
ASCORBIC ACID CONTENT OF CITRUS FRUITS AT DIFFERENT MATURITY STAGES

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ABSTRACT

Ascorbic acid content of oranges, grapefruits and lemons at different maturity stages were determined as well as their pH and sugar content. The juice was squeezed out from the fruits into different labeled beakers and analysed. The results show that ascorbic acid content of the fruits decreases as the fruit matures, while the sugar content increases. The results for pH showed to be below 3.7 ranging from 3.12 to 3.36 for grape fruit, 2.31 to 2.62 for lemons and 3.16 to 3.59 for oranges.

KEY WORDS: Juice, Oranges, Grape fruits, Lemons, Ascorbic acid, pH, Sugar content.

INTRODUCTION

Ascorbic acid is the well known vitamin C, occurring naturally in fruits and vegetables. Its optical isomer erythorbic acid (D-isoascorbic acid) has almost identical chemical properties but no vitamin activity, apparently because it is not physically absorbed by living cells.

Epidemiological studies have also shown a significant association between vitamin C intake and protection against cardiovascular mortality, but the precise mechanism of protection is still unclear. Other possible roles of vitamin C include promoting healthy teeth and gums, helps in absorption of iron, aids in maintenance of normal connective tissues, promote wound healing, lessen risk of developing high blood pressure and heart diseases. Excellent sources of this vitamin are oranges, lemons, grapefruits and lime. They belong to the genus citrus and have their specific names as *C. senensis*, *C. limonum*, *C. paradise*, and *C. aurantifolia* respectively. Citrus fruits are consumed as fresh fruits or utilized for the obtention of processed citrus fruits and their by products. Ascorbic acid is easily destroyed by oxidation, particularly in the presence of heat and alkalinity, and because it is highly soluble in water, it is often discarded in cooking water. Therefore the best sources are fruits and vegetables, preferably acidic, fresh and when necessary, rapidly cooked in very little water and served immediately. The objective of this work is therefore to investigate the vitamin C content of citrus fruits at different stages of maturity and to note at what point of maturity vitamin c is at its peak and when it is best to harvest the fruit.

MATERIALS AND METHOD

The citrus fruits used for this research work were harvested from various citrus trees selected from Umuagwo, Imo State Polytechnic Umuagwo in Imo State. Fresh harvests of mature unripe, fairly ripe and ripe citrus fruits were obtained. The harvested fruits were cleaned by washing with water and peeled. The fruits were cut open and the juice extracted from each of them. The juices were put into separate labeled beakers and analyzed. Ascorbic acid content of the citrus fruits was determined using 2-6 dichlorophenol indophenols titration method. The pH of the citrus fruits was determined using digital pH meter previously

standardized with buffer solution pH 4.0 while their sugar content was determined using refractometer and % sucrose calculated using the refractive index table.

RESULT

Table 1: vitamin C Content of Citrus Fruits at Various Levels of Maturity

Citrus fruits	mg/100 ml vitamin C.		
	Unripe	Fairly ripe	Ripe
Grape fruits	42.9± 0.1	41.8± 0.1	39.8± 0.2
Lemons	54.2± 0.3	49.1± 0.3	47.6± 0.2
Oranges	48.7± 0.3	42.1± 0.4	38.3± 0.3

Table 2: Sugar Content of Citrus Fruits at Various Levels of Maturity

Citrus fruits	Unripe	Fairly ripe	Ripe
Grape fruits	5.4	5.8	6.1
Lemons	4.7	5.0	5.1
Oranges	6.3	6.7	6.9

Table 3: pH values of Citrus fruits at various levels of maturity

Citrus fruits	Unripe	Fairly ripe	Ripe
Grape fruits	3.12	3.19	3.36
Lemons	2.31	2.52	2.62
Oranges	3.16	3.26	3.59

DISCUSSION

Ascorbic acid content of citrus fruits at different maturity stages in table 1 above shows that there is a decrease in each fruit tending from one maturity stage to the other. The values decreased to about 42.9 mg/100ml to 39.8mg/100ml for the grape fruit, 54.2mg/100ml to 47.6mg/100ml for lemon and 48.7mg/100ml to 38.3mg/100ml for oranges. This indicates that the concentration of ascorbic acid in most varieties is highest at early stages of maturity with a gradual decrease in the fruit after full ripening. For sugar content, the table 2 shows that the orange fruits have the highest total sugar with brix of 6.3 to 6.9 over that of grapefruit and lemon. This is possibly as a result of the fact that sugars continue to form rapidly in oranges as the mature and also by the fact that if the fruit is allowed to remain on the tree after it is thoroughly matured, the sugar level increases mainly as dextrose and fructose. It can also be seen that unripe fruits have low sugar content which increases as fruit ripens. From table 3 above, the values increased from 3.12 to 3.16, 2.31 to 2.62, and 3.16 to 3.59 for grape fruits, lemons and oranges respectively. It can be deduced that acidity is high in unripe fruits and decreases as the fruit ripens. Lemon fruit is higher in citric acid level over the other fruits.

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