International Journal of Advanced Biochemistry Research

ISSN Print: 2617-4693
ISSN Online: 2617-4707
IJABR 2025; 9(2): 231-234
www.biochemjournal.com
Received: 13-11-2024
Accepted: 16-12-2024

Puli Vijaya Babu
Department of Horticulture, College of Agriculture, University of Agricultural Sciences, Bangalore, Karnataka, India

Nagappa Desai
Department of Horticulture, Agricultural Research Station, Madenur, University of Agricultural Sciences, Bangalore, Karnataka, India

Kavita Kandpal
Department of Horticulture, College of Agriculture, University of Agricultural Sciences, Bangalore, Karnataka, India

TS Manjunatha Swamy
Department of Horticulture, College of Agriculture, University of Agricultural Sciences, Bangalore, Karnataka, India

Palanna KB
Department of Plant Pathology, ZARS, University of Agriculture Sciences, Bangalore, Karnataka, India

Corresponding Author:
Puli Vijaya Babu
Department of Horticulture, College of Agriculture, University of Agricultural Sciences, Bangalore, Karnataka, India

Performance of chilli (*Capsicum annuum* L.) genotypes for fruit quality traits

Puli Vijaya Babu, Nagappa Desai, Kavita Kandpal, TS Manjunatha Swamy and Palanna KB

DOI: https://doi.org/10.33545/26174693.2025.v9.i2d.3761

Abstract
The experiment entitled "Performance of chilli (*Capsicum annuum* L.) Genotypes for fruit quality traits" was carried out at the Department of Horticulture Laboratory, University of Agricultural Sciences, Gandhi Krishi Vigyana Kendra, Bengaluru during 2021-22. Chilli crop was cultivated as per the UHS, Bagalkot Package of practices (POP) guidelines. Harvested chilli fruits were used for quality estimation in the Laboratory. For determining the TSS, a drop of sample (juice) was placed on the prism of hand refractometer and the percentage was read directly. Total extractable colour of fruits measured in ASTA (American Spice Trade Association) units was determined using the procedure outlined by ASTA (1986). Capsaicin content of different chilli genotypes was determined by Folin-Dennis method. Significantly higher Ascorbic acid content was observed in IC 264468 (120 mg/100 g), followed by EC 378688 (114.20 mg/100 g), IC 215011 (108.85 mg/100 g) and IC 214976 (102.85 mg/100 g), while it was significantly least in EC 402113 (62.50 mg/100 g). Among the several genotypes, IC 362026 had the highest levels of capsaicin (0.87%), followed by IC 570408 (0.81%), EC 378688 (0.79%), and Pant C-1 (0.77%), while IC 545661 had the lowest levels (0.28%).

Keywords: Chilli genotypes, quality, total soluble solids, ascorbic acid, capsaicin, fruit colour value

Introduction
Chilli belongs to the Solanaceae family and one of the most extensively grown crops worldwide. *Capsicum annuum* L. is the most extensively grown of the five species in the genus *Capsicum*. Chilli is an indispensable food ingredient in many cuisines worldwide. Chili, which is rich in vitamins A, C and E, often being used as spice, condiment, vegetable, culinary supplement, medicine and as ornamental plant. Capsanthin and capsorubin are the prominent types of carotenoids found in chillies, they are responsible for imparting the red colour of the berries. Capsaicin, a volatile and crystalline alkaloid obtained from chilli fruits is responsible for the pungent flavour of chillies. It is mainly concentrated to in the placenta. Chilli also an excellent source of oleoresin, a combination of resin and essential oils, which imparts colour and flavour to food (Chattopadhyay *et al.*, 2011) [2].

Materials and methods
The experiment was conducted in the Department of Horticulture Laboratory, University of Agricultural Sciences, Bangalore during 2021-22. The experimental material consisted of thirty one chilli *Capsicum annuum* (L.) genotypes. Package of practices (POP) were followed as per the UHS, Bagalkot POP guidelines for crop cultivation and harvested chilli fruits were used for quality estimation in the Laboratory.

Total soluble solids (TSS ºB)
For determining the TSS, a drop of sample (juice) was placed on the prism of hand refractometer and the percentage was read directly.

Ascorbic acid content (mg/100 g)
Ascorbic acid content of fruit was estimated by 2,6-dichlorophenol indophenol dye method (Sadasivam and Manickam, 1992) [6]. Pippeted out 5 ml of the working standard solution into a 100 ml conical flask and added 10 ml of 4 per cent oxalic acid.

Titrated it against the dye (V1ml). End point is the appearance of pink colour which persisted for at least 5 seconds. 5g of fresh fruit was extracted in four per cent oxalic acid, filtered the extract and volume was made up to 100 ml using oxalic acid. From this 5 ml of aliquat was taken, added 10 ml of 4 per cent oxalic acid and titrated as above against the dye and determined the endpoint (V2ml).

$$\text{Ascorbic acid (mg/100 g)} = \frac{0.5 \times V2 \times 100}{V1 \times 5 \times \text{Weight of sample}} \times 100$$

Fruit Colour value (ASTA units)

Total extractable colour of fruits measured in ASTA (American Spice Trade Association) units was determined using the procedure outlined by ASTA (1986). 100 mg of sieved fine chilli powder was weighed into a volumetric flask. 10 ml of acetone was added and flask was closed tightly with stopper. The contents were kept for 16 hr at room temperature in dark and shaken intermittently. Solution was filtered using Whatman filter paper and final volume was made up to 100 ml. Absorbance of final extract was read at 460 nm using acetone as blank. ASTA colour units were calculated as per the formula given below,

$$\text{ASTA} = \frac{\text{Absorbance at 460nm} \times 16.4}{\text{Weight of sample in grams}} \times 100$$

Capsaicin content (%)

Capsaicin content of different chilli genotypes was determined by Folin-Dennis method. The pungent principle reacts with Folin-Dennis reagent to give a blue coloured complex which is estimated colorimetrically (Mathew *et al.*, 1971) [4]. The fruits harvested at red ripe stage were dried in a hot air oven at 50 °C and powdered finely in a mixer grinder. 500 mg each of the sample was weighed into test tubes. 10 ml of acetone was added to it and kept overnight. Aliquot of 1ml was pipetted into 100 ml conical flask, added 25 ml of Folin-Dennis reagent and allowed to stand for 30 minutes. Added 25 ml of freshly prepared sodium carbonate solution and shook vigorously. The volume was made up to 100 ml with distilled water and the optical density was determined after 30 minutes at 725 nm against reagent blank (1 ml acetone + 25 ml Folin Dennis reagent + 25 ml aqueous sodium carbonate solution) using a UV spectrophotometer. To determine the Electron Ionization (EI) per cent value for pure capsaicin, a stock solution of standard capsaicin (200 µg) was prepared by dissolving 20 mg in 100 ml acetone. From this a series of solutions of different concentrations (Prepared a standard curve using 0.5, 1.0, 1.5, 2.0 and 2.5 ml of standard capsaicin solution containing 50, 100, 150, 200 and 250 µg capsaicin respectively) were prepared and their optical density measured at 725 nm. Standard graph was prepared and calculated capsaicin content in the samples.

$$\text{Capsaicin Per cent} = \frac{\text{Capsaicin (µg)}}{100 \times 1000} \times \frac{100}{1} \times \frac{100}{2}$$

Results and Discussion

Total soluble solids (TSS ºB)

The information on total soluble solids (°B) is shown in table 1, and there were significant differences in TSS among various genotypes. Significantly maximum total soluble solids were recorded in IC 545661(4.50 °B), followed by EC 391095(4.3 °B), IC 214949 (4.10 °B) and IC 570408 (3.90 °B), while it was significantly minimum in EC 391083 (1.5 °B). Similar results were obtained for total soluble solids by Maurya *et al.* (2017) [5]; Awasthi *et al.* (2021) [1].

Ascorbic acid content (mg/100 g)

The data on ascorbic acid content presented in table 1 and there was significant difference in ascorbic acid content among different genotypes. Significantly higher Ascorbic acid content was observed in IC 264468 (120 mg/100 g), followed by EC 378688 (114.20 mg/100 g), IC 215011 (108.85 mg/100 g) and IC 214976 (102.85 mg/100 g), while it was significantly least in EC 402113 (62.50 mg/100 g). Srinivas *et al.* (2017) [7]; Maurya *et al.* (2017) [5]; Thilak and Pant (2017) [8]; Farwah *et al.* (2020) [3] also reported similar results for ascorbic acid.

Fruit colour value (ASTA units)

There were marked variations in colour value content due to different genotypes. The data on colour value presented in table 1 and there was significant difference in colour value among different genotypes. Significantly higher colour value was observed in IC 545658 (119.72 ASTA), followed by IC 215011 (118.08 ASTA), EC 378688 (116.44 ASTA) and IC 505305 (114.8 ASTA), while it was significantly least in EC 382017 (80.36 ASTA). Similar results were recorded for fruit colour value by Farwah *et al.* (2020) [3]; Srinivas *et al.* (2017) [7].

Table 1: Mean performance of chilli genotypes for fruit quality traits

Sl. No.	Genotypes	TSS (ºB)	Ascorbic acid (mg/100 g)	Colour value (ASTA)	Capsaicin (%)
1	EC 321467	2.30	85.60	88.25	0.76
2	EC 382017	2.50	80.25	80.36	0.49
3	EC 399549	2.90	97.00	103.32	0.35
4	EC 399581	2.50	85.71	83.85	0.33
5	EC 332338	2.20	69.00	86.92	0.31
6	EC 378632	2.50	63.00	83.64	0.37
7	EC 378688	3.20	114.20	116.44	0.79
8	EC 390029	3.50	68.57	93.48	0.38
9	EC 391083	1.50	80.4	85.75	0.30
10	EC 391095	4.30	91.75	100.04	0.35
11	EC 402113	2.30	62.50	82.00	0.39
12	EC 596920	2.80	75.00	95.12	0.29
13	IC 208555	3.40	68.75	98.40	0.34
14	IC 214949	4.10	97.75	108.24	0.45
15	IC 214976	3.20	102.85	86.25	0.37
16	IC 215011	2.70	108.85	118.08	0.67
17	IC 278055	3.00	97.14	111.52	0.38
18	IC 505305	2.10	80.35	114.80	0.55
19	IC 505540	3.40	91.42	90.20	0.54
20	IC 545656	2.60	74.28	101.68	0.4
21	IC 545658	3.30	80.00	119.72	0.42
22	IC 545661	4.50	74.80	91.84	0.28
23	IC 545729	3.40	102.50	83.25	0.52
24	IC 570408	3.90	91.50	96.76	0.81
25	IC119744	1.70	86.00	85.28	0.34
26	IC258805	2.80	85.80	104.96	0.38
27	IC264468	2.10	120.00	106.60	0.31
28	IC362007	3.10	103.00	113.16	0.58
29	IC362026	2.10	97.50	88.56	0.87
30	Pant C-1	2.80	91.35	82.75	0.77
31	Arka Sweta	3.70	102.75	109.88	0.64
	Mean	2.89	88.05	97.13	0.48
	CV	2.38	0.31	1.12	1.9

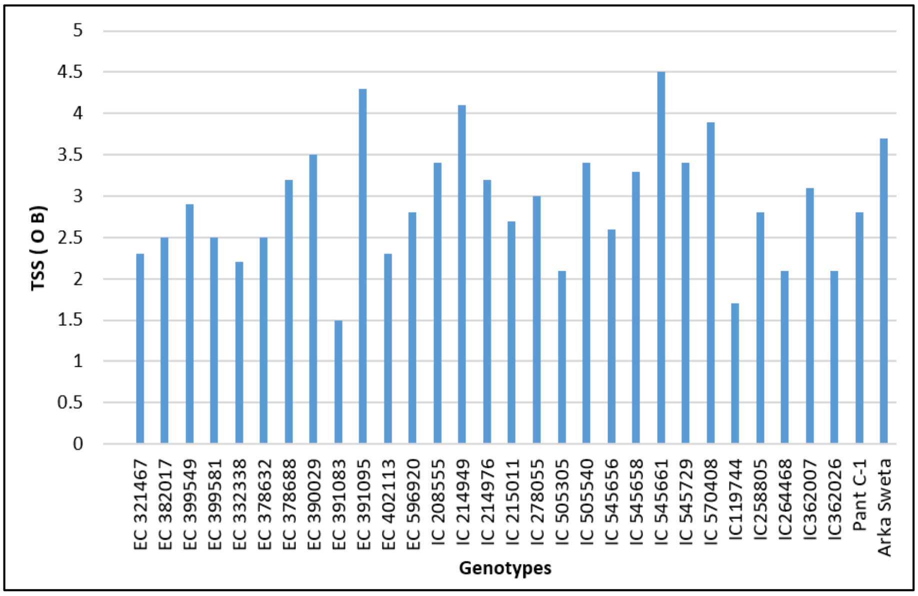

Fig 1: Total soluble solids of chilli genotypes

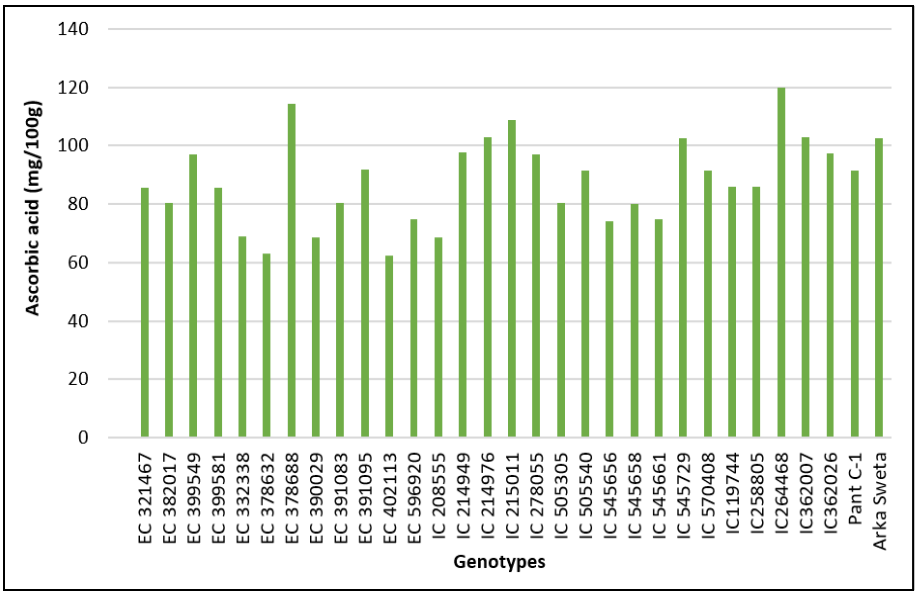

Fig 2: Ascorbic acid content (mg/100 g) of chilli genotypes

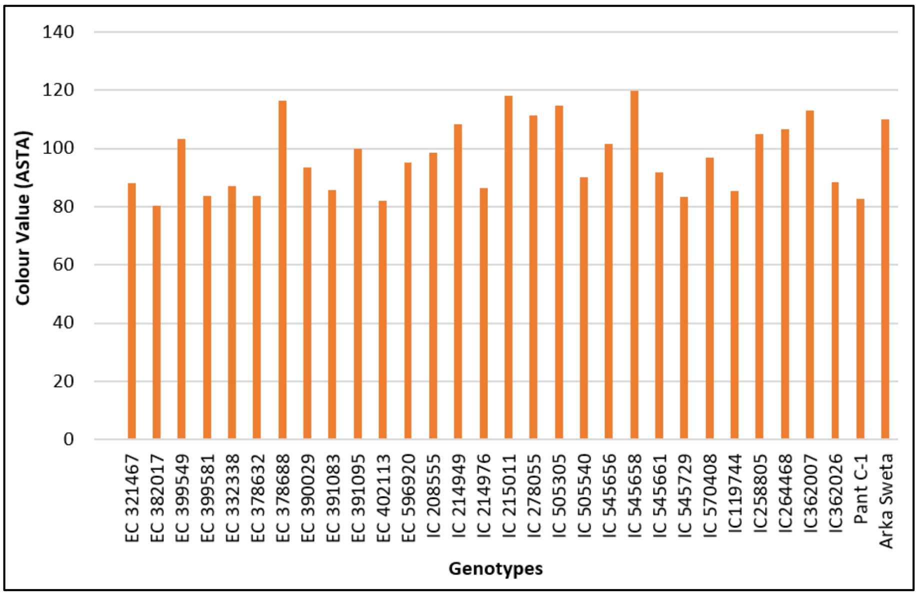

Fig 3: Colour value (ASTA) of chilli genotypes

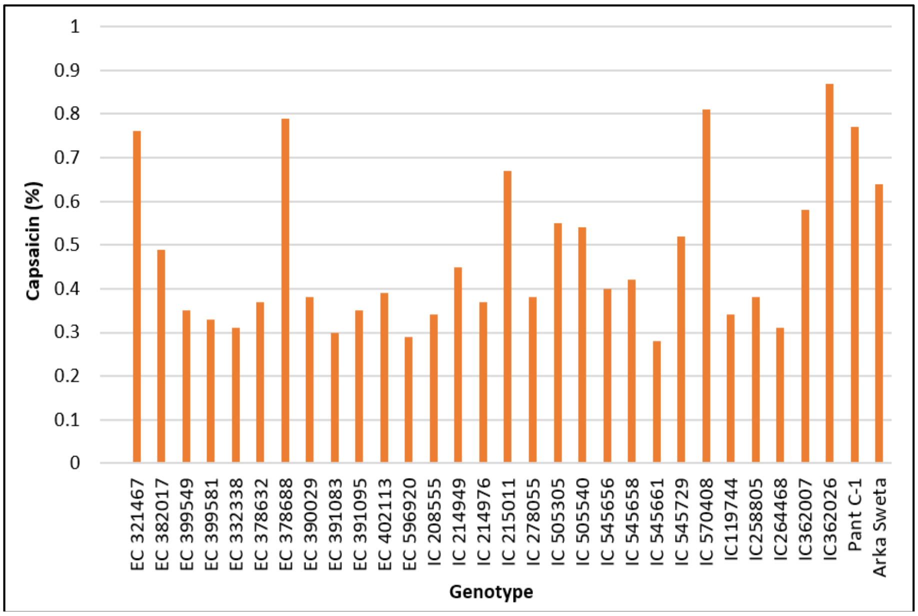

Fig 4: Capsaicin content (%) of chilli genotypes

Capsaicin (%)

There were marked variations in capsaicin content due to different genotypes. Among the several genotypes, IC 362026 had the highest levels of capsaicin (0.87%), followed by IC 570408 (0.81%), EC 378688 (0.79%), and Pant C-1 (0.77%), while IC 545661 had the lowest levels (0.28%). Similar results were obtained for capsaicin by Thilak and Pant (2017) [8]; Farwah *et al.* (2020) [3]; Srinivas *et al.* (2017) [7].

Conclusion

The study revealed significant variations in the quality parameters of chilli genotypes, including total soluble solids, ascorbic acid content, fruit colour value, and capsaicin content. Genotypes such as IC 545661, IC 264468, and IC 362026 stood out for their superior performance in terms of TSS, ascorbic acid, and capsaicin content, respectively. These findings demonstrate the genetic diversity in chilli genotypes and their potential for breeding programs aimed at enhancing quality traits. The results align with previous research, emphasizing the importance of genotype selection for improved chilli production and quality.

References

1. Awasthi M, Singh D, Bahadu V. Varietal evaluation of chilli (*Capsicum annuum*) for growth, yield, and quality in Prayagraj agro climatic condition. J Pharma Innov. 2021;10(10):1267-1269.
2. Chattopadhyay A, Sharangi AB, Dai N, Dutta S. Diversity of genetic resources and genetic association analyses of green and dry chillies of eastern India. Chilean J Agric Res. 2011;71(3):350-356.
3. Farwah S, Hussain K, Rizvi S, Hussain SM, Rashid M, Din S, Maqbool S. Mean performance of various chilli (*Capsicum annuum* L.) genotypes. J Pharmacogn Phytochem. 2020;9(3):1351-1355.
4. Mathew AG, Nambudiri ES, Ananathakrishna S, Krishnamurty N, Lewis YS. An improved method for estimation of capsaicin in capsicum oleoresin. Lab Pract. 1971;1:23-26.
5. Maurya AK, Kushwaha ML, Maurya SK, Panchbhaiya A. Estimation of per se performance of chilli (*Capsicum annuum* L.) genotypes for yield and quality traits. J Pharmacogn Phytochem. 2017;6(1):333-335.
6. Sadasivam S, Manickam A. Biochemical methods for agricultural sciences. New Delhi: Wiley Eastern Limited; 1992.
7. Srinivas J, Ravinder KR, Saidaiah P, Anitha K, Pandravada SR. Performance of chilli genotypes for yield and yield attributes of fruit quality in southern Telangana. Int J Curr Microbiol App Sci. 2017;6(11):469-477.
8. Thilak JC, Pant SC. Biochemical evaluation of chilli (*Capsicum annuum* L. *var. acuminatum* Fingerh.) genotypes under hill zone of Bharsar, Pauri Garhwal, Uttarakhand, India. J Pharmacogn Phytochem. 2017;6(6):2441-2443.