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PERFORMANCE OF CHILLI (*CAPSICUM ANNUUM* L.) GENOTYPES FOR YIELD AND YIELD ATTRIBUTING TRAITS

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ABSTRACT

The experiment entitled “Performance of chilli (*Capsicum annum* L.) genotypes for yield and yield attributing traits” was conducted at Horticulture Department, University of Agricultural Sciences, Gandhi Krishi Vigyana Kendra, Bengaluru during 2021-2022. The experimental material consisted of thirty one chilli *Capsicum annum* (L.) genotypes and followed augmented design. Package of practices (POP) were followed as per the UHS, Bagalkot POP guidelines. Growth parameters such as plant height, plant spread, number of branches per plant, inter-nodal length, stem girth were recorded from five tagged plants. Genotype Pant C-1 produced higher number of fruits plant⁻¹ (216.60) followed by Arka Sweta (141.00), IC362007 (115.00) and IC 570408 (110.00). Arka Sweta exhibited significantly higher fruit weight with 54.00 g followed by IC 215011 (44.50 g), IC 545661 (43.80 g) and IC 505305 (43.50 g). Among 31 genotypes, yield per plant differed significantly. Yield per plant among 31 genotypes ranged from 0.26 kg to 0.76 kg. Highest yield per plant was produced by Arka Sweta (0.76 kg) followed by IC 215011 (0.45 kg), EC 378688 (0.43 kg) and Pant C-1(0.42 kg).

Key words : Chilli genotypes, Traits, Growth, Plant height, Yield.

Introduction

Chilli (*Capsicum annum* L.) is the most important vegetable cum spice crop, originated in Mexico and stands as 3rd most leading vegetable among solanaceous crops after potato and tomato. Among the five important domesticated *Capsicum* species (*C. annum*, *C. baccatum*, *C. chinense*, *C. frutescens* and *C. pubescens*), *C. annum* is the dominating species worldwide. Based on the degree of pungency, it is divided into non-pungent (sweet pepper) and pungent (chili/hot pepper) varieties (Bosland and Votava, 2000). It is an essential ingredient in Indian daily cooking and culinary purpose. It also contains vitamin A, E, C, potassium and oleoresin which has a high potential for export. The main states in India that grow chillies are Andhra Pradesh, Karnataka, Maharashtra, West Bengal, Rajasthan, and others. Chilli has larger genetic diversity of fruits in terms of size, shape, colour etc. The shape can be rounded or elongated, the distal end can be pointy, blunt, or sucked in

and the touch on the outer skin might be smooth or leathery. Similar diversity may be seen in chilli germplasm for all phenotypic, biochemical and responses to biotic and abiotic stresses. Characterization of chilli genotypes for morphological, growth, yield and quality traits is necessary to recognize the variability and to improve the local germplasm (Elias *et al.*, 2001 and Zacarias *et al.*, 2004). It is also equally important for easy and rapid evaluation of collected germplasm. Plant breeders over the years have relied heavily on phenotypic characterization for cultivation.

Materials and Methods

The experiment of the research work was conducted in the Vegetable Block, Department of Horticulture, University of Agricultural Sciences, Bangalore during 2021-22. The site is located at an altitude of 930 meters above mean sea level (MSL), 12° 58' North latitude and 77° 35' East longitude which belongs to the Eastern Dry

Zone (Zone V) of Karnataka. The experiment was carried out in augmented design with 31 treatments by 60 cm × 45 cm spacing. The experimental material consisted of thirty-one Chilli (*Capsicum annuum* L.) genotypes. Among the thirty one genotypes twenty nine Chilli germplasm were collected from National Bureau of Plant Genetic Resources, Regional Station, Hyderabad, Pant C1 from GBPUA&T, Pantnagar and Arka Sweta from IIHR, Bengaluru. Chilli seedlings were raised in a greenhouse. Portrays with 98 cells and cocopeat as media were used. Package of practices (POP) were followed as per the UHS, Bagalkot POP guidelines. Thirty five days aged seedlings were transplanted in the main field. The morphological parameters such as plant growth habit, leaf shape, leaf pubescence, flower orientation, fruit bearing habit, fruit shape were recorded by using Capsicum descriptors documented by IPGRI, AVRDC and CATIE. 1995. Growth parameters such as plant height, plant spread, number of branches per plant, internodal length, stem girth were recorded from five tagged plants. Yield parameters such as days to first flowering was recorded as the number of days taken by a plant after transplanting to produce the first flower and the number of fruits per plant, fruit length, fruit diameter, fruit weight, fruit yield/plant were recorded at the time of harvesting.

Results and Discussion

Plant height (cm)

Highest plant height (90.80 cm) was recorded in genotype IC 214949 at 120 days after transplanting. Genotype IC 505540 was the shortest genotype on 120 Days after transplanting (45.75 cm). Similar results were recorded for plant height by Awasthi *et al.* (2021); Jeevitha *et al.* (2021); Farwah *et al.* (2020); Sreenivas *et al.* (2019); Kumari *et al.* (2018) and Srinivas *et al.* (2017).

Plant spread (cm²)

Maximum plant spread (62.50 cm²) was noted in genotype EC 378688 at 120 days after transplanting. Genotype IC 545656 was showed the least plant spread (40.25 cm²). Similar observations were recorded for plant spread by Sreenivas *et al.* (2019); Farwah *et al.* (2020); Kumari *et al.* (2018).

Number of branches per plant

Maximum number of branches (11.60) was noted in genotype IC 215011 at 120 days after transplanting. Genotype IC 570408 was showed the least plant spread (6.45). Similar results were obtained for number of branches per plant by Jeevitha *et al.* (2021); Awasthi *et al.* (2021); Sreenivas *et al.* (2019); Kumari *et al.* (2018);

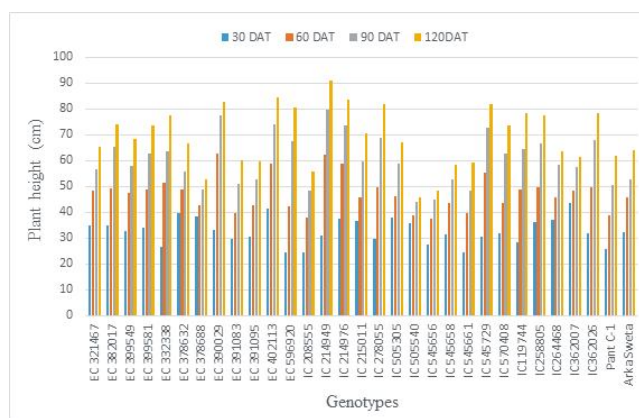


Fig. 1 : Plant height of chilli genotypes for different growth stages.

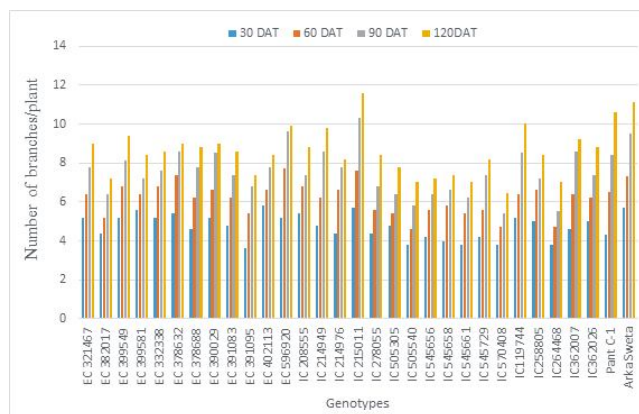


Fig. 2 : Number branches of chilli genotypes for different growth stages.

Srinivas *et al.* (2017).

Internodal length (cm)

Maximum internodal length (3.50 cm) was noted in genotype IC 214949 at 120 days after transplanting. Genotype EC 596920 showed minimum internodal length (2.50 cm at 120 DAT). Similar results were obtained for internodal length of plant by Awasthi *et al.* (2021); Sreenivas *et al.* (2019); Kumari *et al.* (2018); Srinivas *et al.* (2017).

Stem girth/ thickness (cm)

Significantly highest stem girth (2.40 cm) was noted in genotype EC 390029 at 120 days after transplanting. Genotype EC 378632 showed the minimum internodal length (1.40 cm). Kumari *et al.* (2018) and Awasthi *et al.* (2021) also obtained similar results for stem girth/thickness.

Days to first flowering

Data for days to first flowering varied from 27.5 to 42.2 days. Earliest flowering was recorded in IC264468 (27.5 days), followed by IC 505540 (29.40 days), Arka Sweta (29.60 days) and IC258805 (31.5 days). 42.2 days were taken by EC 391095 genotype to produce first

Table 1 : Morphological characters of chilli (*Capsicum annum* L.) genotypes.

S. no.	Genotypes	Plant growth habit	Leaf shape	Leaf pubescence	Flower orientation	Fruit bearing habit	Fruit shape
1	EC 321467	Erect	Lanceolate	Sparse	Pendant	Solitary	Elongate
2	EC 382017	Erect	Ovate	Sparse	Intermediate	Solitary	Elongate
3	EC 399549	Erect	Lanceolate	Intermediate	Pendant	Solitary	Elongate
4	EC 399581	Erect	Lanceolate	Sparse	Pendant	Solitary	Elongate
5	EC 332338	Erect	Lanceolate	Sparse	Pendant	Solitary	Elongate
6	EC 378632	Erect	Lanceolate	Sparse	Pendant	Solitary	Elongate
7	EC 378688	Intermediate	Ovate	Sparse	Pendant	Solitary	Elongate
8	EC 390029	Erect	Lanceolate	Sparse	Intermediate	Cluster	Elongate
9	EC 391083	Erect	Lanceolate	Intermediate	Pendant	Solitary	Elongate
10	EC 391095	Erect	Deltoid	Sparse	Pendant	Solitary	Elongate
11	EC 402113	Intermediate	Lanceolate	Sparse	Pendant	Solitary	Elongate
12	EC 596920	Erect	Lanceolate	Sparse	Pendant	Solitary	Elongate
13	IC 208555	Intermediate	Ovate	Sparse	Pendant	Solitary	Elongate
14	IC 214949	Erect	Lanceolate	Sparse	Pendant	Solitary	Elongate
15	IC 214976	Erect	Lanceolate	Intermediate	Pendant	Solitary	Elongate
16	IC 215011	Erect	Lanceolate	Sparse	Pendant	Solitary	Elongate
17	IC 278055	Erect	Lanceolate	Sparse	Pendant	Solitary	Triangular
18	IC 505305	Erect	Ovate	Sparse	Erect	Solitary	Elongate
19	IC 505540	Erect	Lanceolate	Sparse	Erect	Solitary	Elongate
20	IC 545656	Erect	Lanceolate	Sparse	Pendant	Solitary	Elongate
21	IC 545658	Erect	Lanceolate	Intermediate	Pendant	Solitary	Triangular
22	IC 545661	Erect	Deltoid	Sparse	Pendant	Solitary	Triangular
23	IC 545729	Erect	Lanceolate	Intermediate	Pendant	Solitary	Elongate
24	IC 570408	Erect	Lanceolate	Sparse	Pendant	Solitary	Elongate
25	IC119744	Erect	Lanceolate	Sparse	Pendant	Solitary	Elongate
26	IC258805	Erect	Ovate	Dense	Pendant	Solitary	Elongate
27	IC264468	Erect	Lanceolate	Sparse	Pendant	Solitary	Elongate
28	IC362007	Intermediate	Lanceolate	Sparse	Pendant	Solitary	Elongate
29	IC362026	Erect	Lanceolate	Intermediate	Intermediate	cluster	Triangular
30	Pant C-1	Erect	Lanceolate	Sparse	Erect	Solitary	Elongate
31	Arka Sweta	Erect	Ovate	Sparse	Pendant	Solitary	Elongate

flowers which were recorded as maximum number of days to first flowering. Mean number of days to first flowering was 35.66 days. Similar results were recorded for days to first flowering by Farwah *et al.* (2020); Awasthi *et al.* (2021); Kumari *et al.* (2018); Srinivas *et al.* (2017).

Fruit length (cm)

Fruit length ranged from 5.25 cm to 12.80 cm. Longest fruits were recorded in Arka Sweta (12.8 cm) followed by IC 215011 (11.65 cm), EC 378688 (11.35 cm) and genotype Pant C-1 was reported to produce shortest fruit length (5.25 cm). Overall mean of fruit length was 7.75 cm. Similar findings were reported for fruit length by Farwah *et al.* (2020); Awasthi *et al.* (2021);

Jeevitha *et al.* (2021); Kumari *et al.* (2018); Sreenivas *et al.* (2019); Ratna *et al.* (2018); Srinivas *et al.* (2017); Yatagiri *et al.* (2017).

Fruit diameter (cm)

Fruit diameter varied from 1.10 cm to 1.70 cm. Maximum fruit diameter was noted in IC 545729 (1.70 cm) followed by IC 545658 (1.65 cm) and IC 505305 (1.62 cm). Genotype Pant C-1 was reported to produce minimum fruit diameter (1.0 cm). Overall mean of fruit diameter was 1.34 cm. Sreenivas *et al.* (2019); Awasthi *et al.* (2021); Kumari *et al.* (2018); Farwah *et al.* (2020); Ratna *et al.* (2018); Srinivas *et al.* (2017); Yatagiri *et al.* (2017) also reported similar results for fruit diameter.

Table 2 : Mean performance of chilli genotypes for growth parameters.

S. no.	Genotypes	Plant height (cm)	Plant spread (cm ²)	Number of branches per plant	Internodal length (cm)	Stem girth/ thickness (cm)
1	EC 321467	65.25	55.75	9.00	2.70	2.20
2	EC 382017	73.75	48.75	7.20	2.90	1.60
3	EC 399549	68.50	55.50	9.40	3.10	1.90
4	EC 399581	73.50	53.15	8.40	3.40	1.60
5	EC 332338	77.25	57.00	8.60	3.30	2.10
6	EC 378632	66.75	45.70	9.00	2.80	1.40
7	EC 378688	52.75	62.50	8.80	3.30	1.70
8	EC 390029	82.50	57.50	9.00	3.10	2.40
9	EC 391083	60.25	56.50	8.60	3.25	1.70
10	EC 391095	59.75	46.25	7.40	3.10	1.80
11	EC 402113	84.50	60.25	8.40	3.15	2.30
12	EC 596920	80.35	55.25	9.90	2.50	1.90
13	IC 208555	55.60	42.75	8.80	3.10	1.60
14	IC 214949	90.80	52.45	9.80	3.50	2.30
15	IC 214976	83.50	49.25	8.20	3.20	1.80
16	IC 215011	70.60	50.40	11.60	2.90	1.50
17	IC 278055	81.75	52.50	8.40	2.60	2.00
18	IC 505305	67.20	55.75	7.80	2.80	1.80
19	IC 505540	45.75	45.45	7.00	3.10	1.70
20	IC 545656	48.50	40.25	7.20	2.70	1.60
21	IC 545658	58.35	46.20	7.40	2.90	1.90
22	IC 545661	59.25	55.10	7.00	3.40	2.00
23	IC 545729	82.00	56.45	8.20	3.05	1.80
24	IC 570408	73.50	52.25	6.45	3.15	1.80
25	IC119744	78.25	56.50	10.00	3.00	2.20
26	IC258805	77.50	55.50	8.40	2.80	1.70
27	IC264468	63.70	53.20	7.00	3.20	1.50
28	IC362007	61.50	54.50	9.20	2.90	1.50
29	IC362026	78.25	59.00	8.80	2.80	2.25
30	Pant C-1	61.65	56.50	10.60	3.10	2.20
31	Arka Sweta	63.75	49.25	11.10	3.30	2.1
Mean		69.37	53.15	8.73	3.09	1.85
CV		0.79	0.84	0.55	2.94	3.35

Number of fruits per plant

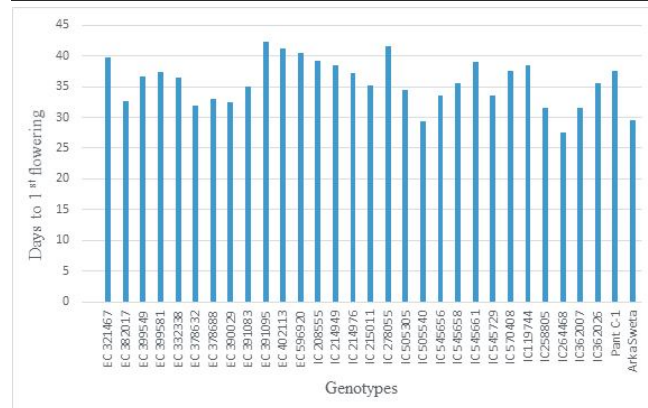
Significant differences in data pertaining to number of fruits plant⁻¹ were noted. Fruits plant⁻¹ varied from 65.60 to 216.60. Genotype Pant C-1 produced higher number of fruits plant⁻¹ (216.60) followed by Arka Sweta (141.00), IC362007 (115.00) and IC 570408 (110.00) while IC 545661 produced least number of fruits plant⁻¹ (65.60). Overall mean of fruits plant⁻¹ was 100.55. Similar results were recorded for number of fruits per plant by Kumari *et al.* (2018); Ratna *et al.* (2018); Yatagiri *et al.* (2017); Srinivas *et al.* (2017).

Fruit weight (g)

Weight of ten fruits varied significantly among genotypes and ranged from 19.50 g to 54.00 g. Arka Sweta exhibited significantly higher fruit weight with 54.00 g followed by IC 215011 (44.50 g), IC 545661 (43.80 g) and IC 505305 (43.50 g). Variety Pant C-1 was reported to produce lowest fruit weight with 19.5 g. Overall mean of fruit weight was 34.07 g. Jeevitha *et al.* (2021); Srinivas *et al.* (2017); Awasthi *et al.* (2021); Yatagiri *et al.* (2017) Farwah *et al.* (2020); Kumari *et al.* (2018); Ratna *et al.* (2018); also obtained similar results for fruit weight.

Table 3 : Mean performance of chilli genotypes for yield parameters.

S. no.	Genotypes	Days to first flowering	Fruit length (cm)	Fruit diameter (cm)	Number of fruits per plant	Fruit weight (g)	Fresh fruit yield (kg/plant)
1	EC 321467	39.70	7.47	1.18	106.00	34.50	0.37
2	EC 382017	32.60	7.35	1.25	105.80	28.60	0.30
3	EC 399549	36.60	7.85	1.15	82.50	31.80	0.27
4	EC 399581	37.40	10.15	1.42	95.40	33.80	0.32
5	EC 332338	36.50	7.25	1.46	89.60	31.40	0.28
6	EC 378632	32.00	7.45	1.28	82.60	33.50	0.28
7	EC 378688	33.00	11.35	1.44	99.80	42.80	0.43
8	EC 390029	32.50	5.55	1.38	108.80	31.50	0.34
9	EC 391083	35.00	7.35	1.12	86.80	29.80	0.27
10	EC 391095	42.20	7.85	1.40	80.60	39.50	0.32
11	EC 402113	41.20	7.43	1.25	102.80	27.80	0.29
12	EC 596920	40.50	7.65	1.13	93.80	28.50	0.27
13	IC 208555	39.20	5.45	1.10	97.00	33.50	0.32
14	IC 214949	38.50	5.75	1.20	94.80	27.50	0.28
15	IC 214976	37.20	8.35	1.50	84.60	32.50	0.27
16	IC 215011	35.20	11.65	1.47	102.00	44.50	0.45
17	IC 278055	41.50	5.73	1.30	93.80	27.50	0.28
18	IC 505305	34.40	10.20	1.62	73.80	43.50	0.32
19	IC 505540	29.40	7.40	1.35	82.80	31.80	0.27
20	IC 545656	33.60	7.45	1.42	88.20	29.60	0.26
21	IC 545658	35.50	8.48	1.65	85.80	36.50	0.31
22	IC 545661	39.00	4.85	1.25	65.60	43.80	0.29
23	IC 545729	33.50	8.10	1.70	104.80	37.20	0.39
24	IC 570408	37.60	7.65	1.35	110.00	32.80	0.36
25	IC119744	38.50	7.35	1.28	106.20	29.50	0.31
26	IC258805	31.50	7.85	1.37	105.60	37.50	0.40
27	IC264468	27.50	9.95	1.35	109.80	31.50	0.35
28	IC362007	31.50	7.26	1.35	115.00	36.20	0.41
29	IC362026	35.50	6.45	1.55	107.80	35.50	0.38
30	Pant C-1	37.50	5.25	1.10	216.60	19.50	0.42
31	Arka Sweta	29.60	12.80	1.28	141.00	54.00	0.76
Mean		35.66	7.75	1.34	100.55	34.07	0.34
CV		1.43	2.07	3.36	0.84	0.98	5.3

**Fig. 3 :** Days to 1st flowering of chilli.

Fresh fruit yield per plant (kg)

Among 31 genotypes, yield per plant differed significantly. Yield per plant among 31 genotypes ranged from 0.26 kg to 0.76 kg. Highest yield per plant was produced by Arka Sweta (0.76 kg) followed by IC 215011 (0.45 kg), EC 378688 (0.43 kg) and Pant C-1(0.42 kg). Genotype IC 545656 was reported to produce lowest yield per plant (0.26 kg). Overall mean of yield per plant was 0.34 kg. Similar results were reported for fresh fruit yield per plant by Ratna *et al.* (2018); Awasthi *et al.* (2021); Srinivas *et al.* (2017); Yatagiri *et al.* (2017). Farwah *et al.* (2020); Kumari *et al.* (2018).

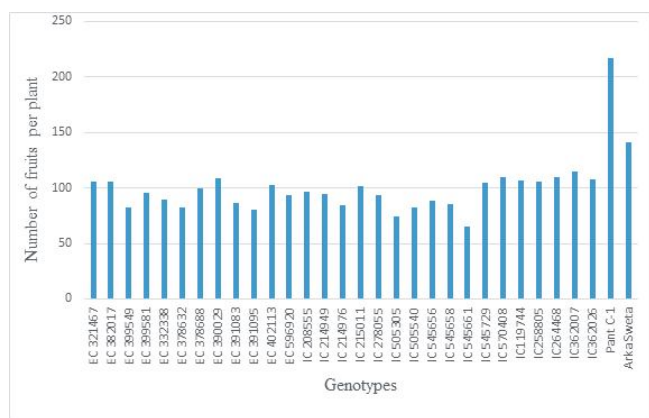


Fig. 4 : Number of fruits per plant.

Conclusion

The average genotype performance revealed that, out of the 31 genotypes examined, the yield per plant genotypes were Arka Sweta (0.76 kg) followed by IC 215011 (0.45 kg), EC 378688 (0.43 kg) and Pant C-1 (0.42 kg). Carry out evaluation and screening experiments in other agroclimatic zones in different seasons will be helpful. Improvement of genotypes which are proven to be high yielding and quality useful for further need.

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