

## Evaluation of Certain Varieties and Hybrids of Capsicum for Quality Attributes under Shade Net

Narayana Swamy G\*, Srinivasulu B, Madhumathi C and Tirupal D

Department of Horticulture, Dr. Y.S.R. Horticultural University, H.C & R.I, Anantharajupet, Y.S.R. District-516 105, A.P, India

\*Corresponding author: Narayana Swamy G, Department of Horticulture, Dr. Y.S.R. Horticultural University, H.C & R.I, Anantharajupet, Y.S.R. District-516 105, A.P, India, Tel: 09581969957; E-mail: [gnswami.gsr@gmail.com](mailto:gnswami.gsr@gmail.com)

Rec date: Oct 25, 2014; Acc date: Jan 30, 2015; Pub date: Jan 06, 2015

Copyright: © 2015 Narayana GS. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

### Abstract

A study was conducted to evaluate certain varieties and hybrids of capsicum for quality attributes under 50% shade net. The hybrid, Angel recorded significantly high ascorbic acid content ( $179.34 \text{ mg g}^{-1}$ ) closely followed by the variety, Arka Gaurav ( $170.85 \text{ mg g}^{-1}$ ). The capsaicin content was found meagre (0.003% to 0.010%) in all the varieties and hybrids. Total carotenoids was high in the hybrid, NS-280 (0.178%) and in the variety, Arka Basant (0.139%) which produced red coloured fruits. High Total Soluble Solids was recorded in the variety, Arka Gaurav ( $8.37^\circ\text{Brix}$ ) followed by the hybrid, Angel ( $7.53^\circ\text{Brix}$ ). Fruit wall thickness was observed maximum in the hybrid, Indra (1.05 cm) and in the variety, Royal Wonder (1.01 cm) and hence suitable for long distant transportation.

**Keywords:** Capsicum; Quality attributes; Shade net; Varieties and hybrids

### Introduction

Capsicum (*Capsicum annuum* L. var. *grossum* Sendt.) also known as Bell pepper or Sweet pepper or Green pepper or Shimla mirch is one of the popular solanaceous vegetable crops grown throughout India in open as well as protected environments. It is extensively cultivated in hills of Himachal Pradesh, Uttar Pradesh, Jammu and Kashmir and Nilgiri hills during summer months. As an autumn crop, it extends up to winter months in Karnataka, Maharashtra, Tamil Nadu, Andhra Pradesh, Bihar, West Bengal and Madhya Pradesh. The average annual production of capsicum in India is 1.60 lakh MT from an area of 12,000 ha (NHB, 2012-13).

Capsicum attained a status of high value low volume crop in India in recent years and occupies a place of pride among vegetables in Indian cuisine, because of its delicacy and pleasant flavour coupled with rich content of ascorbic acid along with other vitamins and minerals [1]. Capsicums are used as vegetable as well as condiment. The mature fruits (green, red and yellow) of capsicum are eaten raw (salads) or widely used in stuffings, bakings, pizza and burger preparations.

Cultivation of capsicum under protected structures is gaining momentum due to increased demand for the produce throughout the year. Through there are number of varieties and hybrids available for cultivation, the information relating to performance of different coloured capsicum varieties and hybrids for quality attributes under protected environment is scanty.

Therefore, the present investigation was undertaken to assess the performance of different coloured capsicum varieties and hybrids for quality attributes under 50% shade net.

### Material and Methods

The experiment was conducted during the period from September, 2012-March, 2013 at Horticultural College and Research Institute, Anantharajupet, Y.S.R. District of Andhra Pradesh. The trial was laid out in randomized block design with three replications and eight treatments (four varieties viz., Arka Basant, Arka Gaurav, Arka Mohini and Royal Wonder and four hybrids viz., Angel, Indra, Inspiration and NS-280). The crop was raised under 50% green coloured shade net house of  $250 \text{ m}^2$ . The spacing adopted was  $45 \text{ cm} \times 30 \text{ cm}$  with 4.4 plants  $\text{m}^{-2}$ .

Thirty days old seedlings were transplanted on 15 cm raised beds of 120 cm width. Besides the application of well decomposed farm yard manure at the rate of  $20 \text{ kg m}^{-2}$  along with coco peat ( $1 \text{ kg m}^{-2}$ ), vermicompost ( $1 \text{ kg m}^{-2}$ ) and neem cake ( $200 \text{ g m}^{-2}$ ), a basal dose of chemical fertilizers (5 kg calcium ammonium nitrate, 7 kg single super phosphate and 2 kg muriate of potash  $250 \text{ m}^{-2}$ ) were applied as per recommended dose of fertilizers (80 kg calcium ammonium nitrate, 125 kg single super phosphate and 32 kg muriate of potash  $\text{acre}^{-1}$ ). The fertigation was given twice a week by applying liquid fertilizers (19:19:19, calcium nitrate and potassium nitrate) three weeks after transplanting and was stopped 15 days before final harvest.

Irrigation through drip was given to provide 2-4 l of water per square meter per day depending on stage of crop. Pinching of terminal bud was done at 30 DAT. Plants were trained to 'v' shape to enhance productivity.

The observations were recorded from ten randomly selected plants from each treatment on various quality traits such as ascorbic acid content ( $\text{mg } 100\text{g}^{-1}$ ), capsaicin content (%), total carotenoids (%), TSS ( $^\circ\text{Brix}$ ) and fruit wall thickness (cm). The ascorbic acid content in the fruit was estimated by volumetric method as proposed by Sadasivam and Manickam [2] using 2,6-dichloro phenol-indophenol dye. ASTA method 21.3 [3] was used for determination of capsaicin content in capsicum fruits at marketable stage. Total carotenoids in coloured capsicum varieties and hybrids were estimated as per the procedure developed by Hornero-Mendez and Minguez-Mosquera [4] and total

soluble solids (TSS) ( $^{\circ}$ Brix) with the help of a digital refractometer. Fruit wall thickness was measured with the help of vernier calipers. The data was subjected to statistical analysis as per the methods outlined by Panse and Sukhatme [5].

## Results and Discussion

### Ascorbic acid content ( $\text{mg g}^{-1}$ )

It is evident from data presented in Table 1 that the varieties and hybrids of capsicum differed significantly for ascorbic acid content. High ascorbic acid content ( $179.34 \text{ mg g}^{-1}$ ) was recorded in the hybrid, Angel which was closely followed by the variety, Arka Gaurav ( $170.85 \text{ mg g}^{-1}$ ). The hybrid, Indra and the variety, Royal Wonder recorded the lowest ascorbic acid content of  $76.84 \text{ mg g}^{-1}$  and  $91.75 \text{ mg g}^{-1}$ , respectively.

Generally, the higher ascorbic acid content would increase the nutritive value of capsicums, which would help better retention of colour and flavor. Capsicum varieties and hybrids possessing high

ascorbic acid content are of great demand in export markets as opined by Sweta Rani [6] and Choudhary et al. [7].

### Capsaicin content (%)

Capsaicin content showed non-significant variation among varieties and hybrids of capsicum under 50% shade net (Table 1). Capsaicin content was found negligible in all the varieties and hybrids evaluated and the values ranged from 0.003% (Arka Gaurav) to 0.010% (Arka Basant, Royal Wonder, Angel and Indra). Similar findings were reported in capsicum genotypes by Valsikova and Belko [8], Sood et al. [9] and Choudhary et al. [7].

### Total carotenoids (%)

There was significant difference among varieties and hybrids of capsicum under 50% shade net with respect to total carotenoids (Table 1). Total carotenoids was high in red coloured capsicums compared to yellow and green coloured capsicums.

Treatment	Ascorbic acid content ( $\text{mg g}^{-1}$ )	Capsaicin content (%)	Total carotenoids (%)	TSS ( $^{\circ}$ Brix)	Fruit wall thickness (cm)
Arka Basant	146.00	0.010	0.139	6.83	0.68
Arka Gaurav	170.85	0.003	0.028	8.37	0.67
Arka Mohini	133.33	0.004	0.116	6.06	0.84
Royal Wonder	91.75	0.010	0.001	3.37	1.01
Angel	179.34	0.010	0.047	7.53	0.89
Indra	76.84	0.010	0.001	4.00	1.05
Inspiration	159.32	0.007	0.114	6.35	0.93
NS-280	149.81	0.007	0.178	5.31	0.98
S.Em $\pm$	15.79	0.002	0.01	0.10	0.06
CD (P=0.05)	48.39	N.S	0.02	0.30	0.19

**Table 1:** Quality attributes of different varieties and hybrids of capsicum.

The hybrid, NS-280 which produced red coloured fruits recorded high percentage of total carotenoids (0.178) followed by the varieties viz., Arka Basant (0.139) and Arka Mohini (0.116) which produced orange red and red coloured fruits, respectively. The green coloured capsicum variety, Royal Wonder and the hybrid, Indra had low total carotenoids (0.001%). These results are in conformity with the findings of Aherne et al. [10] and Choudhary et al. [7] in capsicum.

### TSS ( $^{\circ}$ Brix)

Significant variation was observed among varieties and hybrids of capsicum with regard to TSS (Table 1). The variety, Arka Gaurav recorded high TSS ( $8.37^{\circ}$ Brix) followed by the hybrid, Angel ( $7.53^{\circ}$ Brix) and the variety, Arka Basant ( $6.83^{\circ}$ Brix). Low TSS was observed in the variety, Royal Wonder ( $3.37^{\circ}$ Brix) and in the hybrid Indra ( $4.00^{\circ}$ Brix).

TSS is an important quality attribute of capsicum fruit. Increase in this parameter improves the flavour and increases the palatability.

Since capsicum is used for salad making, fruits with high TSS are highly preferred. The variety, Arka Gaurav and the hybrid, Angel were rated high for TSS. Hazarika and Phookan [11] and Sood et al. [9] assessed the quality of tomato and capsicum based on TSS.

### Fruit wall thickness (cm)

The varieties and hybrids of capsicum differed significantly for fruit wall thickness under 50% shade net (Table 1). Maximum fruit wall thickness was observed in the hybrid, Indra (1.05 cm) which was closely followed by the variety, Royal Wonder (1.01 cm) and the hybrid, NS-280 (0.98 cm). The fruit wall thickness was observed minimum in the varieties viz., Arka Basant (0.68 cm) and Arka Gaurav (0.67 cm).

Capsicum fruits are hollow from inside therefore, a thick fruit wall is preferred to help the fruits withstand long distant transportation and retain firmness for a longer period of time. The hybrid, Indra and the variety, Royal Wonder were identified superior with respect to this

trait. These findings are similar to those of Arya and Saini [12], Sweta Rani [6], Valsikova and Belko [8] and Choudhary et al. [7] in bell pepper.

## Conclusion

Based on the results of the present study, it is concluded that the capsicum hybrid, Angel and the variety, Arka Gaurav which produced yellow coloured fruits were rated superior in quality as they recorded higher values of ascorbic acid and TSS. Total carotenoid content was high in the hybrid, NS-280 which produced red coloured fruits. The hybrid, Indra and the variety, Royal Wonder had thick walled fruits and hence suitable for long distant transportation. The capsicums with thick fruit wall also retain firmness for a longer period.

## References

1. Kurubetta Y, Patil AA (2009) Performance of coloured capsicum hybrids under different protected structures. *Karnataka Journal of Agricultural Sciences* 22: 1058-1061.67.
2. Sadasivam S, Manickam (2009) *Biochemical methods*, 3rd ed, New age International (P) limited, Publishers. New Delhi. pp: 193-194.
3. ASTA method 21.3 (2004) Pungency of capsicum and their oleoresins.
4. Hornero-Méndez D, Minguez-Mosquera (2001) Rapid spectrophotometric determination of red and yellow isochromic carotenoid fractions in paprika and red pepper oleoresins. *Journal of Agricultural Food Chemistry*. 49: 3584-3588.
5. Panse VG, Sukhatme PV (1985) *Statistical methods for agricultural workers*. Ind. Council of Agril. Res., New Delhi
6. Sweta Rani (2003) Variability and path coefficient studies in bell pepper (*Capsicum annum L.*) M.Sc thesis, Dr. Y.S. Parmar Univ. Hort. and Forestry, Nauni, Solan. (H.P)
7. Choudhary N, Pathania NK, Singh SP, Pardeep Kumar, Yudhvir Singh (2011) Evaluation of red and yellow capsicum hybrids for quality attributes in naturally ventilated poly house in mid hills of western Himalayas. *Veg Sci* 38: 218-220.
8. Valsikova M, Belko I (2004) Evaluation of sweet pepper (*Capsicum annum L.*) assortment. *Capsicum and Egg plant News letter* 23: 21-24.
9. Sood S, Anil Bindal, Akhilesh Sharma (2007) Genetical study for quality traits in bell pepper (*Capsicum annum L. var. grossum* Sendt). *Ind J Genetics* 67: 95-97.
10. Aherne SA, Sullivan OL, Jiwan MA, Daly T, Brien NM (2010) Content and Bioaccessibility of carotenoids from sweet peppers (*Capsicum annum L.*) *Proc Nutrition Society* 69: 509.
11. Hazarika TK, Phookan DB (2005) Performance of tomato cultivars for poly house cultivation during spring summer in Assam. *Indian Journal of Horticulture* 62: 268-271.
12. Arya PS, Saini SS (1977) Variability studies in salad type peppers. *Progressive Horti* 9: 37-42.