

COMPARATIVE ANALYSIS OF SUGARS IN SELECTED NIGERIAN FRUITS.

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ABSTRACT

Ten different fruits, namely; Apple (*Malus communis*), Banana (*Musa sapientum*), Carrot (*Daucus carota*), Cashew (*Anacardium occidentale*), Grape fruit (*Vitis vinifera*), Mango (*Mangifera indica*), Africa Star Apple (*Chrysophyllum africanum*), Bitter Orange (*Citrus aurantium*), Pineapple (*Ananas comosus*) and Walnut (*Tetracarpidium conophorum*) were assessed in this study using thin-layer chromatography for their different sugar contents. All the fruits assessed in this study contain glucose and fructose at varying concentrations, with *Mangifera indica* (Mango) having the highest concentrations of both sugars, 4.15% and 3.80% respectively, while Grape fruit has the lowest values of 1.19% and 1.12% of each. Galactose was present in only three of the fruits, namely Apple, Grape fruit and Orange, same with Lactose, present in Pineapple, African star apple and Walnut. Raffinose was present only in Apple and Pineapple. The findings of this study are discussed along their health and medical implications.

INTRODUCTION

Sugars have been an integral part of human diet throughout history. In ancient Egypt, figs, dates and honey were eaten exclusively by the upper class (1). It is only from the last century that sugars have been extracted from cane and beet on a commercial scale and used in foods preparation both domestically and industrially.

Fruits are important components of man's diet. They are important supplementary sources of carbohydrates, protein, dietary fibre, minerals and vitamins. In addition, they improve food palatability (2). Sugars are found almost entirely in natural fruits, vegetables and other natural foods. Glucose is ubiquitous, it is found in all fruits and it is the major form of carbohydrate utilized by the body. Fructose is the sweetest of the sugars, found in all fruits and honey (6). Its concentration in fruits varies between 0.35% (Apricot), and 23.7% (Dates). Galactose is another sugar found in fruits but not in all fruits, as the percentage composition in most fruits is low. The objective of this study is to determine quantitatively and qualitatively sugars in selected fruits. The findings of this research are discussed along their health/medical implications.

MATERIALS AND METHODS

Sample Collection and Preparation

The fruits were purchased fresh from a local market in Lagos State, South West Nigeria. All the samples used were ripe and mature. The different fruits were washed repeatedly in distilled water to remove dirt particles. The pericarp were peeled, the fleshy fruit blended. The resultant pulp samples were filtered with cheesecloth to obtain the juice.

Methods

Thin-layer chromatographic method was used for the qualitative analysis of the sugars. 50ml aliquots of the pulp were spotted on commercially prepared TLC plates, along with 20ml of reference standard sugars of known concentration. The reference standards were glucose, sucrose, maltose, Raffinose, Galactose, lactose and fructose. The TLC plates with the sample and standard spots were subjected to one-dimensional thin-layer chromatography.

Quantitative Estimation Of Sugars

The quantitative estimation of the sugars were done through spectrophotometrically using Phenol-sulphuric acid method (3)

Elution

The quantitative estimation was done by the use of a guide step technique where the developed TLC plates were used in locating the positions of sugars in unsprayed plates. The squares containing the sugars were cut out and eluted with 5ml of 95% ethanol at 70°C for 2 hours. The cellulose powder was removed by centrifugation at 3000rpm for 15 minutes. The sugars in the extract were then estimated according to the methods of Dubois and McSeady (3,4).

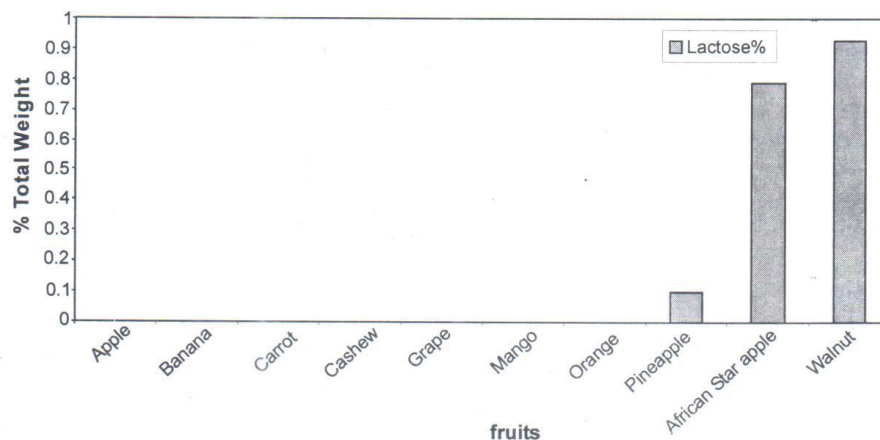


Fig. 1: Lactose composition of some selected fruits

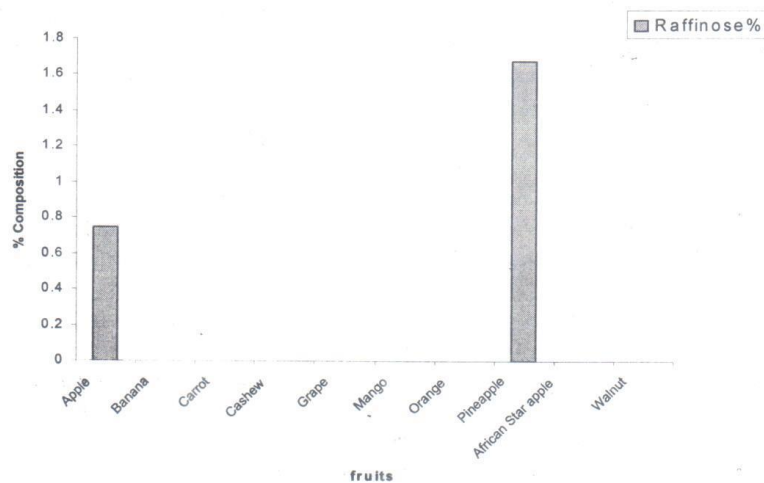


Fig. 2: Raffinose composition of some selected fruits

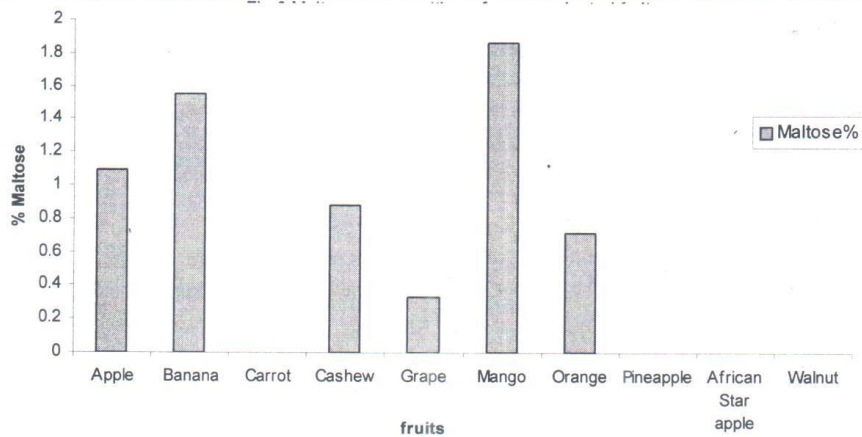


Fig. 3: Maltose composition of some selected fruits

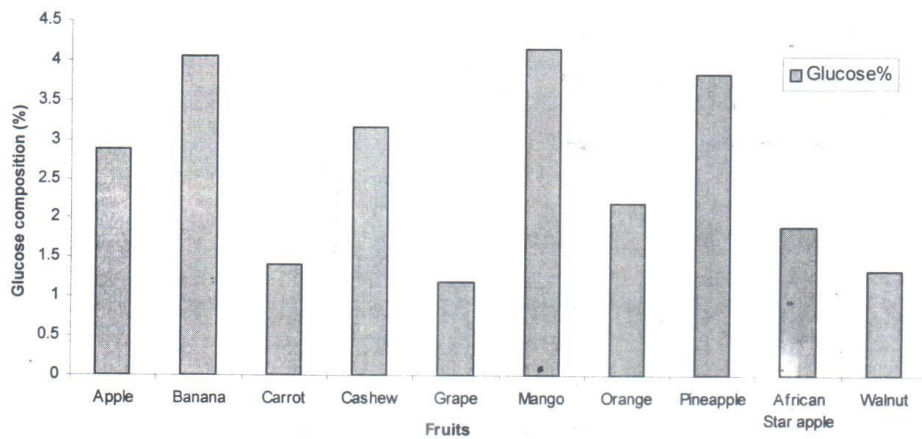


Fig. 4: Glucose composition of some selected fruits

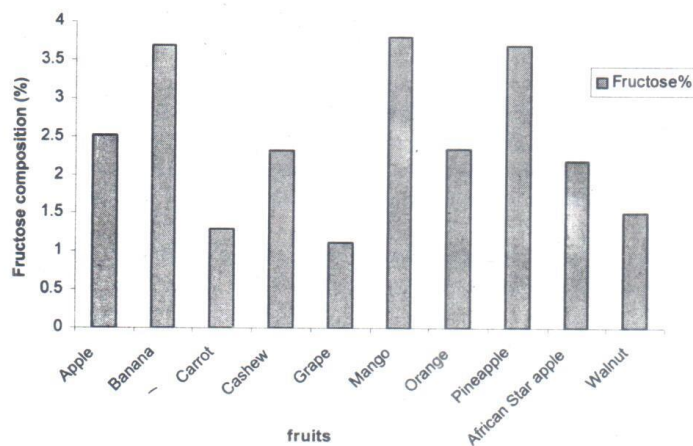


Fig. 5: Fructose composition of some selected fruits

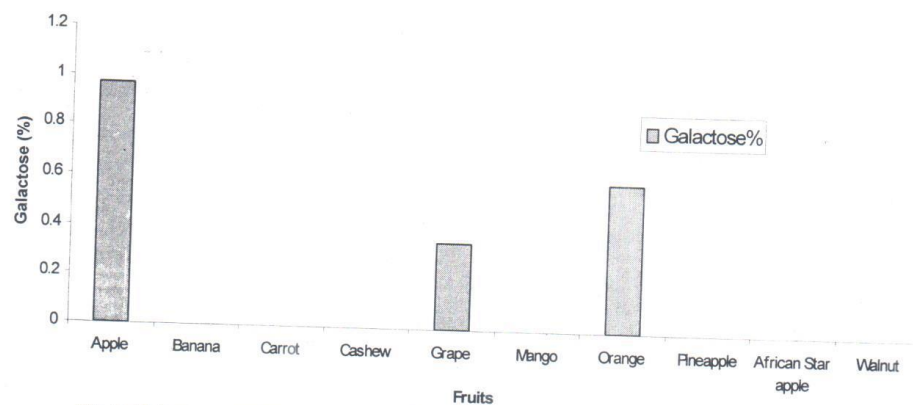


Fig. 6: Galactose composition of some selected fruits

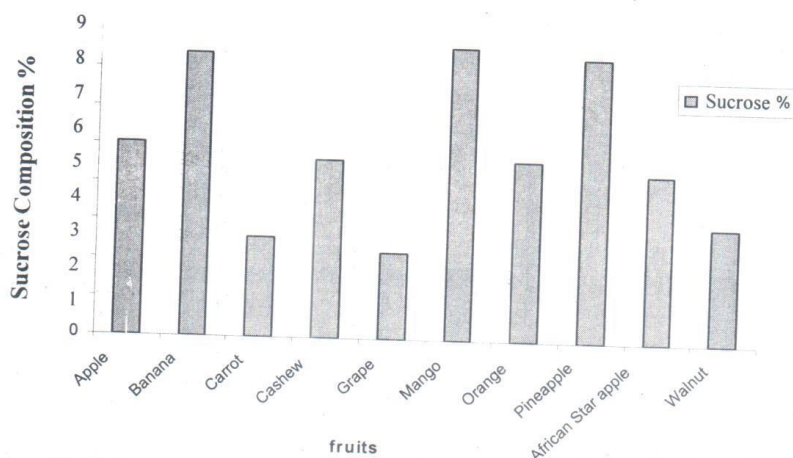


Fig. 7: Sucrose composition of some selected fruits

DISCUSSION

Glucose, fructose and sucrose were identified in all the fruits analysed. The concentrations of each of these sugars were in line with earlier reported work. (5). The little variation of 0.01% could be attributable to a variety of factors such as, species differences level of ripening, etc. The numbers of sugars identified was highest in Apple, with six different types of sugars, and lowest in Carrot, with only three types of sugars present.

Banana (*Musa sapientum*) contained the highest percentage composition of sucrose (8.08%) followed by mango (7.68%) and while Grape fruit has the lowest composition of 2.47%.

Another sugar, a galacto-oligosaccharide called Raffinose, which is present in a lot of seeds such as Cotton seeds (7), was discovered in Apple and Pineapple. Raffinose is reportedly contained in beans and is said to be responsible for the flatulence effect experienced after beans consumption.

Fresh fruits contain high glucose content, which could serve as an instant source of energy replenishment for athletes. The increased consumption of fruits could boost the performance of the brain, but could also help ward off infections with the presence of vitamins like Vitamin C in such fruits. The high dietary fibre composition of fruits also makes it a good food source as it enhances bowel movement, thus curbing constipation. With the sugar composition and concentration of fruits known, it affords the opportunity of knowing which fruits to consume because of their effect on blood glucose level.

The findings of this research supports the gastronomic importance of fruits salad, the salad is a combination of different fruits, having differences in their nutritional components. The usage of fruits in health and in medicine is numerous and consumption of natural sugars through fruits is better for health than the refined types.

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