STABILITY OF VITAMIN C IN TOMATO JUICE

AHMED FAHMY MABROUK, ABDEL AZIZ HUSSEIN, AND HUSSEIN AREF[1]
Department of Agricultural Industries, Faculty of Agriculture, Cairo University, Giza, Egypt

The scientific literature contains many references pertaining to factors influencing the nutritive value of fruits and vegetables. A considerable proportion relate to the effect of processing and of storage on the vitamin content of these foods.

The nutritive value of tomato juice depends largely on its ascorbic acid content. Prevention of the loss of ascorbic acid through enzymatic oxidation is one of the most difficult problems. Naito and Isimaru (1938) reported the presence of ascorbase in tomatoes. Later, Wokes *et al.* (1943) showed that the oxidase activity is greatest in both the unripe and ripe skin and the least in the juice. Kardo-Sysoeva *et al.* (1938) pointed out the presence of a stabilizer or a protective factor for ascorbic acid in the tomato pulp. The same investigators also showed that such stabilizer may be inactivated by boiling. On the other hand, Griffee (1943) observed no losses of vitamin C during preparation of tomato juice.

The present work is a part of a comprehensive program of study concerning the behavior, adaptability, composition, crop yield, etc., of many imported varieties of tomatoes. This work has been conducted to find out the rate of vitamin C destruction in tomato juice pressed out of fully ripe preheated and non-heated tomatoes. The heating was carried in live steam for either five or fifteen minutes.

MATERIALS AND METHODS

Samples of 6 imported varieties of tomatoes, raised on the Faculty of Agriculture farm, namely New Stone, Sunrise, Norton, Victor, Tomato California First and Early, and Sutton's Best of All, were used in this work. Samples were picked, sorted and stored at 5°C till the next day and, then, analysed for ascorbic acid content over a period of two hours. The method used was that described by the Association of Vitamin Chemists, Inc. (1951). Ascorbic acid content was expressed as mg. per 100 g. tomato juice. In this investigation, samples of 16–20 tomato fruits were used for analysis as recommended by Mabrouk (1950).

EXPERIMENTAL RESULTS

Tables 1 and 2 and figures 1 and 2 show the average results of three experiments.

DISCUSSION

The results show a gradual but slow decrease in the vitamin C content of the non-heated juice; in the 6 tested varieties the decrease ranged from 30 to 65 percent over a period of 2 hr. On the other hand, heating caused a sudden large decrease in the juice amounting to approximately 90 percent. The residual reducing effect of the pre-heated juice remained constant over the tested period.

The gradual and rather slow rate of Vitamin C destruction in the non-heated tomato juice probably indicate the presence of a vitamin C stabilizer. In the meantime, the sudden decrease in the vitamin C content of juice pressed out from pre-heated tomatoes might indicate the destruction of such a stabilizer. The residual reducing value of the juice after heating may be due to the presence of the so-called reductones as suggested by Roe *et al.* (6).

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[1]Present address: Vice-President, Cairo University, Egypt.

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TABLE 1

Stability of Vitamin C in Tomato Jiuce at Room Temperature

Time Minute	ASCORBIC ACID MGM/100 GM. New Stone	Sunrise	Norton	Victor	Tomato Calif. First and Early	Sutton's Best of All
0	18.02	19.43	20.91	14.43	24.85	26.75
5	16.90	18.44	19.85	10.77	22.67	25.27
10	16.90	18.22	19.71	9.29	21.89	24.78
15	15.98	17.95	19.50	8.25	21.33	24.50
20	15.91	17.74	19.36	8.17	20.63	24.50
30	15.49	17.60	19.08	7.88	20.42	24.08
40	14.92	17.25	18.58	7.46	20.06	24.08
50	14.92	16.90	17.74	6.83	19.85	23.23
60	14.36	16.60	17.32	6.62	19.01	23.23
75	14.08	16.32	16.61	6.48	18.75	22.81
90	13.60	16.04	16.05	5.42	18.09	22.67
105	13.09	15.12	15.98	5.00	17.32	22.13
120	12.67	14.08	15.28	.....	16.33	.....

TABLE 2

Stability of Vitamin C in Heated Tomato Juice

Time Minute	ASCORBIC ACID MGM/100 GM. Norton (a) 20.91 mgm/100 gm before heating	Victor (b) 14.43 mgm/100 gm before heating
0	4.05	1.40
5	4.05	1.40
10	4.05	1.40
15	4.05	1.40
20	4.05	1.40
30	4.05	1.40
40	4.05	1.40
50	4.05	1.40
60	4.05	1.40
75	4.05	1.40
90	4.05	1.40
105	4.05	1.40
120	4.05	....

(a) The fruits were heated for five minutes before juice extraction.
(b) The fruits were heated for fifteen minutes before juice extraction.

SUMMARY

A slow rate of vitamin C destruction was observed in the case of non-heated tomato juice; while pre-heating the fruits was accompanied by a sudden great decrease in their ascorbic acid content (approximately 90%).

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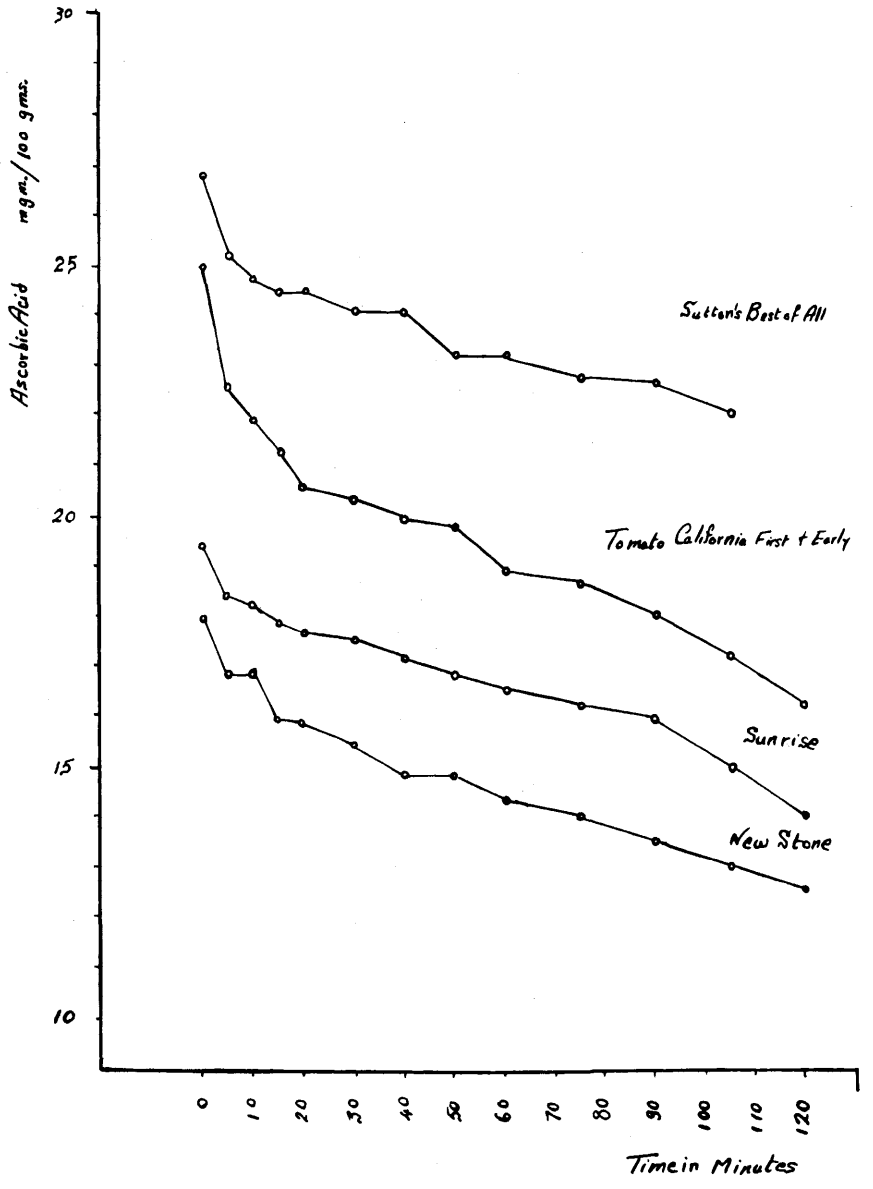

FIGURE 1. Ascorbic Acid Destruction in Non-heated Tomato Juice.

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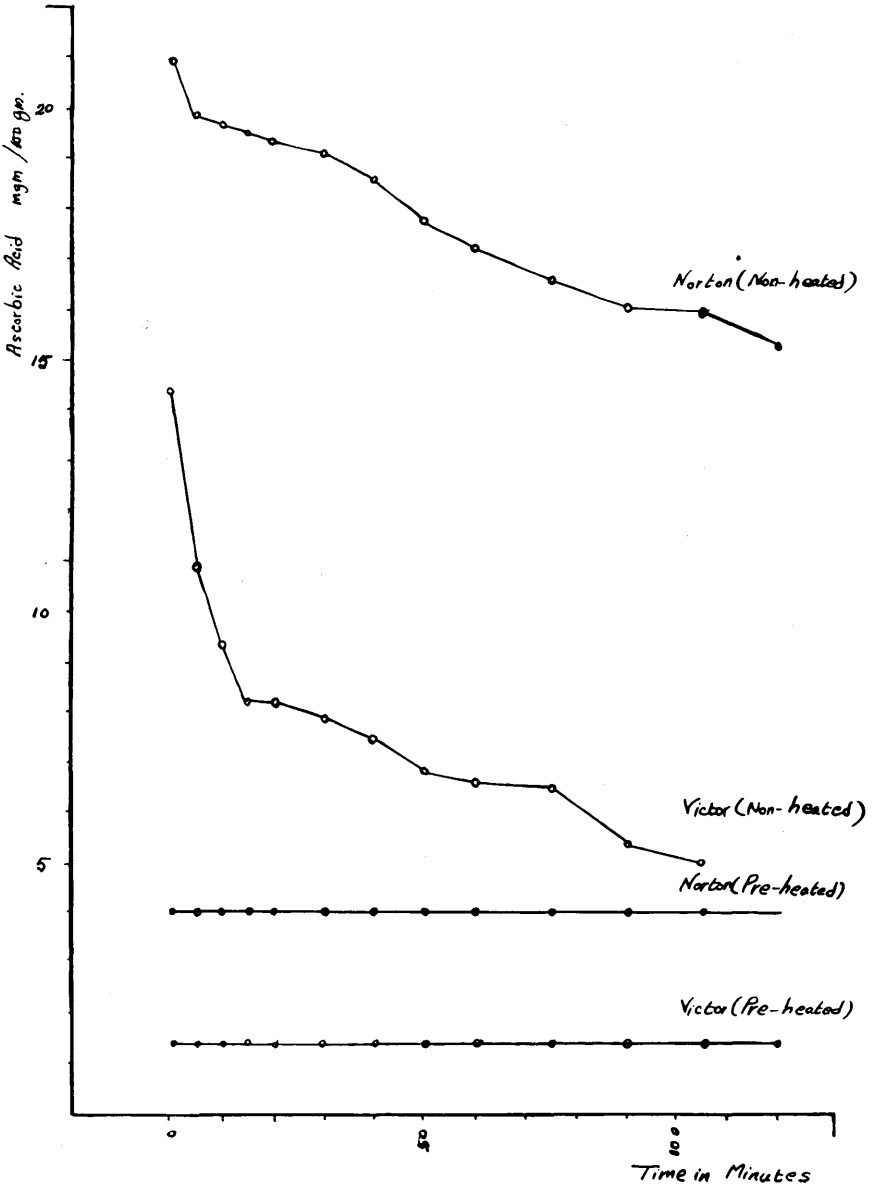

FIGURE 2. Ascorbic Acid Destruction In Non-heated and Pre-heated Tomato Juice.

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