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Agricultural Products Beneficial to Human Health

Edmundo Arias Torres, Imilla I. Arias Olgu ń and Bol ívar Arias Olgu ń
Department of Applied Technology, Mexican Institute of Appropriate Technologies, S. C. Mexico City 07270, M éxico

Abstract: Jamaica (Hibiscus) calyxes contain a high percentage of soluble fiber (4.87%), higher than other commonly consumed foods, which suggests that the use of Hibiscus calyxes, either as a food ingredient or as a dietary supplement, could promote the physiological properties characteristic of this type of dietary fiber, such as reducing the rate of glucose entry into the blood, controlling insulin secretion, increasing intestinal volume and peristalsis, greater production of short-chain fatty acids during colonic fermentation, maintaining a healthy intestinal ecosystem. Jicama is a legume plant rich in nutrients and antioxidant compounds that provide many health benefits, such as promoting the reduction of blood sugar, being beneficial for people with diabetes, in addition to helping to lower cholesterol, preventing cardiovascular diseases. The edible part of the jicama is its roots, and edible tubers that are mostly water, measure up to 14 cm in length. They have a sweet, starchy taste and are generally eaten raw with salt, lemon and chili or as a salad with other vegetables or fruits. It can also be used to prepare juice or in preparations such as soups or stews.

Key words: Jamaica, jicama, human food.

1. Introduction

1.1 Jamaica

The hibiscus flower is also known as the Abyssinian rose. It is native to tropical Africa and has been cultivated with great success in Mexico, Central America, and South and Southeast Asia, including southern China.

It belongs to the mallow family; it has an intense violet-red color, is soluble in water, and has concentrations of vitamins, nutrients, and trace elements distributed in different concentrations in the root, stem, and leaves.

The hibiscus measures 1 to 3 m in height (3 to 9 feet), reproduces by self-fertilization, and its flower measures 3 to 4 cm (1 to 2 inches) long. It is made up of four or five petals and has a conical shape that resembles a small poppy. Its roots do not go very deep and it requires hours of light.

The health benefits of the hibiscus flower are taken advantage of when its calyxes are consumed [1]. It is an excellent medicinal plant since it significantly improves the health of the body.

1.2 Jicama

Jicama is native to Mexico and Central America and has been consumed since pre-Hispanic times by different cultures. The word “jicama” comes from the “Nahuatl xicamatl” which means “watery navel root”. After the Spanish conquest, the jicama was taken to various parts of Asia. Jicama, also called “Mexican turnip”, is one of the main crops in this country. September and October are the best months for this crop in Mexico.

It is found under the surface of the earth, and is the tuber that forms the root [2].

Its root is the only part of this edible plant, and is consumed as a fruit or vegetable. It is a seasonal product all year round, but its best time is from December to June in the northern hemisphere. The plants grow best in warm, dry climates, temperatures of 20 ℃ to 30 ℃, at altitudes of 0 to 1,700 m, with rainfall of 600 to 4,000 mm, in soils with pH 7.0. The tastiest ones are produced in the summer, although they are usually somewhat smaller.

Corresponding author: Edmundo Arias Torres, Ph.D., research fields: environmental protection and biotechnology.

Jicama is a legume, characterized by its low caloric content, its contribution of vitamin C and minerals, mainly potassium, iron, calcium and magnesium.

2. Materials

2.1 Hibiscus

Very few vegetables are raw materials that meet the requirements to be classified as antioxidant fiber. These are the following:

(a) The fiber content must be greater than 50% of its dry matter.

(b) One gram of fiber must have the capacity to inhibit lipid oxidation equivalent to at least 200 mg of vitamin E.

(c) The antioxidant capacity must be intrinsic, derived from the natural constituents of the corresponding plant material and not from possible added antioxidants.

2.1.1 Description of the Hibiscus Flower

The Hibiscus flower (*Hibiscus sabdariffa* L.) is also known as the rose of Jericho, red tea, hibiscus flower or red flower. It is a plant belonging to the Malvaceae family, Hibiscus genus and Sabdariffa L. species (Table 1).

Cultivation is carried out mainly in marginal soils with low fertility and poor moisture retention. This plant completes its life cycle in one or two years and reaches 1 to 3 m in height, depending on the variety of the plant, the fertility of the soil and the management conditions [4].

Table 1 Taxonomic classification of the hibiscus flower (*Hibiscus sabdariffa* L.).

Kingdom	Plantae
Sub-kingdom	Tracheobionta
Division	Anthophyta
Class	Magnoliopsida
Order	Malvales
Family	Malvaceae
Genus	Hibiscus
Species	Sabdariffa L.

Source: Ref. [3].

Table 2 Taxonomy of jicama.

Kingdom	Plantae
Division	Fanerógama
Subdivision	Magnoliophyta
Class	Magnoliopsida
Subclass	Rosidae
Order	Fabales
Family	Fabaceae
Subfamily	Faboideae
Tribe	Phaseoleae
Subtribe	Glycininae
Genus	*Pachyrhizus*
Species	*Pachyrhizus erosus*

Source: Ref. [6].

2.2 Jícama

Its scientific name is *Pachyrhizus erosus*, classified in the kingdom plantae (Table 2). It grows at altitudes of 0 to 1,700 m, with rainfall of 600 to 4,000 mm and annual temperature of 20 to 28 ℃; it thrives in soils with a sandy-loamy to clay-sandy texture, with good drainage, with pH of 4.8-7.3. For flowering and fruiting, the plants require short days. In Mexico, they can develop up to 1,400 m, but some species have been found at 10 m above sea level. It is recommended for crop rotation since it can fix up to 127 kg of nitrogen per hectare [5].

3. Results

3.1 Jamaica

The values indicated in following (Table 3) have been determined analytically following the method proposed by AOAC (Association of Official Analytical Chemists).

The properties of hibiscus to inhibit microbial activity were compared with those of garlic and ginger, when applied to antibiotic-resistant bacterial species in urinary tract infections: *Escherichia coli*, *Klebsiella pneumonia*, *Staphylococcus aureus* and *Pseudomonas aeruginosa*. Hibiscus was able to demonstrate an important antimicrobial effect that reduces the development of these bacterial species [8].

Table 3 Proximal composition of calyxes from Jamaica (g/100 g of dry matter).

Composition	Content (%)
Protein	8.6
Lipids	2.0
Ash	6.8
Crude fiber	8.5
Total dietary fiber	33.90
Insoluble fiber	29.04
Soluble fiber	4.87
Minerals and vitamins (mg/100 g)	
Calcium	1,263
Potassium	2,320
Iron	34.6
Magnesium	340
Zinc	6.3
Ascorbic acid	54.8
Niacin	3.76
Thiamine	0.117
Riboflavin	0.277

Source: Ref. [7].

Table 4 Nutritional information in 100 g of Jicama.

Nutrition	Content
Energy	38 kcal
Proteins	2 g
Fats	0.8 g
Carbohydrates	35.3 g
Fibers	4.9 g
Vitamin C	20 mg
Potassium	150 mg
Iron	0.6 mg
Calcium	12 mg
Zinc	0.2 mg

Source: Ref. [9].

3.2 Jicama

Jicama is a low-fat, low-calorie root vegetable that is rich in fiber, nutrients, and antioxidants. (Table 4)

In addition, it has a high carbohydrate content; 100 g contain 87% water, 1.3 g of protein, 9.9 g of carbohydrates and 39.9 calories [10].

4. Conclusions

4.1 Hibiscus

The health effects that have been evidenced in experiments carried out with the aqueous extract of the calyxes are numerous. One of the best known is the hypotensive effect, attributed to its action as a vaso-relaxant [11]. A cardioprotective effect has also been observed, reducing the concentrations of creatinine in urine, uric acid, citrate, tartrate, calcium, sodium, potassium and phosphate [12].

The hibiscus flower is also an interesting source from the nutritional point of view of iron and magnesium [13]. In addition, the calyxes present in their composition vitamins such as thiamine, niacin and mainly vitamin C [14].

4.2 Jicama

The jicama tuber contains 86% to 90% water, vitamin C, calcium, phosphorus, potassium, iron, as well as traces of protein and lipids.

Its sweet taste comes from the oligofructose inulin (a carbohydrate that is converted into fructooligosaccharin when cooked), which is not metabolized by the human body and is ideal for consumption by diabetics.

The tuber can be stored for one to two months in dry places, at temperatures between 12 and 16 ℃.

Jicama provides many health benefits such as promoting the reduction of blood sugar, being beneficial for people with diabetes, in addition to helping to reduce cholesterol, preventing cardiovascular diseases.

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