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RESEARCH PAPER

Effect of Different Storage Conditions on Ascorbic Acid Content in Tomato and Cabbage

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Abstract

Ascorbic acid commonly known as vitamin C is essentially required human beings for their health and longevity. However, Due to inability of man to synthesize ascorbic acid, it has to be continuously supplied through the diet. The present study conducted with an objective to examine the relative efficacy of different storage conditions in retaining the ascorbic acid content in fresh vegetables. viz tomato and cabbage The vegetable were kept in both perforated and non -perforated polythene bags under light, dark and refrigerated condition. The ascorbic acid was analyzed with titration method from the day of procurement from market till eighth day on every alternative day. A gradual decrease in ascorbic acid content in both the vegetables during storage took place. The vegetables kept in non perforated polythene bags under refrigeration and dark retained vitamin C most when compared to other storage conditions.

Keywords: Ascorbic acid, storage, perforated and non-perforated polythene bags, storage, refrigeration

Fresh fruits and vegetables are the major source of vitamin C in our diets. Vitamin C or ascorbic acid is a least stable water soluble vitamin. It has long been advocated to be essential for human health and longevity. It acts as a strong reducing agent in the hydroxylation reaction during collagen formation which accounts for twenty five per cent of total body protein (ARC/MRC, 1974). It also plays an important role in several aspects of body immune system. The reduced form of ascorbic acid generates dehydroascorbate spontaneously by oxidation, which ultimately looses its nutritional value.

The recommended dietary allowances for ascorbic acid in India is 40 mg/day for adults except the lactating women, require twice of the normal and 20-25 mg/day for children (ICMR, 1989). It is established that the consumption of 75-125 gm leafy vegetables, 85 gm other vegetables and 85 gm roots and tubers per day, is able to meet these requirements.

Succulent vegetables contain a very high percentage of moisture, likewise; 90-92 percent in cabbage and 95-98 percent in tomatoes. Consequently, vegetables exhibit relatively high metabolic activity when compared to other plant derived. This metabolic activity continues even after harvest and as a result vegetable start losing their vitality, turgidity and food value particularly vitamin C on storage.

Vegetables provide an appreciable amount of vitamin C. Among many vegetable crops- Cabbage and Tomato are estimated most for their many virtues. They are good source of vitamin C. These vegetables are highly perishable in nature and require proper and careful post harvest handling and storage.

It is a general practice in home to keep the market purchased fruits and vegetables in plastic basket, bag, crate etc. for several days, without knowing the losses of ascorbic acid and other nutrients that takes place during storage. Therefore, it is quiet necessary to know the quantity of ascorbic acid lost during storage and the ways to minimize them.

The present study was conducted to determine the content of ascorbic acid in fresh vegetables (Cabbage and Tomato)assess the effect of various storage conditions on their ascorbic acid content

Materials and Methods

Raw material and the location

The present study was carried out at Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi during winter season.

To observe the changes in vitamin C content under different storage conditions, two commonly consumed vegetables namely cabbage and tomato were taken. They were collected at the commercial maturity stage.

Preparation of experimental materials for storage

Prior to keep the vegetables for experimentation, they were washed and cleaned to . The following were the delcited steps it

collection of fresh vegetables,
sorting out and removal of non edible parts;
washing under tap water;
removal of excess water;
wiping with clean muslin cloth and
storage under various conditions

(a) Storage material Thirty six polythene bags of known thickness were taken. Eighteen polythene bags were kept non-perforated while remaining were made perforated. A total of fourty perforations were made, twenty on each side of the polythene bags 3 mm diameter.

Number and amount of samples: One weighed head of cabbage and six fruit of tomato replicated three times, were kept under each type of polythene bag. The poly bags were made air tight with rubber bands.

Storage conditions: The vegetables were kept in six storage conditions:

dark—perforated polythene bag;

dark— non-perforated polythene bag;

light—perforated polythene bag;

light—non-perforated polythene bag;

refrigerator—perforated polythene bag and

refrigerator—non-perforated polythene bag

Chemical analysis

The chemical analysis for ascorbic acid was done by the titration method using 2,4-dichlorophenolen-dophenol dye solution recommended by A.O.A.C (1984).

Statistical analysis

Statistical analysis for derivation of results and interferences from observations involved mean, standard deviation and analysis of variance.

Results and Discussion

Tomato

It is evident from table 1 that vitamin C content of the tomatoes decreased with the advancement of the storage period, irrespective of their treatments. The ascorbic acid content of fresh by purchased tomatoes ranged between 21.62 to 27.02 mg/100gm with a mean of 24.13 ± 2.27 mg/100gm. It started declining in perforated polythene bags from first, fourth and second day in light, dark and refrigerated conditions respectively where as in non perforated bags the deterioration started after second day in both light and dark condition while it was from fourth day in refrigerated condition. Maximum of losses occurred when tomatoes were kept in non- perforated in light and minimum loss to be under non- perforated dark condition where on eighth day a total loss was found 31.84 per cent. Giradldo (1977) also reported that the ascorbic acid content of tomatoes packed in sealed bags retained up to four days. The underlying cause may be

Table:1 Average ascorbic acid (mg/100gm) in tomato and change under different storage conditions

Storage condition	Time interval					% difference in ascorbic acid during storage	F-value	P-level	LSD
	Zero day (T0)	Second day (T2)	Fourth day (T4)	Sixth day (T6)	Eighth day (T8)				
LIGHT									
1.Perforated polythene bag	24.32	20.72*	18.69	17.11	13.06	46.29	61.66	0.00	2.09
2.Non perforated polythene bag	27.02	25.00	21.17*	19.14	13.06	51.66	88.81	0.00	2.27
DARK									
1.Perforated polythene bag	23.87	22.52	20.72	16.66*	12.16	49.05	35.12	0.00	3.16
2.Non perforated polythene bag	26.35	24.55	22.29*	20.04	17.96	31.84	22.98	0.0001	2.76
REFRIGERTED									
1.Perforated polythene bag	21.62	20.49	18.46*	16.66	13.51	37.51	16.19	0.0002	3.14
2.Non perforated polythene bag	21.62	20.49	19.14	18.01*	14.64	32.28	12.94	0.0006	2.93
Mean± SD	24.13±2.27	22.29±2.07	20.07±1.54	17.93±1.40	14.05±2.07	41.43	—	—	—

*Indicate from which day significant change observed

P-Probability level

LSD-least significant difference

that the polythene package restricts the permeation of gases thereby retard the process of respiration and transpiration and helps in increasing the shelf life and quality retention.

Cabbage

Cole crops especially cabbage is known as a rich source of vitamin C (Gopalan *et al.,* 1988). In cabbage, the content of ascorbic acid ranged between 52.29-57.75 mg/100gm with a mean of 54.53 ± 1.91 mg/100gm when purchased fresh from the market (Table 2). Just like tomato, vitamin C started declining in cabbage when stored. There was a consequent change in ascorbic acid content from the second day when perforated and non perforated bags were kept under light condition. On the other hand, in dark condition the change was observed from fourth day. In refrigeration non-perforated polythene bag performed better than perforated polythene bag. The per cent decrease in ascorbic acid ranged from 47.81 to 66.53 with a mean of 56.26 per cent. The table also revealed that for the storage of cabbage should be done in refrigerator in non-perforated polythene bags. Chikkasubbanna *et al.* (1991) also reported the optimum storage life of lettuce heads packed in polythene bags without ventilation (7.08 days).

Summary

It was observed that the ascorbic acid content was considerably reduced during storage in fresh vegetables. So, it is necessary for home makers to utilize the vegetables as soon as possible to ensure better vitamin C intake. Non-perforated polythene bags were found better than perforated polythene bags in retaining ascorbic acid. To minimize the vitamin C losses, tomatoes should be kept in non-perforated polythene bags in dark where as cabbage in refrigerated condition.

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