

# Study on the effect of different storage conditions on ascorbic acid content in fresh fruits (Guava and Lime)

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**SUMMARY :** Post harvest losses are severe problem in the handling and marketing of highly perishable fruits and vegetables. These losses can be substantially reduced by adopting proper handling, packaging and storage. The present study was carried out to analyze ascorbic acid content in fresh guava and kagzi lime and the effect of packaging and various storage conditions on ascorbic acid. For the study, three storage conditions including light, dark and refrigeration were chosen and the fruits were kept in perforated and non perforated polythene bags in each condition. It was observed that when guava and kagzi lime were stored, a significant decrease in ascorbic acid was observed. Guava performed best when stored in non perforated polythene bag kept under light condition whereas kagzi lime retained maximum ascorbic acid when it was stored in perforated polythene bag under light condition.

**Key Words :** Ascorbic acid, Storage, Refrigeration

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**F**resh fruits and vegetables constitute the main source of vitamins especially ascorbic acid in India, where the food habit of majority of population is vegetarian. Vitamin C or ascorbic acid is a least stable water soluble vitamin. The reduced form of ascorbic acid generates dehydroascorbate spontaneously by oxidization, which ultimately loses its nutritional value.

Succulent fruits contain a very high percentage of moisture consequently they exhibit relatively high metabolic activity when compared to other plant derived foods such as seeds etc. This metabolic activity continues even after harvest and fruits start losing their vitality, turgidity and food value particularly vitamin C on storage. Being a highly perishable commodity, fruits require proper and careful post harvest handling and storage. In order to regulate the marketing and to

make fruits available during off season for longer duration, proper storage is quite essential. It is a general practice in home to keep the market purchased fruits in plastic packets, bag, crate etc. for several days, without knowing the losses in ascorbic acid and other nutrients that are taking place during storage. Therefore, it is quite necessary to know the quantity of ascorbic acid lost during storage and what should be the proper method to minimize them.

## Objective of the study:

In view of the above facts, the present work was taken with the objective:

To find out the effect of different storage conditions on the ascorbic acid content of fresh fruits namely guava and kagzi lime.

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## EXPERIMENTAL METHODS

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

### Selection of fruits:

To observe the changes in ascorbic acid content under different storage conditions, two commonly consumed vitamin C rich fruits namely guava and kagzi lime were procured from the local market.

### Preparation of experimental material for storage:

Prior to keeping the fruits for experimentation, they were washed thoroughly and cleaned to reduce the chances of extra losses and rotting. After removal of excess water, the fruits were wiped with clean muslin cloth and stored under various conditions.

### Storage of experimental material:

#### Preparation of polythene bags:

Thirty six polythene bags of known thickness were taken in which eighteen were made perforated while remaining kept unperforated. A total of 40 holes were made, twenty on each side of polythene bags with the help of a glass rod having three mm diameter.

#### Number and amount of sample:

Six fruits of kagzi lime and guava replicated three times were kept in each type of polythene bag separately. The polythene bags were made airtight with rubber bands.

### Storage conditions for experiment:

The fruits packed in polythene bags were kept under following conditions:

- Dark (Perforated and non perforated polythene bags)
- Light (Perforated and non perforated polythene bags)
- Refrigerator (Perforated and non perforated polythene Bags)

Thus each kind of fruit was stored in six conditions.

### Chemical analysis of ascorbic acid:

Ascorbic acid of fruits was analyzed on alternate days:

zero day ( $T_0$ ) after purchase, second day ( $T_2$ ), fourth day ( $T_4$ ), sixth day ( $T_6$ ) and eighth day ( $T_8$ ). The analysis was done according to the method recommended by AOAC (1975) through titration method with the use of dye 2,6 di-chlorophenol endophenol.

### Statistical analysis:

The data obtained were finally analyzed for average, percentage and analysis of variance (ANOVA).

## EXPERIMENTAL FINDINGS AND ANALYSIS

The mean ascorbic acid content of the guava fruits purchased from market ranged between 261.48mg/100g to 291.11mg/100g with an average of 276.72mg/100g. The data obtained from the study revealed that with the advancement of the storage period, the ascorbic acid content of guava fruits underwent a gradual and significant decrease irrespective of the type of packaging and the condition of storage (Table 1). However, an exception was observed when the fruits were kept in non perforated polythene bags under light condition. In this condition, upto the eighth day of storage only 12.51 per cent loss in ascorbic acid content of guava was recorded. On the other hand, when guava fruits were stored in perforated polythene bag under similar condition, highest decrease of 38.68 per cent in ascorbic acid was observed. Earlier studies also revealed that guava fruits can be stored for only 2-4 days at room temperature and several weeks at the temperature between 3.5<sup>o</sup> to 7<sup>o</sup> C (Vazquez *et al.*, 1990) but damage when kept at 0<sup>o</sup>C (Wills *et al.*, 1983). The loss in ascorbic acid may be owing to its susceptibility to enzymatic and non enzymatic oxidation.

Table 2 indicates that in the fresh fruits of kagzi lime had ascorbic acid content ranged between 54.17 to 61.17mg/100g with an average of 58.39mg/100g. It can also be depicted that the deterioration starts in fruits gradually from the day of storage and speedily occurred with increase of storage time. The

**Table 1: Average ascorbic acid content (mg/100g) in guava under different storage conditions at various time intervals**

Storage conditions	Time Interval					Decrease in ascorbic acid (%)	F value	P	LSD
	Zero day ( $T_0$ )	Two days ( $T_2$ )	Four days ( $T_4$ )	Six days ( $T_6$ )	Eight days ( $T_8$ )				
<b>Ligh</b>									
Perforated polythene bag	291.11	283.22	251.82	185.91	178.49	38.68	18.16	0.0001	48.99
Non perforated polythene bag	287.03	281.48	268.52	255.87	251.11	12.51	NS	-	-
<b>Dark</b>									
Perforated polythene bag	264.42	257.01	211.84	203.70	191.83	27.45	5.22	0.0156	56.35
Non perforated polythene bag	269.63	249.62	243.69	228.88	217.77	19.23	11.80	0.0008	22.74
<b>Refrigerator at low temp (10°C)</b>									
Perforated polythene bag	261.48	207.39	194.06	188.89	179.99	31.16	3.67	0.0435	66.35
Non perforated polythene bag	286.66	271.84	217.02	208.50	196.65	31.39	7.66	0.0043	57.26

NS=Non-significant

**Table 2 : Average ascorbic acid content (mg/100g) in kagzi lime under different storage conditions at various time intervals**

Storage conditions	Time interval					Decrease in ascorbic acid (%)	F value	P	LSD
	Zero day (T <sub>0</sub> )	Two days (T <sub>2</sub> )	Four days (T <sub>4</sub> )	Six days (T <sub>6</sub> )	Eight days (T <sub>8</sub> )				
<b>Light</b>									
Perforated polythene bag	54.17	50.83	48.75	48.75	39.17	27.69	5.25	0.0153	9.57
Non perforated polythene bag	61.17	59.58	56.67	50.00	38.33	37.33	51.44	0.0000	5.10
<b>Dark</b>									
Perforated polythene bag	60.00	56.67	51.67	41.25	30.83	48.61	98.19	0.0000	4.74
Non perforated polythene bag	55.00	52.92	50.42	35.93	28.08	48.94	49.41	0.0000	6.60
<b>Refrigerator at low temp (10°C)</b>									
Perforated polythene bag	59.58	54.92	46.75	37.92	20.88	64.95	78.13	0.0000	6.81
Non perforated polythene bag	60.42	57.08	53.33	46.67	28.75	52.41	70.84	0.0000	5.85

decrease in ascorbic acid was recorded between 27.69 to 64.95 per cent upto the eighth day of storage. Among all the conditions, fruits of kagzi lime when kept in perforated polythene bags under light retained maximum ascorbic acid and was found to be the best method for its storage. This may be due to low moisture content inside the bag arresting the favourable condition for invasion of micro-organism to the fruit. The worst performance was observed in case the fruits when kept in perforated polythene bag under refrigerated condition where kagzi lime lost 64.95 per cent of its ascorbic acid content.

### Conclusion:

On the basis of the findings of the present investigation, following conclusion may be drawn:

- Guava and kagzi lime are perishable in nature and, therefore, require quick disposal and utilization.
- To ensure the minimization of post harvest loses, there is largest need for exploring the possibility of utilization of these fruits into processed products.

- Ascorbic acid content of fruits and vegetables decreased considerably in storage with an increase in storage period.

- Best storage condition for guava in non perforated polythene bags kept under light condition whereas kagzi lime kept in perforated polythene bags under light condition showed maximum storage life.

### LITERATURE CITED

- A.O.A.C. (1975). *Official methods of analysis*. 15<sup>th</sup> Ed. Association of Official Analytical Chemist. Washington D.C. (U.S.A.).
- Vazquez, V.S., Wilson, T.N. and Squandel, R. O. (1990). Effect of temperature on the shelf life of guava fruits. *Can. Agr. Assoc. J.*, **201**: 637-641.
- Wills, Q., Taylor, S.F. and Rod, N. (1983). Temperature vs shelf life if guava. *Biochem. Fruit Ripening*, **1**: 286-289.

