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Nutrient content and Active Ingredients in Safou fruits (Dacryodes Edulis) From the City of Lubumbashi, Haut-Katanga / DRC

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RESUME :

Le safoutier du nom scientifique *Dacryodes edulis* est un arbre à usage multiple dont la culture nutritionnelle et socio-économique est très importante en Afrique centrale et dans les pays riverains du golfe de Guinée.

La présente recherche a été entreprise en vue de connaitre la composition nutritionnelle et phyto-chimique des fruits de safou poussant et consommés à Lubumbashi dans le but de servir de guide aux consommateurs et pour divers usages dans les industries agroalimentaire comme la fabrication des biscuits.

Les fruits de safou sont en outre dotés des propriétés anti oxydantes, antiseptiques, antivenimeuses suite à la présence des tanins dans cette dernière.

Monts clés :Nutriments, Principes Actifs, Fruits, Safou

ABSTRACT:

The safoutier, scientifically named Dacryodes edulis, is a multipurpose tree whose nutritional and socio-economic cultivation is very important in Central Africa and in the countries bordering the Gulf of Guinea.

The present research was undertaken in order to know the nutritional and phytochemical composition of the fruits of safou growing and consumed in Lubumbashi in order to serve as a guide to consumers and for various uses in the agro-food industries such as the manufacture of cookies.

The fruits of safou are also endowed with antioxidant, antiseptic and antivenom properties due to the presence of tannins in the latter.

Keywords: Nutrients, Active Principles, Fruits, Safou

1. INTRODUCTION

The safoutier, scientifically named Dacryodes edulis, is a multipurpose tree whose nutritional and socio-economic cultivation is very important in Central Africa and in the countries bordering the Gulf of Guinea. ([1], [2], [3], [4])
Its fruit called safou in DRC kikongo and widely consumed in central Congo and Bandundu consists of a stone and a pulp. There are several varieties, being distinguished by the colors varying from navy blue to light pink through purple and sky blue. It is consumed after softening in hot water, ash and embers. It is sometimes eaten raw. It could also be used as a bread butter spread. [5]
Research carried out with a view to the physicochemical characterization of the fruits of the safoutier ([6], [7], [8], [9], [10], [11]) have shown that the safou contains on average 50% fat, 10% protein, 27% fiber and 10% sugars.
. It is also rich in minerals and trace elements. The safou contains 690mg / 100g of calcium, 450mg / 100g of magnesium, 2380mg / 100g of potassium, 220mg / 100g of phosphorus and 80mg / 100g of sodium. [12]
Thus its pulp, the only edible part of the fruit, is rich in lipids, proteins, carbohydrates, minerals and fibers ([13], [12]).
However, safou does not have the sweet taste usually attributed to fruits, just like olive or avocado, with which it has some similarities. It is a fatty fruit that contains few carbohydrates.
The present research was undertaken in order to know the nutritional and phytochemical composition of the fruits of safou growing and consumed in Lubumbashi with the aim of enhancing the plant and serving as a guide for consumers and for various uses.

2. MATERIALS AND METHODS

2.1. EQUIPMENT

2.1.1. Plant material

The study material consists of ripe fruits of safou
2.1.2. Other analytical materials
To know the nutritional and phytochemical composition of the fruits we have used the main materials below:
- HERAEUS brand oven
- Prolabo brand muffle furnace
- Prolabo 8300 brand ICP
- 315 µm mesh sieve
- Soxhlet
- Salvis brand water bath
- Philip brand uv-visible spectrophotometer

2.2. METHODS

2.2.1. Sample collection and preparation

The samples were taken in the city of Lubumbashi Municipality of Kampemba, Cadastre district on avenue Des gissements number 370. The ripe safou fruits were thus picked manually from the plant in the morning.
The separation of the pulp and the core was done using a stainless steel knife. The pulp was dried in an oven at 105 ° C for 12 hours then ground using a porcelain mortar and then sieved using a 315 μm mesh sieve in order to obtain the fine powders which were stored at room temperature in clean and dry glass jars well closed and on which the various analyzes were carried out.

2.2.2. Analysis methods

a) Determination of the content of macronutrients and mineral elements

- The moisture content was determined by drying the samples in an oven set at 105 ° C to constant weight. [14]
- The total ash was determined by calcination at 550 ° C for 8 hours in a muffle furnace (method 923.03; AOAC, 1990; [15].
- Determination of crude protein was made by measuring total nitrogen. The total nitrogen content was determined by the Kjeldahl method [12].
- The conversion of total nitrogen to crude protein was done using the following relationship: % P.B =% N x 6.25. Where% P.B = crude protein content; % N = total nitrogen content of the sample and 6.25 = universal conversion factor for nitrogen to protein content.
- Lipids were extracted by soxhlet according to the Weiball method as reported by BUKATUKA [16].
- The determination of the total carbohydrate content was made according to Dubois et al [17], and calculated using the following relationship: QI = OD x 160 / 0.0072 x 1000 where QI = quantity of sugars in the 'sample in g / 100g, OD = the optical density of the sample (evaluated at 390nm).
- To quantify the mineral elements, we used the ICP prolabo 8300;

b) Identification of active chemical substances in safou fruits

The principles of the methods used are based on the formation of a precipitate, the change in color or the formation of a foam as described by Aebisch et al. [18], Wagner [15], Lumbu [16], Bruneton [17] and use reagents from Bragendorff, Hager, Mayer, Sunnenshein, Wagner and Bertrand [18].

The phytochemical groups sought are alkaloids, flavonoids, anthocyanins, quinones, steroids, terpenoids, saponins and tannins.

The aqueous flavonoid extract, in the presence of concentrated acid and magnesium shavings, gives a pink-orange and purplish-red coloration in the supernatant layer.

isoamyl alcohol. After heating in a water bath, without adding the magnesium, the appearance of a red color indicates the presence of leuco anthocyanins.

The yellow picrosodium paper turns orange or red depending on the concentration of free hydrochloric acid in the aqueous vapor during heat treatment of the drug. Quinones contained in an extract are detected by the change in color of the extract turning red in the presence of the base (NaOH) [18]; The detection of saponins is based on their foaming power: For a non-persistent foam, the filtrate is tested with a mixture of equal volume of 1N sulfuric acid and green-dirty or purple color turning red. The organic ethereal extract containing the steroids gives the yellow green colorings in the presence of anhydrous acetic acid. By adding the HIRSHNON reagent (trichloroacetic acid), the yellow color turning red indicates the presence of terpenes [18].

In the presence of 1% ferric chloride, the aqueous extracts containing the tannins give various colorations: blue-green, blue-dark or green or form precipitates [18].

3. PRESENTATION OF THE RESULTS

Table 1. Composition of main nutrients in the pulp of safou fruit

Component	Content (in%)
Moisture	52
Protein	9,8
ash	1,3
Fat	34
Sugars	9

Table 2. Composition in mineral elements of the pulp of safou fruits

Element type	Mass in mg /kg
Ca (Calcium)	589
Fe (go)	5.61
K (Potassium)	546.90
Mg (Magnesium)	22.17
Mn (Maganese)	24.61
Na (Sodium)	49,90
Zn (Zinc)	126.16

Table 3. Identification of the active chemical principles in the fruits of safou

Active subtances	Identification
Alkaloids	++
Flavonoids	++
Leucoanthocyanins	–
Saponins	+++

Steroids	–
Tannins	+++
Terpenods	+
Quinones	–

***Legend**:* −: absence
+: presence
++: Strong presence
+++: Very strong presence

4. DISCUSSION OF THE RESULTS

Composition in main nutrients of the fruit pulp of safou

The safou fruits cultivated in the city of Lubumbashi have a low protein content (4%). in the food industry This content is similar to the results found by OMOGBAI, BA, et al, 2010; [19] and the results of Kapseu, C., et al, Kinkéla, T., Silou, T. and Kinkéla T, Kama Niamayoua R, et al. and Miguel, LM et al ([11], [20], [21], [22], [23]) who respectively found the values oscillating around 10% their results are higher than our current one. to the different types of fruit that we have analyzed.

Safou is an important source of lipids. The results found confirm those of Silou T., Rocquelin G., et al; Kapseu, C., et al. ([11], [20]) having found the average contents of 50% these values make safou an important source of fats which can be used in food processing. Regarding the matter, thanks to our corobort results with ceul de OMOGBAI, B.A. et al, 2010 of which 34% in ours and 35% for OMOGBAI, B.A. et al. And the sugar in our research is 9% this content is similar to those of ([11] [19])

Composition of safou fruits in mineral elements

The contents of mineral elements found are similar to those found by Tchiegang C. et al, Kapseu C. et al… ([23], [6]). From a nutritional standpoint, we can remember that "safou" fruits are an important source of potassium 546.90mg / kg of fresh and ripe fruits our research is similar to that of OMOGBAI, B. A. et al. who found a content of 540.81-549.23mg / kg [23]

According to our study the sodium content is 49.90mg / kg while only from OMOGBAI, B.A. et al they found a content of (163.50-170 mg / kg). In our study, the sodium content is similar to that of Kadji et al. 2016 who found a content of 51.54mg / kg. [12]

Regarding the magnesium and manganese content the results we have are similar to that of Kadji et al. 2016. [24]

Identification of active chemicals in safou fruits

The identification analyzes of the active chemical principles reveal the presence of alkaloids, flavonoids, terpenoids, as well as a very strong presence of saponins and tannins. This would confer on the fruit certain therapeutic virtues, in particular antivenoms, anti hemorrhoids,

antiseptics, anti diarrhea, anti oxidants and bactericides following the strong presence of tannins. ([25], [26],[27])

CONCLUSION

From the results found, it emerges that the pulp of the fruits of safou contains proteins and are very rich in fat and certain mineral elements.

These fruits could thus be used in the food industry, in particular for the manufacture of cookies. In addition, it is endowed with antioxidant, antiseptic and antivenom properties due to the presence of tannins in the latter.

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