

Ascorbic Acid Contents in Chili Peppers (*Capsicum* L.)

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Abstract

The genus *Capsicum* commonly known as chili pepper is a major spice crop and is almost cosmopolitan in distribution. The nutritive value of chili pepper is largely determined by ascorbic acid content. The fruits at five ripening stages viz., (M₁, M₂, M₃, M₄ and M₅) from seventeen cultivars of *Capsicum annuum* L and one cultivar of *Capsicum frutescens* L were analyzed for ascorbic acid content. Among eighteen genotypes the *C. annuum* var. IC: 119262(CA₂) showed higher ascorbic acid content (mg/100g) FW i.e., 208.0±0.68 (M₁), 231.0±0.66 (M₂), 280.0±0.31 (M₃), 253.0±0.34 (M₄) and 173.7±0.27 (M₅). The study revealed that the gradual increase in ascorbic acid content from green to red and subsequently declined in the lateral stages (red partially dried and red fully dried fruits). The variability of ascorbic acid content in the genotypes suggests that these selected genotypes may be use full as parents in hybridization programs to produce fruits with good nutritional values.

Keywords: *Capsicum* L., ascorbic acid, ripening, 2, 4. dinitrophenylhydrazine

Introduction

A wealth of information and scientific evidences are rapidly accumulating the beneficial effects of wide variety of food components on human health. The most important vitamin in fruits and vegetables is vitamin C 90% of the ascorbic acid in human diet was supplied by them. Chili peppers are the most important vegetable cum spice because of its colour, taste, pungency, flavour and aroma grown in tropical and sub tropical regions of the world. They are extremely popular for the abundance content of vitamin C larger than other vegetables and fruits commonly recognized as a source of this substance (Durust *et al.*, 1997; Osuna-Garcia *et al.* 1998). The ascorbic acid (Vitamin C) content in chili peppers has been reported by few workers (Howard *et al.*, 1994; Lee *et al.*, 1995; Mishra, 2004; Sheela, 2004). Large varietal variations in ascorbic acid content have been reviewed by Manju *et al.* (2002) and Antonious *et al.* (2006). Ascorbic acid content was increases with fruit ripening while, losses during post harvest handlings (Martinez *et al.*, 2005). Despite many reports of ascorbic acid content in chili peppers is inadequate. There fore the present study is taken up to estimate the content of ascorbic acid during ripening in eighteen genotypes of chili peppers (*Capsicum* L) and to select genotypes having high content of ascorbic acid as parents in breeding programs.

Materials and methods

Seventeen cultivars of *C. annuum* L and one cultivar of *Capsicum frutescens* L were grown in randomized design

with three replicates at the experimental farm of Andhra University, Visakhapatnam. The healthy fruits were harvested at five ripening stages viz., Green (M₁), Breaker (M₂), Red (M₃), Red partially dried (M₄) and Red fully dried (M₅). The fruits were washed with tap water and cut into small pieces and homogenized with the help of mortar and pestle by adding 5 ml of 4% oxalic acid. The homogenates were centrifuged at 5000 rpm for 10 minutes then the supernatants were filtered with 541 Whatmann filter paper the obtained residues were made up to 25 ml with 4% oxalic acid. The ascorbic acid content was estimated by using 2, 4. dinitrophenylhydrazine reagent in conjunction with spectrophotometer at 540 nm (Sadasivam and Manickam, 1992) five samples from each lot were analyzed.

Results and discussion

From the (Tab. 1 and Fig. 1) shows that a gradual increase of ascorbic acid content from green to red ripening while, decreased in the lateral stages (i.e., red partially dried and red fully dried) these results were agreed according to the data reported by Osuna- Garcia *et al.* (1998) and Martinez *et al.* (2005). The genotypes showed considerable variation in ascorbic acid content ranged from 44.3mg to 280mg/100g FW and were categorized under hot peppers in agreement with previous observations (Howard *et al.*, 1994; Lee *et al.*, 1995; Manju *et al.*, 2002; Antonious, *et al.* 2006). Among the eighteen genotypes *C. annuum* var.IC: 119262(CA₂) showed highest ascorbic acid content in all the ripening stages i.e., 208.0±0.68 (green), 231.0±0.66 (breaker), 280.0±0.31 (red), 253.0±0.34 (red partially dried) and 173.7±0.27 (red fully dried) while,

Tab. 1. Mean ascorbic acid contents in eighteen genotypes of chili peppers (*Capsicum* L.) at five ripening stages.

Genotype	Ascorbic acid content mg/100g of fruit fresh weight				
	Stage of ripening				
	Green (M ₁)	Breaker (M ₂)	Red (M ₃)	Red partially dried (M ₄)	Red fully dried (M ₅)
<i>C.annuum</i> var. IC:119243 (CA ₁)	122.8±0.89	139.0±0.17	197.5±0.18	168.5±0.65	103.2±0.38
<i>C.annuum</i> var. IC:119262 (CA ₂)	208.0±0.68	231.0±0.66	280.0±0.31	253.0±0.34	173.7±0.27
<i>C.annuum</i> var. IC:119264 (CA ₃)	157.0±0.64	180.2±0.38	234.0±0.41	205.0±0.70	128.5±0.18
<i>C.annuum</i> var. IC:119267 (CA ₄)	107.0±1.30	136.8±0.29	180.6±0.36	149.0±0.96	84.0±0.66
<i>C.annuum</i> var. IC:119578 (CA ₅)	150.6±0.48	175.0±0.65	227.0±0.71	200.0±0.95	133.8±0.95
<i>C.annuum</i> var. NIC:20901 (CA ₈)	130.0±0.95	140.5±0.63	210.5±0.20	185.0±0.35	110.0±0.65
<i>C.annuum</i> var. IC:147719 (CA ₁₀)	135.3±0.33	143.0±0.43	211.3±0.21	190.3±0.33	109.8±0.56
<i>C.annuum</i> var. EC:399557 (CA ₁₃)	137.0±0.28	159.0±0.67	215.8±0.31	183.4±0.64	111.0±0.40
<i>C.annuum</i> var. G-4 (CA ₁₆)	171.3±0.31	203.0±0.42	250.0±0.96	225.8±0.26	142.7±0.24
<i>C.annuum</i> var. CA-960 (CA ₁₇)	160.5±0.35	184.0±0.41	239.6±0.20	213.5±0.65	136.0±0.11
<i>C.annuum</i> var. Pusa jwala (CA ₁₈)	194.0±0.63	224.0±0.64	267.0±0.63	238.2±0.57	168.6±0.65
<i>C.annuum</i> var. X-235 (CA ₁₉)	148.5±0.32	170.8±0.29	225.0±0.96	205.0±0.31	123.0±0.95
<i>C.annuum</i> var. NP-46A (CA ₂₀)	173.0±0.31	210.0±0.79	252.5±0.35	227.6±0.66	149.8±0.40
<i>C.annuum</i> var. LCA-206 (CA ₂₁)	176.9±0.36	216.7±0.11	254.0±0.98	235.0±0.70	152.0±0.40
<i>C.annuum</i> var. Trupti (CA ₂₂)	182.5±0.27	219.0±0.68	261.0±0.40	249.0±0.35	160.0±0.42
<i>C.annuum</i> var. PCI (CA ₂₅)	99.3±0.54	134.0±0.32	172.5±0.15	150.9±0.42	73.2±0.63
<i>C.annuum</i> var. Surya muchi cluster (CA ₂₇)	86.6±0.20	129.5±0.20	165.0±0.43	149.2±0.34	58.5±0.41
<i>C. frutescens</i> (CF)	72.0±0.64	96.0±0.65	137.5±0.20	104.6±0.21	44.3±0.95

* Significant at 1% level

the lowest content was recorded in *C. frutescens* (CF) i.e., 72.0±0.64 (M₁), 96.0±0.65 (M₂), 137.5±0.20 (M₃), 104.6±0.21 (M₄) and 44.3±0.95 (M₅) mg/100g fresh

weight. Based on the mean ascorbic acid contents the eighteen genotypes were classified into three categories viz., low (0-100mg/100g FW), medium (101- 200mg/100g

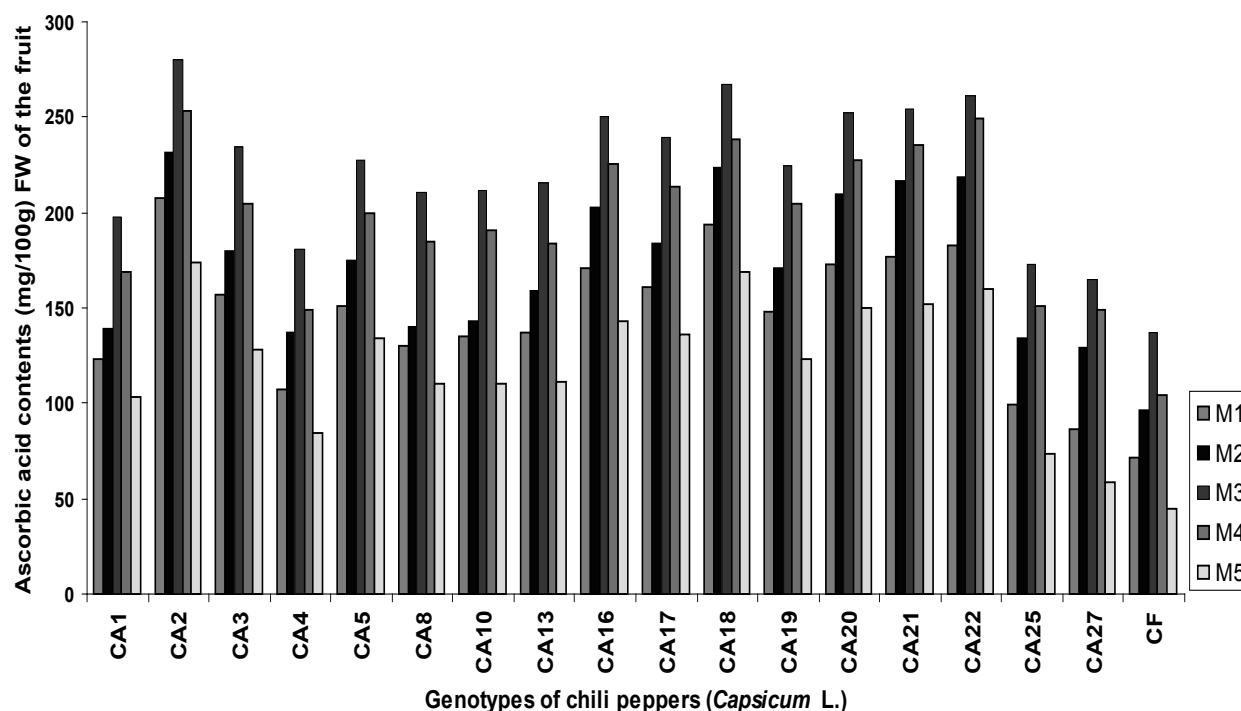


Fig.1. Ascorbic acid contents in eighteen genotypes of chili peppers (*Capsicum* L.) at five ripening stages. Bars mean value of ascorbic acid content.

FW) and high (201- 300mg/100gFW) however, the medium category was most frequently described by Khadi *et al.* (1987) and Simone *et al.* (1997). High content of ascorbic acid was pronounced in red ripening and most of the chili peppers were fall under medium category of ascorbic acid content however, the lowest contents were recorded in red partially dried and red fully dried fruits. This may be due to decrease in the moisture content in fruits, a similar view point is also shared by Osuna-Garcia *et al.* (1998), Lalitha Kumari *et al.* (1999), Gnayfeed *et al.* (2001), Robi and Sreelatha Kumari (2004) and Martinez *et al.* (2005) in diverse cultivars of *Capsicum* L. Our results suggests that six genotypes (i.e., CA₂, CA₁₈, CA₂₂, CA₂₁, CA₂₀ and CA₁₆) (Tab. 1) showed best ascorbic acid content ranged from 171.3 to 280 mg/100g FW in M₁, M₂, M₃, M₄ and M₅ fruits can be recommended in breeding programs to produce high ascorbic acid content varieties.

Conclusions

The present study reports that the ascorbic acid content in eighteen genotypes of *Capsicum* L showed variation from one another, among the genotypes CA₂ represents more ascorbic acid. The study revealed that ascorbic acid content increased from green to red while, decreased in red partially dried and red fully dried fruits.

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