Estimation of Ascorbic acid content in different Ripe and Unripe Fruits

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Abstract

Ascorbic acid, also known as vitamin C, is a vital antioxidant widely found in plants,some fruits are rich in ascorbic acid and are the primary source of human intake of vitamin C.It affects fruit ripening and stress resistance and plays an essential regulatory role in fruit development and postharvest storage. Ascorbic acid functions as an antioxidant and has the additional ability to stimulate fibroblasts to generate collagen because collagen production requires the presence of ascorbic acid. It is an excellent food preserving agent because it helps maintain the natural colour of certain foods, especially fruits, vegetables and even meats that turn brown when cut open and exposed to oxygen. Ascorbic acid has a bitter, acidic flavour.Its estimation was done in various ripe and unripe fruits by using oxalic acid and DCIP dye in titrimetric method. In both ripe and unripe fruits ripe lemon has high vitamin c content and ripe Muskmelon has low content.

***Key words**:Ascorbic acid,Vitamin C,Antioxidant, Oxalic acid,DCIP dye,Lemon and Muskmelon.*

Introduction

Vitamin C was isolated by Szent-Gyorgyi in 1928 (Carpenter KJ 2012). It was the first discovered vitamin which was recognized as early as in sixteenth century, but its exact presence, nature, chemical structure, and antiscorbutic properties were later on confirmed in the nineteenth century.It dissolves itself in water and is supplied throughout the body, but is not stored in any part of the body in simple it is a water-soluble vitamin (National Research Council (US)1989). Vitamin C plays vital roles as associate in nursing anti-oxidant and in scleroprotein synthesis (Padayatty SJ, Levine M 2016). These vital roles, and also the comparatively giant amounts of Water- soluble vitamin needed daily. These embody serving to guard cells and keeping them health, maintaining healthy skin, blood vessels, bones and animal tissue (Pullar, J.M.; Carr, A.C.; Vissers, M.C.M 2017). Vitamin C increases the amount of iron absorbed from foods (Hallberg L, Brune M, Rossander 1989). It also helps the body absorb iron from nonheme sources. Vitamin C is needed for healing wounds, and for repairing and maintaining bones and teeth (Bechara, N.; Flood, V.M.; Gunton, J.E. 2022). It is an antioxidant, along with vitamin E, beta-carotene, and many other plant-based nutrients (Lin J, Cook NR et al., 2009). The build-up of free radicals over time may contribute to the aging process and the development of health conditions such as cancer, heart disease, and arthritis.It is anti-inflammatory agent and powerful antioxidant which limits the chronic

infection and oxidative stress. Other sources of vitamin C are leafy vegetables, green peas, beans, peppers, potatoes, turnips, and other fruits (oranges, lemons, limes, grapefruits, strawberries, banana etc.). The citrus fruits contain considerable amounts of the essential vitamin C (Saeid, A., & Ahmed, M. 2021), the antiscorbutic vitamin as well as fruit acids. In healthy people, any extra vitamin C consumed above the recommended daily amount simply gets flushed out of the body (ShailajaChambial et al., 2013).Its deficiencyresults in a disease, known as "Scurvy" (Maxfield L, Crane JS 2022).

Human have lost the capability to synthesize Ascorbic acid by themselves due to mutation in the last enzyme required in the AsA biosynthetic pathway (Liu H et al., 2022). Thus, humans must acquire Ascorbic acid from dietary sources such as fresh fruits and vegetables (Carr AC, Vissers MC 2013). In this researchestimatedthe Ascorbic acid content in different ripe and unripe fruits.

Materials and Methodology

Chemicals

Oxalic acid, DCIP dye (2,6-Dichlorophenol-indophenol), Sodium Bicarbonate, Ascorbic acid and Distilled water.

Apparatus

Weighing Machine, glass rods, dropper, spatulas, funnel, filter paper, beaker, volumetric flasks, measuring cylinders, Burette, Burette stand.

Methodology

Fresh fruits of both ripe and unripe Apple (Malus domestica),Papaya(Carica papaya), Guava(Psidium guajava), Muskmelon(Cucumis melo), Banana(Musa),Pineapple(Ananas comosus), Orange(Citrus×sinensis) and lemon(Citrus limon)collected from local markets in Hyderabad and all sample fruits were thoroughly cleaned using deionised water to remove any adhering contaminants if present.Sample juices were prepared by addition of 4% Oxalic acid.Then 5 ml of sample juices of each ripe and unripe were taken and titrated against filtered DCIP dye solution which acts as self-indicator.Titrated it against the dye solution till the onion pink colour is seen. Repeated the titration till get concurrent values. Noted down the burette readings each time of titration, by these readings calculated the Ascorbic acid content in each fruit sample.

Results and Discussion

In the estimation of Ascorbic Acid in ripe and unripe fruits the vitamin C content is as follows:

Unripe fruits- Vitamin C content is high in Lemon i.e., 132.8mg/100g and low in Muskmelon i.e., 11.24 mg/100g.

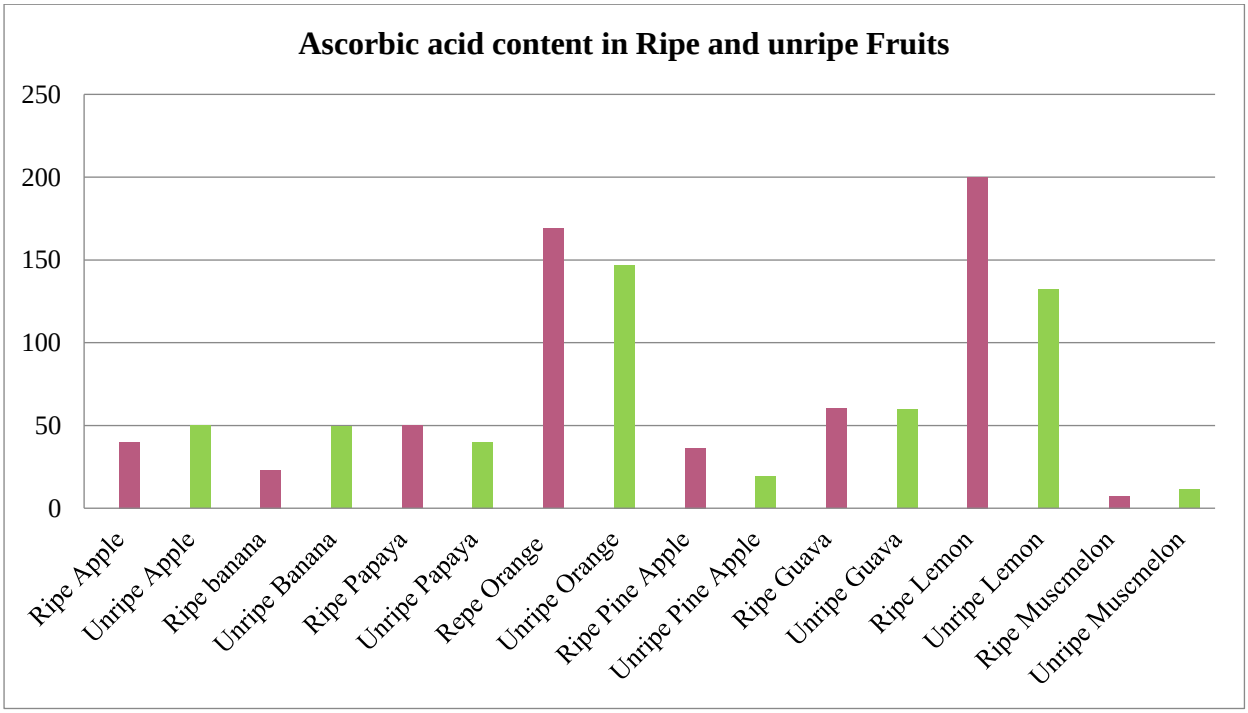
Ripe fruits- Vitamin C content is high in Lemon i.e., 200mg/100g and low in i.e., Muskmelon 7.45 mg/100g.

In this experiment, the vitamin C content of ripe and unripe fruits results indicated that the given ripe & unripe fruits contain vitamin C but in different concentration. Thus, we can see that there may be some factors that can affect the vitamin C level in ripe and unripe fruits such as soil nutrients, climate, maturity state, analytical method, production process and degree of ripeness. This experiment is simple, convenient, less time consuming.

Table: Ascorbic acid content in different Ripe and unripe Fruits (in mg/100 g).

S.No.	Name of the Fruit	Ascorbic acid content (mg/100 g)	
		Ripe	Unripe
1	Apple (Malus domestica)	40	50
2	Banana (Musa)	22.98	49.26
3	Papaya (Carica papaya)	50	40
4	Orange (Citrus×sinensis)	169	147
5	Pine Apple (Ananas comosus)	36.36	19.04
6	Guava (Psidium guajava)	60.24	59.5
7	Lemon (Citrus limon)	200	132
8	Muskmelon (Cucumis melo)	7.45	11.24

Figure: Ascorbic acid content in different Ripe and unripe Fruits (in mg/100 g).



Conclusion

The vitamin C (Ascorbic Acid) determination in different ripe and unripe fruit juices, having the value of the recovery of known quantities of ascorbic acid ranging between.

The highest quantity of ascorbic acid wore obtained in ripe lemon and lowest in muskmelon.

The concentrations of ascorbic acid in fruit juices determined by titrimetric method in good agreement with the data obtained by this classical method (Table).

The obtained results are also in good agreement with data reported in literature regarding the content of ascorbic acid in ripe and unripe fruits. Thus, the reported values forApple(Malus domestica): ripe-40mg/100g, unripe-50mg/100g.Banana(Musa): ripe-22.98mg/100g, unripe-49.26mg/100g.Papaya(Carica papaya): ripe-50mg/100g, unripe-40mg/100g.Orange(Citrus×sinensis): ripe-169mg/100g, unripe-147mg/100g.Pineapple(Ananas comosus): ripe-36.36mg/100g, unripe-19.04mg/100g.Guava(Psidium guajava): ripe-60.24mg/100g, unripe-59.5mg/100g. Lemon(Citrus limon): ripe-200mg/100g, unripe-132mg/100g.Muskmelon(Cucumis melo): ripe-7.45mg/100g, unripe-11.24mg/100g.

The results obtained in this study show that titrimetry can be successfully used as part of quality management in food industry, for assessing the vitamin C content in natural fruit juice and soft drinks.

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