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Performance studies of chilli (*Capsicum annuum* L.) hybrids for quality characteristics under the hill zone of Karnataka, India

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ABSTRACT

The performance of twenty chilli hybrids were studied for quality characteristics using Randomized Block Design with three replications. The hybrids showed significant differences for all the characters studied. The maximum chlorophyll content was found in the fruits of Arka Harita (2.40 mg/g). Ascorbic acid (212.58 mg/100 g) was observed highest in CO (Ch)-1. Total soluble solids of 6.67 °B was registered in Arka Gagan and CHT-202 which was highest among all the hybrids. The hybrid H-43 had maximum pungency of 1.23 per cent. Reducing, non-reducing and total sugars were found maximum in the hybrid CHT-188 (2.09 %, 2.87 % and 4.96 %, respectively). The differences among the hybrids for quality characteristics is mainly attributed to the genetic makeup of the individual hybrid.

Key words: Ascorbic acid, Chilli, Hybrids, Pungency, Quality

Introduction

Chilli (*Capsicum annuum* L.) is the most important vegetable as well as spice crop, belongs to the family Solanaceae with chromosome number $2n=24$. It is valued for its aroma, taste, flavor and pungency grown in all parts of the world. Chilli also known as hot pepper introduced into India from Brazil in 16th century by Portuguese. Chilli is native of Tropical America where it was domesticated around 7000BC. The centre for morphological diversity for *Capsicum annuum* is probably Mexico. The genus *Capsicum* includes about 30 species, among these

species, *Capsicum annuum* L. is the most widely cultivated species.

Chilli is mainly used in culinary adding flavor, colour, vitamin (A, C, E and P) and pungency. Green chillies are used every day in Indian kitchens for curries, sambar, rasam and other savory dishes to impart pungency, colour and flavor in food. In food and beverage industries it is used in the form of oleoresin which permits better distribution of color and pungency. The pungency in chilli is due to crystal line acrid volatile alkaloid called Capsaicin (8-methyl-N-vanillyl-6-enamide). Capsaicin is an alkaloid present in the pericarp and placenta, which is a

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digestive stimulant and an important ingredient of daily diet and cure for many rheumatic problems. Extract from the fruits is incorporated into pharmaceutical preparations and the colour oleoresin (capsanthin) obtained from the fruits is commonly used in the food processing industries.

India is the world's largest producer, user and exporter of chillies. India is the world leader in chilli production, followed by China, Thailand, Ethiopia and Indonesia. There is a great need of research for the development of hybrids with better yield and superior quality characteristics. In this context, twenty hybrids were evaluated for their quality traits and the findings of the present research were furnished here.

Materials and Methods

The present experiment was conducted at Department of Vegetable Science, College of Horticulture, Mudigere during 2021-22. The experiment was laid out in Randomized Complete Block Design with twenty hybrids as treatments with three replications. Ten hybrids were collected from Indian Institute of Horticulture (IIHR), Bengaluru. One from Tamilnadu Agriculture University (TNAU) and the rest were from private sectors. Here Arka Harita was used as check for comparison. The hybrids included in the present study were: Arka Yashasvi, Arka Saanvi, Arka Gagan, Arka Tejasvi, Arka Tanvi, H-7, H-20, H-25, H-43, CO (Ch)-1, LHC- Raina, LHC- Manish, LHC- Diya, Trikas, AK-47, HCH-6570, CHT-188, CHT-201, CHT-202 and Arka Harita (Check).

The seeds were sown in portrays with coco peat as a media. 35-40 days old healthy and disease free seedlings were transplanted on the side of the ridges with a spacing of 75 cm x 45 cm. The recommended dosage of fertilizers were applied as per the package of practices. Hand weeding was done once in 30 days to keep the plots weed free. Regular sprays were taken to control major pest and diseases that affects the crop.

The chlorophyll content in green fruits was measured by using dimethyl sulfoxide (DMSO) method given by Shoef and Lilum (1976). Samples of the mature green fruits were analysed for their ascorbic acid content using 2-6 dichlorophenol visual method (Thimmaiah, 1999). Reducing sugars present in the chilli fruit samples were estimated by DNSA reagent method and was expressed in per-

centage (Ranganna, 1978). Total sugars present in the chilli fruit samples were estimated by anthrone reagent method and was expressed in percentage (Ranganna, 1979). Non reducing sugars were estimated by subtracting the reducing sugar from total sugar content of the sample. Freshly harvested green fruits were crushed with mortar and pestle. 1-2 drops of the juice extract was placed in the hand refractometer and observations were recorded. Pungency in chilli is due to alkaloid capsaicin. It was estimated in green chilli by the procedure proposed by Ramos Palacio (1977). The data were analysed with appropriate statistical method suggested by Panse and Sukhatme (1957).

Results and Discussion

The Hybrids varied significantly for all the quality characters studied at 5 per cent level of significance. Table 2 represents the chlorophyll content in fruits which varied significantly among the hybrids investigated. The maximum total chlorophyll content was found maximum in Arka Harita (2.40 mg/g) and the minimum in CHT-201 (0.55 mg/g). These variations within the hybrids might be due to the inherent genetic nature of the hybrid. These results follows the earlier reports of Ashwini (2016).

The hybrids varied significantly with respect to ascorbic acid content (Table 2). CO (Ch)-1 had 212.58 mg/100 g of ascorbic acid which was the highest among all the treatments. The lowest was observed in LHC-Raina (92.43 mg/100 g). Bosland and Votava (2000) highlighted that differences in nutritional composition are determined by the cultivar and the growing conditions. Similar conclusions were also drawn by Yatung *et al.* (2014); Bharadwaza *et al.* (2018); Mishra *et al.* (2017) and Molonaro *et al.* (2022).

The findings of TSS content in green chilli fruits is presented in Table 2 and the hybrids were notably different in TSS content. The highest TSS was recorded in Arka Gagan and CHT-202 (6.67 °B) which was on par with CO (Ch)-1 (6.47 °B). The lowest TSS of 4.63 °B was registered in H-25. This variation might be due to the genetic background of the hybrids. Similar results were also observed by Awasthi *et al.* (2021).

Statistically pungency content showed significant differences among the hybrids (Table 2). H-43 had 1.23 per cent of pungency which was highest among all the hybrids evaluated. The significantly lowest

Table 2. Quality characteristics of chilli hybrids

Sl. No	Treatments	Total Chlorophyll (mg/g)	Ascorbic acid (mg/100g)	TSS (°B)	Pungency (%)	Reducing sugars (%)	Non-reducing sugars (%)	Total sugars (%)
1	Arka Yashasvi	0.78	111.10	6.23	0.57	1.92	2.46	4.38
2	Arka Saanvi	0.67	106.37	6.37	0.50	1.85	2.4	4.25
3	Arka Gagan	0.64	124.07	6.67	0.84	1.42	2.25	3.67
4	Arka Tejasvi	0.96	196.87	6.07	1.07	1.807	2.36	4.167
5	Arka Tanvi	1.68	176.23	5.70	0.66	1.823	2.39	4.213
6	H-7	1.06	162.60	5.73	0.62	1.77	2.35	4.12
7	H-20	0.81	101.63	6.13	0.67	1.947	2.48	4.427
8	H-25	1.76	180.73	4.63	0.66	2.023	2.57	4.593
9	H-43	0.97	154.15	5.20	1.23	1.577	2.287	3.863
10	CO (Ch)-1	0.87	212.58	6.47	0.34	1.897	2.42	4.317
11	LHC-Raina	1.16	92.43	6.27	0.42	2.04	2.4	4.44
12	LHC-Manish	1.89	96.75	5.50	0.44	1.727	2.343	4.07
13	LHC-Diya	0.61	158.97	5.73	0.32	1.9	2.45	4.35
14	Trikas	0.70	206.77	5.43	0.28	2.06	2.62	4.68
15	AK-47	0.78	145.63	5.77	0.38	1.61	2.3	3.91
16	HCH-6570	2.38	202.27	5.57	0.77	1.97	2.553	4.523
17	CHT-188	2.13	210.53	6.17	0.72	2.09	2.87	4.96
18	CHT-201	0.55	176.20	5.83	0.17	1.65	2.327	3.977
19	CHT-202	2.12	102.77	6.67	0.83	1.98	2.51	4.49
20	Arka Harita (Check)	2.40	158.90	5.97	0.93	1.337	2.233	3.57
	S.Em.±	0.07	7.73	0.31	0.04	0.09	0.10	0.22
	C.Dat 5 %	0.20	22.13	0.89	0.10	0.26	0.27	0.63

content was recorded in CHT-201 (0.17 %) while, the check Arka Harita recorded 0.93 per cent pungency. This variation could be due to the presence of gene modifying factors for pungency and the ratio of placental tissue to seed and pericarp. The results were in accordance with the findings of Lekshmi and Sreelathakumary (2016), who reported the capsaicin range of 0.10 to 0.88 percent. Similarly, Uddin *et al.* (2015) also noted the range of 1.6 per cent to 1.2 per cent.

As per the data presented in Table 2, clearly presents that the reducing sugars in chilli fruits varied significantly among the different hybrids. The highest reducing sugar content was registered in CHT-188 (2.09 %), which was on par with hybrid H-20 (2.06 %). The lowest was seen in Trikas (1.34 %). The non-reducing sugar content in chilli fruits studied were in the range from 2.87 per cent -2.23 per cent. The maximum value for the observed parameter was seen in CHT-188 (2.87 %), which was on par with hybrid H-20 (2.62 %). The lowest was in Trikas (2.23 %). The greatest amount of total sugars were recorded in CHT-188 (4.96 %), which was on par with hybrid H-20 (4.68 %). The lowest was observed in Trikas (3.57 %). These variations within the hy-

brid might be due to the genetic makeup. These results are in agreement with the findings of Chaudary and Pandya (2019).

Conclusion

The differences among the hybrids for quality characteristics is mainly attributed to the genetic makeup of the individual hybrid.

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Conflict of interest

The authors have declared that no conflict of interest exists.

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