



## Vitamin C (Ascorbic Acid) - The Powerful Antioxidant for Health Benefits from Daily Intake of Chilli Pepper and Tomato Fruits

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### ABSTRACT

Total ascorbic acid contents in both chilli pepper and tomato fruits are reported. The extracts of hot chilli pepper samples were obtained with 3% (v/v) acetic acid and were subjected to separate on RP-HPLC. Dehydroascorbic acid (DHA) in the chilli samples was determined as difference in total ascorbic acid after DHA reduction with dithiothreitol. The contents of ascorbic acid and DHA in the chilli samples were ranged from 1.31-99.58 and 0.13-0.74 mg/100 g DW, respectively. While total contents of ascorbic acid in some tomato extracts determined by modified method of 2,6-dichlorophenolindophenol were 54.22 mg/100 g DW in average.

**Keywords:** Vitamin C, Ascorbic acid, Chilli pepper, Tomato, Colorimetry

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### INTRODUCTION

Ascorbic acid is a good indicator of retention of nutritional quality for vegetables and fruits. It can participate in browning effect through the ascorbic acid browning reactions, leading to the formation of a wide variety of end products [1,2]. It is reversibly oxidized to form dehydroascorbic acid (DHA). Since DHA can be easily converted into ascorbic acid, it is important to measure both ascorbic acid and DHA [3]. The content of ascorbic acid during paprika processing was determined. Total vitamin C in vegetables and fruits were also reported [4,5].

Chilli peppers (*Capsicum annuum* L.) are popular spices in many parts of the world, valued for their sensory attributes of color, pungency and flavor. They are economically important because of the vast consumption of the diverse varieties. Food industry is the largest user of capsicums, where they are used as coloring and flavoring agents in sauces, soups, processed meats, snacks, candies, soft drinks and alcoholic beverages [6]. Also, they are a good source of vitamin C and E as well as provitamin A and carotenoids with well-known antioxidant properties [7]. Their nutritional quality is related primarily to its content of ascorbic acid and DHA. The decomposition of ascorbic acid, together with non-enzymatic browning, is the main deteriorative reaction that occurs during storage [8]. Color is one of the most important qualities of the chilli peppers, which affects the consumers' preferences [9].

The determination of ascorbic acid in tomato (*Lycopersicon esculentum* Mill) and bell pepper (*Capsicum annuum*) during development, maturation and senescence was reported [10]. HPLC was used for evaluation of ascorbic acid content in fresh-cut bell peppers at different intervals of storage [11]. Navarro et al. [12] studied the change in the content of ascorbic acid in pepper fruits at different ripening stages, as affected by salinity. HPLC technique was used for quantitation of ascorbic acid in ripe fruits of five *Capsicum annuum* cultivars, grown in Turkey [13]. The ascorbic acid contents were found in various fruits such as fresh *Embllica officinalis* fruits (*Embllica officinalis*), quava fruits (*Psidium guajava*), amaranth leaves (*Amaranthus gangeticus*) and green chilli (*Capsicum annuum*) [14].

#### Ascorbic acid contents in hot chilli peppers

From our research, some hot chilli pepper fruits were subject to be studied. These chilli peppers were availablely purchased from local fresh market in Khon Kaen, Thailand and stored in plastic bag at 4°C prior to determination of ascorbic acid, DHA and/or total ascorbic acid [15]. The results are compiled in Table 1.

**Table 1:** The contents of ascorbic acid, dehydroascorbic acid and total ascorbic acid in hot chilli pepper samples

Sample No.	Contents (mg/100 g DW)		
	Ascorbic acid	Dehydroascorbic acid	Total ascorbic acid
1	66.08	N.D.	-
2	86.72	N.D.	-
3	23.46	N.D.	-
4	64.17	0.21	64.43
5	99.58	0.61	100.5
6	73.85	0.48	-
7	26.17	0.16	26.37
8	49.48	N.D.	-
9	24.09	N.D.	-
10	12.63	N.D.	-
11	22.56	0.21	22.79
12	15.57	0.23	15.81
13	6.45	0.45	6.93
14	20.96	0.25	21.24
15	13.47	0.13	-
16	1.31	0.74	2.59

N.D.: not detectable; - :not determined

**Ascorbic acid contents in tomatoes**

Some tomato samples were also obtained from local fresh market in Khon Kaen, Thailand. The samples were pretreated as a freeze-dried powder prior to extraction. Each of the freeze-dried tomato samples (0.5 g) was extracted with 20 ml of 3% (w/v) metaphosphoric acid followed by ultrasonication for 20 min. The extract was centrifuged at 4000 rpm for 10 min. [16]. Ascorbic acid was determined in accordance with the slightly modified method of 2,6-dichlorophenolindophenol [17]. The amounts of ascorbic acid in some local varieties of tomatoes are also shown in Table 2 [18,19]. The obtained results were found in the range from 33.32 to 66.46 mg/ 100 g DW. The ascorbic acid content in Thapthim Daeng variety (66.46 mg/ 100 g DW) was higher than other varieties, while that of Mo Kho 40 sample gave the lowest (33.32 mg/ 100 g DW).

**Table 2:** Ascorbic acid contents in the extracts of some varieties of tomatoes

Variety of tomato sample	Contents of ascorbic acid (mg/100 g DW)
Black Cherry Kham Kaen	56.11
Lai Ko Red	45.88
Mani Siam	50.3
Mani Thapthim	64.5
Mo Kho 40	33.32
Phuang Thong 80	53.51
Red Sweet	50.58
Sida 01	63.69
Tha-ap-green	62.99
ThapthimDaeng	66.46
Rashinee	54.2
Puang	62.9
Sida 02	37.59
Cherry	58.51
Tou	52.8

**CONCLUSION**

The contents of ascorbic acid, dehydroascorbic acid and total ascorbic acid in some hot chilli pepper samples available in local fresh markets were widely found ranging from 1.31 - 99.58, 0.13 - 0.74, and 2.59-100.5 mg/100 g DW, respectively. Total ascorbic acid contents found in some local varieties of tomato fruits were ranged from 33.32 - 66.46 mg/100 g DW. It is, therefore, shown that both kinds of chilli pepper and tomato fruits contain very useful phytochemicals attributing for nutritive functional vegetables and fruits for daily intake, since ascorbic acid is long time known as a powerful antioxidant for human being.

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