E-ISSN: 2278-3229

IJGHC; March 2013 – May 2013; Vol.2, No.2, 271-274.

Research Article

International Journal of Green and Herbal Chemistry

An International Peer Review E-3 Journal of Sciences

Available online at www.ijghc.com

CODEN (USA): IJGHAY

Herbal Chemistry

Estimation of the Type and Quantity of Sugars in Banana (Musa cumenita or Cavendish group)

Anita Makwana, Ekta Gupta and Ajit V Pandya*

Department of Biochemistry, C.U. Shah Science College, Ahmedabad, Gujarat, India

Received: 12 April 2013; **Revised:** 4 May 2013; **Accepted:** 10 May 2013

Abstract: The utilization of locally available fruits is limited due to lack of information and knowledge on their nutritive values. The sugars present in the banana fruit were investigated. The green banana tasted plain because it contained large amount of starch, while the yellow banana tasted sweet since it contained large amount of reducing sugars. The result revealed that the sugars present in banana are- fructose, glucose and sucrose; were found to be as 4.35 g in 20gm of quantity. The value obtained were found to be below the daily recommended intake. The analysis revealed that banana has greater amount of fructose, glucose and sucrose present in it. It is therefore recommended that banana should be consumed in our daily life. The total amount of sugars present in banana is 27.5g in a medium sized banana.

Keywords: Carbohydrates, glucose, fructose, sucrose,

INTRODUCTION

Carbohydrates are the most abundant bio-molecules on Earth. Certain carbohydrates (sugar and starch) are a dietary staple in most parts of the world, and the oxidation of carbohydrates is the central energy-yielding pathway in most non-photosynthetic cells. Insoluble carbohydrate polymers serve as structural and protective elements in the cell walls of bacteria and plants and in the connective tissues of animals. Other carbohydrate polymers lubricate skeletal joints and participate in recognition and adhesion between cells. Carbohydrates are polyhydroxy aldehydes or ketones, or substances that yield such compounds on hydrolysis. Many, but not all, carbohydrates have the empirical formula (CH2O)*n*; some also contain nitrogen, phosphorus, or sulfur. There are three major size classes of

carbohydrates: monosaccharide, oligosaccharides, and polysaccharides (the word “saccharide” is derived from the Greek *sakcharon,*meaning“sugar”). Simple sugars are called monosaccharide and glucose, fructose and galactose. The table sugar most customarily used as food is sucrose,a disaccharide. Other disaccharides include maltose and lactose. The average person consumes about 24 kgs of sugar each year equivalent to over 260 food calories per person, per day.

The banana plant is the largest herbaceous flowering plant. The plants are normally tall and fairly sturdy and are often mistaken for trees, but their main or upright stem is actually a pseudostem that grows 6 to 7.6 meters (20 to 24.9 ft) tall, growing from a corm. Individual banana fruits (commonly known as a banana or 'finger') average 125 grams (0.28 lb), of which approximately 75% is water and 25% dry matter. Generally, modern classifications of banana cultivars follow Simmonds' and Shepherd's system. The accepted names for bananas are ***Musa acuminata***, ***Musa balbisiana*** or ***Musa acuminata* × *balbisiana***, depending on their genetic ancestry. Bananas were introduced to the Americas by Portuguese sailors who brought the fruits from West Africa in the 16th century. The word banana is of West African origin, from the Wolof language, and passed into English via Spanish or Portuguese.

Bananas are among the most popular fruits enjoyed in the U.N. Chiquita brands International claims that the average American eats 27 pounds of bananas each year. Bananas are cheap and available year-round ,and with their sugar content they provide a quick burst of natural energy to power you through your day.

Many wild banana species as well as cultivars exist in extraordinary diversity in New Guinea, Malaysia, Indonesia, China, and the Philippines.

The vast majority of the world's bananas today are cultivated for family consumption or for sale on local markets. India is the world leader in this sort of production, but many other Asian and African countries where climate and soil conditions allow cultivation also host large populations of banana growers who sell at least some of their crop. In 2009, India led the world in banana production, representing approximately 28% of the worldwide crop, mostly for domestic consumption. Flavor and texture are also affected by ripening temperature. Bananas are refrigerated to between 13.5 and 15 °C (56 and 59 °F) during transport. At lower temperatures, ripening permanently stalls, and turns the bananas gray as cell walls break down. The skin of ripe bananas quickly blackens in the 4 °C (39 °F) environment of a domestic refrigerator, although the fruit inside remains unaffected. During the ripening process, bananas produce a plant hormone called ethylene, which indirectly affects the flavor. Among other things, ethylene stimulates the formation of amylase, an enzyme that breaks down starch into sugar, influencing the taste of bananas. The greener, less ripe bananas contain higher levels of starch and, consequently, have a "starchier" taste. On the other hand, yellow bananas taste sweeter due to higher sugar concentrations. Furthermore, ethylene signals the production of pectinase, an enzyme which breaks down the pectin between the cells of the banana, causing the banana to soften as it ripens. The banana plant has long been a source of fiber for high quality textiles.

According to the USDA National Nutrient Database, a single medim banana contains about 105 calories and roughly 14.43g of total sugars. Sugar is a carbohydrate, supplying 4 calories per gram. That means close to 58 of these calories come just from the sugar content. Put another way, a medium banana is approximately 55% sugar. Fortunately, bananas contain natural sugars and supply a good deal of vitamins and nutrients that make it a healthy choice for most people.

The sugar content of bananas changes as they ripen,in a process controlled by a plant hormone known as ethylene. Green bananas are almost all starch and have low sugar content. As the bananas ripen,the starch content decreases, then sucrose appears. Next,fructose and glucose appear and increase. After

about 28 days of ripening, sucrose begins to decline. The sugar content in overripe bananas can be dramatically higher than in bananas that are underripe and optimally ripe.

MATERIALS AND METHODS

Sample collection: The banana fruit of middle size was purchased directly from the Shahibaug Market in the beginning of month September , 2012. Fresh sample of banana fruit was taken. Then it was analyzed first for the estimation of sugars. All the reagents and standard used in this work were of laboratory grade. The methods used in this work are the standard methods.

ESTIMATION OF SUGARS

Sample analysis: The banana was peeled off . 20.10g of the sample was taken in the hand mixer. It was then fully mashed with the help of mixer to get the banana juice and then 100 +75ml distilled water was added in it. The dilution was prepared and then it was filtered from the cotton or a muslin cloth and the quantity was made 100ml. The 50ml solution was taken for qualitative estimation and rest 50ml was preserved in the refrigerator by covering the upper portion of test tube with the help of aluminium foil. The qualitative estimation was performed then using standard methods of carbohydrate estimation procedure.

Tests	**Observation**	**Inference**
Molish's test	Blue-violet colour obtained	Carbohydrate present
Iodine test	Dark blue colour obtained	Starch present
Benedict's test	Orange-red colour obtained	Reducing sugar (glu,fruc,mal,lac,suc) present
Seliwanoff's test	Cherry red colour obtained	Reducing sugars present
Phosphoric acid test	Brown ring obtained	Reducing sugars present
Barfoed test	Red residue obtained	Monosaccharide present
Cobaltous chloride test	Violet colour obtained	Fructose present
Phenyl hydrazine test	Osazone crystals obtained in 5minutes	Glu,fruc,mal,lac present

RESULT AND OBSERVATION

Fructose and glucose are the two most abundant sugars found in bananas ,and they occur in roughly equal amounts. Bananas also contain a bit of a third sugar, sucrose. A medium banana contains approximately 5.72g of fructose. Fructose is a common sugar found in many fruits and it is also present in bananas. Natural fructose, like other simple sugars, supplies our body with energy.

The same medium serving of banana contains about 5.8g of glucose. Glucose, most commonly known as blood sugar is the most common carbohydrate. When we eat, our body breaks down our food into this simple sugar so it can use it as energy for our cells.

The sugars estimated in the above experiment are glucose and fructose

REFERENCES

1. Centres for disease control and prevention: Fruit of the month:Banana
2. University of Hawai Nutrition ATC;Bananas Need No Hype to be considered good; Joannie Dobbs and Alan Titchenal;April 2010
3. "Food Chemistry"; Bioactive Amines and carbohydrate changes during ripening of 'Prata' banana(musa acuminate-M-Balbisiana); Rigna C.Adao and M.Beatriz A. Gloria; May 2005
4. Elmhurst college, Virtual Chembook; Fructose and Glucose; Charles Ophard; 2003

*Corresponding Author: **Dr.Ajit V Pandya**

Department of Biochemistry, C.U. Shah Science College, Ahmedabad, Gujarat, India