Comparative Analysis of Ascorbic Acid Content of Ripe and Unripe Tamarind (Tamarindus Indica)

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Abstract

The importance of Ascorbic acid in prevention of diseases and building up of the body immune system cannot be over-emphasized. This study analyzed the content of ascorbic acid in Tamarindus indica, through comparative analysis of ripe and unripe Tamarind (Tamarindus indica). The samples for the experiment were obtained from a farm at Tilden Fulani and market all in Toro Local government Area of Bauchi State, Nigeria. The Unripe Tamarind was plucked from a Tamarind tree from the farm while the ripe Tamarind was purchase at the market. The percentage (concentration) of ascorbic acid in unripeTamarindus indica is 124.6±12%. In the ripe Tamarindus indica the concentration of ascorbic acid is 2358.4±25%. Titrimetric Procedure was used to determine the concentration of the ascorbic acid. This procedure is the best for quick verification of ascorbic acid in fruits. The findings indicate that ripe Tamarindus indica have high concentration of ascorbic acid while unripe have low concentration of ascorbic acid. From the result obtained, it is obvious that Tamarind fruit can serve as a good source of ascorbic acid and the fruit can be used for domestic and commercial purposes. The study also support the common level of ascorbic acid depend on the type of fruit. The result is in deviation from the perception that tamarind contain less or little amount of ascorbic acid.

Keywords: *Ascorbic Acid, Tamarind, Tamarindus indica.*

Introduction

Tamarind or Tamarindus indica of the family Leguminosae, is an important food in tropics. It is a multipurpose tree of which almost every part finds at least some use, either nutritional or medicinal. Tamarind is indigenous to tropical Africa but it has been introduced and naturalized worldwide in over 50 countries. The major production areas are the Asian countries India and Thailand, but also in Bangladesh, Sri Lanka. In America, Mexico and Costa Rica are the biggest producers. Africa on the whole does not produce tamarind on a commercial scale, though it is widely used by the local people. Minor producing countries in Africa are Nigeria, Senegal, Gamabia, Kenya, Tanzania and Zambia.

The whole Tamarind plant, right from the root to the leaves, is of immense use, ranging from medicinal, decorative, brewing and dye production. Tamarind are slow-growing, long –live, evergreen tree that under optimum conditions can grow 80 feet high with a spread of 20-35ft, in its native to eastern Africa and Asia. İt seldom reaches more than 15-25ft in height, it is a legume popular in many tropical and sub tropical areas as an ornamental and as a fruit produce. Tamarind is considered as a wild fruit and is not cultivated in Nigeria; it can also be seen across the entire nation. The pulp of the fruit is used as a syrup and juice.

The bright green, pinnate foliage is dense and feathery in appearance, making an attractive shade tree with an open structure. Tamarind leaves can be eaten as vegetable and are prepared in variety of dishes. They are used to make curies, salads, stews and soups in many countries, especially in times of scarcity.

As the pond mature, they fill out somewhat and the juicy, acidious pulp turn brown or reddish brown. When fully ripe, the shells are brittle and easily broken. The pulp dehydrates to a sticky paste enclosed by a few coarse strands of fiber. The ponds may contain from 1-12 large, flat, glossy brown, obviate seed embedded in the brown, edible pulp. The pulp has a pleasing sweet/sour flavor and is high in acid and sugar. It is also rich in vitamin B and is high in calcium. There are wide differences in fruit size and flavour in seedling trees. Indian types have longer pods with 6-12 seeds, while the West Indian types have shorter pods containing 3-6 seeds. Most tamarind in America are of the shorter type (California Rare fruit Growers, 1996). Tamarind fruit pulp is used for seasoning, as food component, to flower confections, curies and sauces, and is a main component in juice and certain beverages. Tamarind fruit pulp is eaten fresh and often made into a juice, infusion or brine (El-Siddig et al.; 2006), and also be processed into jam and sweet. The refreshing drinks are popular in many countries around the world, though there are many different recipes. In some African countries, the juice obtained from the fruit pulp is mixed with wood ash to neutralize the sour taste of the tartaric acid. However, the most common method is to add sugar to make a pleasantly acid drink. In Ghana, the pulp is mixed with sugar and honey to make a sweet drink. Most of the producing countries manufacture tamarind drinks commercially. Sometimes pulp is fermented into non alcoholic beverages.

Ascorbic acid is a sugar acid with antioxidant properties, its appearance is white to light yellow crystals or powder and its water soluble, Ascorbic acid is a powerful reducing agent that is readily oxidized in solution, and it is also said to have a laxative effect.

Ascorbic acid is a colourless crystalline water soluble vitamin found especially in citrus fruit and green vegetables. Most organisms synthesize it from glucose but man and other primates obtain it directly from their diet. It is required for the maintenance of healthy connective tissue, deficiency lead to Scurvy. Vitamin C is readily destroyed by heat and light. Its functions include assistance in the synthesis of protein and collagen. This protein is highly concentrated in connective tissues; epithelial tissue bone, teeth, tendons and blood vessels. The vitamin also plays an important role in wound healing.

In addition it helps the body to use calcium and other nutrients build bones and blood vessels. Ascorbic acid also assists in iron absorption by keeping iron in its most absorbable form and destroys free radical in the body. Apart from this it helps to strengthen the immune system of the body and also contribute to reduce stress, heat diseases and cancer (Wardlaw, 2003). It helps in regulating cholesterol, prevent development of scurvy, inhibit conversion of irritant in smog, tobacco, smoke and certain food into cancer causing substance. Food sources of vitamin C include Green pepper, potatoes, citrus fruits, cornflower, Broccoli, Papayas and Strawberries etc.

Traditional uses of Tamarindus indica

Tamarind pulp is used as a raw material for the manufacture of several products, such as tamarind juice concentrate (TJC). Tamarind pulp powder (TPP), produced from seed is another commercial product and is often reported upon in commercial digest.

Tamarind is used for treating trypanosomiasis in domestic animals in Kaduna, Nigeria. Indigenous knowledge revealed the use of tamarind and Adansonia digitata (popularly known as bishiyar kuka in Hausa), Terminalia avicennioides (popularly known as Baushe, idi in Hausa and Yoruba respectively), Khaya senegalensis (popularly known as bishiyar madaci in Hausa) in various combinations (Atawodi, et.al, 2000).

In northern Nigeria, fresh stem bark and fresh leaves are used. As decoction mixed with potash for the treatment of stomach disorder, general body pain, jaundice yellow fever and as blood tonic and skin cleanser.

Tamarind is used in herbal medicine in many parts of the world, and medicinal uses of tamarind are uncountable. Medicinal uses of tamarind can be found in many cultures and for a wide array of application.

Traditionally tamarind products, leaves, fruits and seeds have been extensively used in traditional India and African medicine. A number of recent surveys have listed local folk uses of tamarind as remedies for a number of ailment, (El-Siddig et al.; (2006).

In Nigeria, there are several claims on the usefulness of the Tamarind fruit and as such has led to it being one of the most patronized beverage by the people of Northern Nigeria, most especial during the period of Ramadan (fasting period),. This claim ranges from Nutritional to medicinal and hence it is highly preferred to several beverages, alcohol and non alcoholic sold in the market especially within the Muslim communities. In spite of the high patronage of this beverage in most parts of northern Nigeria and the several claims on the nutritional value of the fruit, there is inadequate or lack of scientific data on whether the ripe or unripe is richer in nutrient, there is a need to determine the difference in the nutritional content (Vitamin C).

Methodology

The Unripe Tamarind used for this experiment was plucked from a Tamarind tree, while the ripe Tamarind was purchase at the market all at Tilden Fulani in Toro local government area of Bauchi State, Nigerian.

The Tamarind fruits were prepared by screening to remove the bad ones, the unripe tamarind fruit was washed with distill water and pounded after collection, dried under shade and sieved, while the ripe fruit was dried under shade and sieved to fine powder.

15g each of ripe and unripe Tamarindus indica were weighed and 50ml of distilled water was added, the mixture swirl for about 20minutes and rapidly filtered.

Instruments

Burette and stand, volumetric flask, pipette, measuring cylinder and conical flask.

PREPARATION OF REAGENT

Iodine Solution (0.005mol/L)

2g of potassium iodide was weight into 100ml, 1.3g of iodine was added into the same beaker, and few ml of distilled water was added and swirl for a few minutes until the iodine is dissolved. The solution was transferred into 1 litre volumetric flask and distilled water was added until it reaches 1 litre mark.

Starch Indicator Solution (0.5%)

0.25g of soluble starch was added to 50ml near boiling water in a 100ml conical flask. Stirred to dissolved and cooled before using.

Vitamin C Standard Solution

0.25g of vitamin C was dissolved into 100cm3 of distilled water and filled with distilled water up to 250cm3 in a volumetric flask.

Standardization

Burette was drained, rinsed with 0.005mol/L of iodine solution and later filled with the same solution 20ml of vitamin C solution was pipetted into a 250ml of conical flask and about 150ml of distilled water and 1ml of starch indicator were added. The sample was titrated with 0.005mol/L iodine solution; the end point of the titration is identified as the first permanent trace of dark blue black colour.

Extraction of Ascorbic acid

20ml of filtrates sample was pipetted into a 250ml conical flask and about 150ml of distilled water and 1ml of starch indicator were added. The solution was titrated with 0.005mol/L iodine solution, the titration were repeated in triplicate.

Results

The total ascorbic acid in ripe and unripe Tamarind was obtained in mg/L as shown in the table below.

Table1: Ascorbic acid content of unripe Tamarindus indica (sample A)

	1	2	3	MEAN
ASCORBIC ACID IN mg/20ml	9.8566	12.4088	12.5844	12.4966

Table2: Ascorbic acid content in ripe Tamarindus indica (sample B)

	1	2	3	MEAN
ASCORBIC ACID IN mg/20ml	23.4088	23.7600	24.2000	23.5844

Discussion

The result support that the common level of ascorbic acid content depend on type of fruit and also ripe or unripe as it's in tamarind. The result is in deviation from the perception that tamarind contain less or little amount of ascorbic acid. The result also shows that those that consume ripe Tamarind are at lesser risk to scurvy infection than those that consume the unripe Tamarind. Factors such as environment, production, climatic condition, maturity state, handling, seasonal and topographical factor which varies from one location to other also determine the concentration of ascorbic acid in Tamarind.

Conclusion

From the result obtained, it is obvious that tamarind fruits can serve as a good source of ascorbic acid. Emphasis should be giving in using the ripe tamarind as it contain high amount of ascorbic acid most especially for domestic use.

Recommendations

* The populace should be enlightened about how nutritive the fruit is, so that they can use it for domestic and commercial purpose.

* Further phytochemical screening on the seed and leaves of the plant should be carried out to determine more of the medicinally active substance in it.

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