.00	2.76	45.10	4.78	1.19
7	Powel	38.00	4.30	3.07	33.73	2.37	1.52
8	Sunil	34.63	4.67	2.67	29.57	2.72	1.95
9	Jyothi	38.06	6.00	3.50	32.36	2.42	1.23
10	Nandi	40.86	6.33	3.30	40.93	2.86	1.90
11	Arka Sharath	35.53	6.00	2.66	43.00	2.89	1.16
12	Anuradha	34.37	3.67	2.07	22.90	2.00	1.02
	Mean	39.69	6.25	3.17	37.12	3.43	1.45
	SEm±	2.25	0.48	0.28	1.83	0.26	0.10
	CD at 5%	6.59	1.40	0.82	5.37	0.77	0.31

cated at 13°25′ North latitude and 75°25′ East longitude with an altitude of 980 m above mean sea level.The twelve genotypes obtained from IIHR and other sources were evaluated in randomized complete block design with three replications. The sowing was done on February 1st 2014 in *rabi* season and each genotype sown with row spacing of 30 cm and plant to plant spacing of 15 cm, recommended package of practice was followed to rise the crop. Five random plants per treatment were selected, tagged and observations were recorded on selected plants for different characters in each replication. Like plant height, number of primary branches, leaf area, leaf area index, chlorophyll content, days to first flowering, days to 50% flowering, days to first picking, number of clusters per plant, number of pods per cluster, number of pods per plant, pod length, pod yield per plant and pod yield per hectare.

Table 2. Performance of French bean genotypes for yield parameters.

Sl. No.	Genotypes	Days to first flowering	Days to 50% flowering	Days to first picking	Number of clusters/ plant	Number of pods/ cluster	Pod length (cm)	Number of pods/ plant	Yield per plant (g)	Yield per hectare (t)
1	Mridula	39.00	42.33	58.00	8.53	4.27	15.10	35.20	47.47	10.54
2	Arka Komal	36.33	38.67	55.67	7.86	4.37	15.67	33.30	67.10	14.90
3	Selection-9	37.00	40.00	56.00	7.66	3.53	15.33	25.97	61.53	12.52
4	Arka Suvidha	36.67	39.33	54.00	9.80	4.06	15.00	39.00	79.93	17.67
5	Arka Anoop	41.33	45.00	59.00	10.06	4.53	17.00	44.33	82.00	18.26
6	Arka bold	37.67	41.00	61.33	7.76	3.50	12.00	26.00	45.50	10.03
7	Powel	42.67	46.33	63.67	5.93	3.60	15.33	19.97	39.00	8.18
8	Sunil	43.33	46.00	57.33	8.07	3.10	14.67	23.33	35.13	7.82
9	Jyothi	43.00	47.67	64.33	7.67	3.60	13.67	26.56	42.20	9.37
10	Nandi	41.67	45.67	62.67	6.83	3.90	16.00	25.43	54.20	12.05
11	Arka Sharath	39.67	44.67	58.33	5.83	4.70	13.60	26.00	36.33	8.51
12	Anuradha	42.00	45.33	61.00	5.63	3.80	10.00	19.67	35.30	7.19
	Mean	40.02	43.50	59.27	7.64	3.91	14.44	28.73	52.14	11.42
	SEm±	1.34	1.28	1.16	0.32	0.22	0.42	2.54	4.93	0.95
	CD at 5%	3.93	3.76	3.41	0.94	0.65	1.23	7.46	14.45	2.77

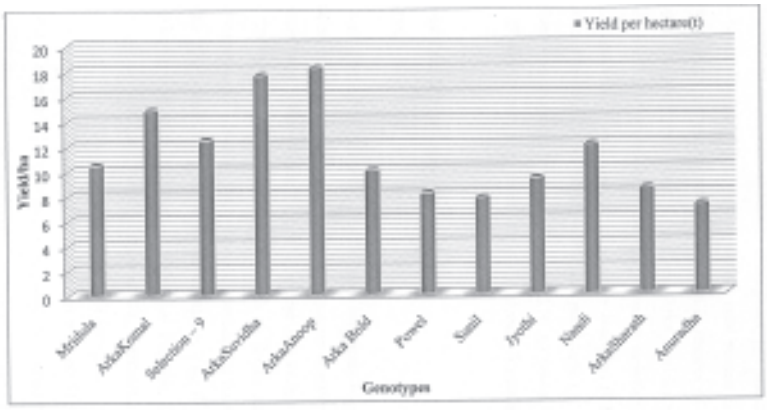

Fig. 1. Yield per hectare of various French bean genotypes.

Results and Discussion

All the genotypes were found significantly different from each other with respect to the characters studied (Tables 1 and 2). The genotype Arka Anoop was tallest with a plant height of 45.33 cm and it was on par with Selection-9 (43.93 cm) and Arka Suvidha (43.87 cm). Whereas, the genotype Anuradha and Sunil found shortest (34.37 cm and 34.63 cm respectively). Different responses to plant height might be due to genetic characteristic of genotypes and adaptability to a prevailing environmental condition [3]. Highest number of primary and secondary branches per plant was recorded in Arka Anoop (9.00 and 4.46 respectively) which is on par with an Arka Suvidha (8.67 and 4.17 respectively) and minimum was recorded in Anuradha (3.67 and 2.07 respectively). Genotype Arka Bold has recorded the maximum leaf area of 45.10 cm^2 and it was on par with Selection-9 (43.76 cm^2) while, Anuradha has recorded minimum leaf area of 22.90 cm^2. Maximum leaf area index was recorded in Arka Suvidha (5.63) which was on par with Arka Komal (5.41) and Arka Bold (4.78). Variation in leaf area and leaf area index in different genotype was also recorded previously in French bean [4]. The total chlorophyll content at peak stage of crop growth was higher in the genotype Sunil (1.95 mg/g) and minimum was recorded in Anuradha (1.02 mg/g). The leaf chlorophyll content is a varietal character that differs according to genotype [4]. The overall mean of days to first flowering and 50 % flowering in genotypes was 40.02 and 43.50 days respectively, Arka Komel (36.33 and 38.67 days) and Arka Suvidha (36.67 and 39.33 days) took less number of days for initiation of flowering and days to 50 % flowering in genotypes was 40.02 and 43.50 days respectively. Sunil was took more number of days for initiation of first flower and 50% flower (43.33 and 46.00 days) followed by Jyothi (43.00 and 47.67 days). First picking of pods was recorded early in genotype Arka Suvidha (54.00 days) followed by Arka Komal (55.67 days) and late in Jyothi (64.33 days) followed by Powel (63.67 days). The genotype Arka Anoop recorded significantly higher number of clusters per plant (10.06) followed by Arka Suvidha (9.80) and lowest number of clusters per plant was observed in Anuradha (5.63). Maximum number of pods per cluster (4.70) was noticed in Arka Sharath which was on par with Arka Anoop (4.53) and minimum number was recorded in Sunil (3.10). This might be due to genetic makeup of the genotypes [5]. Number of pods per plant was highest in Arka Anoop (44.33) which was on par with Arka Suvidha (39.00), lowest number of pods per plant was recorded in Anuradha and Powel (19.67 and 19.97 respectively). This was mainly due to significantly higher number of branches with higher photosynthetic efficiency which

might have led to formation of more number of pods [6]. Pod length ranged from 10.00 cm to 17.00 cm, highest pod length was recorded in the genotype Arka Anoop (17.00 cm). The maximum pod yield per plant and yield per hectare (Fig. 1) was recorded in Arka Anoop (82.00 g and 18.26 t/ha respectively) which was on par with Arka Suvidha (79.93 g and 17.67 t/ha) and Arka Komal (67.10 g and 14.90 t/ha). The lowest was recorded in Sunil and Anuradha (35.13 g and 7.82; 35.30 g and 7.19 t/ha respectively). The pod yield per plant may be directly related to the number of branches per plant [7] and number of pods per plant [8].

References

1. Anonymous (2012) FAOSTAT. http//www.fao.stat.fao.org.
2. Anonymous (2013) Indian Horticulture Database. National Horticulture Board, www.nhb.gov.in
3. Khan NT, Ramzan A, Mehmood T (2013) Morphological performance of pea (*Pisum sativum*) genotypes under rain fed conditions of potowar region. J Agric Res 51 : 51—60.
4. Sofi PA, Zargar MY, Debouck D, Graner A (2011) Evaluation of common bean (*Phaseolus vulgaris* L.) germplasm under temperate conditions of Kashmir valley. J Phyto 3 : 47—52.
5. Parmar AM, Singh AP, Dhillon NPS, Jamwal M (2013) Genetic variability studies for morphological and yield traits in dolichos bean (*Lablab purpureus* L.) . World J Agric Sci 9 : 24—28.
6. Ghodake PR, Chittapur BM, Hiremath SM, Chimmad VP (2004) Effect of planting geometry on the performance of rajmash (*Phaseolus vulgaris* L.) genotypes. Karnataka J Agric Sci 17 : 401—404.
7. Rana DK, Arvind K (2008) Performance of various French bean (*Phaseolus vulgaris* L.) genotypes under mid-hill condition of garhwal Himalaya. Prog Hort 40 : 184—186.
8. Sharma BK, Kushwah SS, Verma KS, Singh OP (2013) Studies on French bean (*Phaseolus vulgaris* L.) varieties under different N,P,K and S levels for growth, yield and economics. J Hort Sci 8 : 268—270.