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Proximate Composition and Utilization of *Napoleona imperialis* Fruits.

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Abstract

Wild fruits abound in forests of south eastern Nigeria which are not properly utilized. These fruits are occasionally consumed by locals not because they knew the content of such fruits but rather because their fore fathers consumed such fruits in the past. It is against this background that *Napoleona imperialis* was studied to determine its proximal composition and possible economic utilization. The pulp of the fruit was analyzed proximately using standard methods for carbohydrate, fat, crude fibre, protein, ash content and moisture content and was used for the production of fruit jam.
The proximate analysis showed that the pulp contains 9.9% carbohydrate, 1.0% fat, 5.05% fibre, 1.3% protein, 0.35% ash and 87.5% moisture while the jam contained 15.7% carbohydrate, 0.2% fat, 2.5% fibre, 0.4% protein, 0.25% ash and 80.5% moisture. Flame photometric analysis showed that the jam contained 0.16g/mg sodium and 0.13g/mg potassium.
Key words: *Napoleona imperialis*, fruit products, proximate analysis.

1. Introduction

Plants and plant products have gone a long way in providing the basic necessities of man. These necessities of man include: clothing, shelter and food. Almost every plant can be utilized in one way or the other to provide materials that are necessary to the existence of man (Dutta, 1995).
Food processing accelerates agricultural productivity and promotes sustainable agricultural intensification since agriculture is the life blood of the economy of most developing countries. Food processing offers good opportunity for enterprising people to generate income and employment using locally available raw materials on a small scale. Food processing starts with the harvest of raw agricultural produce, procurement of foods of marine origin, or slaughter of animals and finishes when the processed foods are consumed. The purpose is to extend the storage time, remove undesirable raw food constituents and change the colour, flavour and texture to make the food more attractive and palatable (Ihekereonye, 1994).
In Nigeria today; the demand for products made from natural sources has been on the increase following the ban by government on imported and synthetic food items. This demand however can be met by utilizing our local plants some of which are not known to be very useful ordinarily (Ihekereonye, 1980). One of such plants is the *Napoleona imperialis* which is a wild plant found in south eastern Nigeria.
Napoleona imperialis is an evergreen non-timber plant that grows abundantly in bush fallows, secondary bushes and marginal lands in most of the tropical humid zones of West Africa (Koppel, 1990). The plant belongs to the family known as the *lecythidaceae*, along with the cannon ball tree (*corrupita guianensis*), which grows in most regions of Nigeria (Dalziel, 1955), (Hutchinson et al, 1958) and (keay et al, 1964).
The plant is commonly known as Utum in the Ikwuano dialect of Igbo language in Nigeria(Ukpabi et al, 2003). Some botanists however, have placed *Napoleona imperialis* in the *barringtoniaceae* family and others believe it warrants its own family the *Napoleonaceae*.
The tree is about 14.5m high, 10m in girth with a dense rounded crown and dark green foliage. The bark is grey to pale brown and darkens on exposure. The leaves have stout common stalk with broad and elliptic leaflets mostly rounded at the apex. It flowers between January and March, and is usually yellowish white and about 0.7-1.10mm long, crowded in compact branched stout central stalk. It fruits around April and is broadly globular. The fruits which are fleshy structures are attached directly to the main trunks and limbs.
Though *Napoleona imperialis* is one of the lesser known plants, its economic importance has partially been reported by Dalziel, (1955) and Irvine (1961). These include the use of the fruits sugary pulp as deserts, the roots

for medicinal purposes and the twigs as traditional chew sticks. Also in the works of Osei- owusu (1981); Okafor and Fernades (1987); different parts of the plant are used for different purposes in the region including mulching and fodder (leaves and twigs); and firewood, chewing sticks and ethnomedicine (stem and root). The juice from the fruits and pods are consumed by man while the seeds are discarded. The seeds have very low human food preference or any industrial use and could therefore form alternative feed ingredient for livestock production (Ukpabi et al, 2000).
Uchegbu et al (2000) studied the proximate composition of the ripe and dried raw *Napoleona imperialis* seed meal and found the seeds to contain 90.5g/kg-1crude protein. Iheukwumere and Okoli (2002) fed the raw dry seed to weaner rabbits and found that at 15% dietary inclusion, the seeds had deleterious effects on the performance, hematology and serum criteria, and while at 5% inclusion, the rabbit did not show any negative effect on similar parameters.

Much is not known of the chemical composition of the seeds of Napoleona imperialis. However, the chemical composition of the leaf, bark and roots had been partially determined by Ogbonnaya; (1983). Also the possible presence of saponin in the seeds of *Napoleona imperialis* had been earlier reported by Dalziel, (1955); Irvine, (1961). The leaves have a characteristic bitter taste, foaming properties, and can cause injuries to the digestive mucosa and hemolytic changes in blood Kumar and Dimello, (1995); Radostits et al, (1997); Macdonald et al, (1998). *Napoleona imperialis* is commonly found in south eastern Nigeria.

1.1 Fruits And Fruit Products

Botanically, a fruit is the ripened ovary and accessory part of a flower. In common usage of the term, a fruit implies a fleshy product typical of trees that is high in acidity and sugar and when ripe posses a characteristic flavor (Ihekereonye et al 1997). However, many vegetables such as beans, squash, tomatoes etc are true fruits. Fruits such as apples, peaches, plumes and pears are consumed primarily for their fine texture and distinctive flavor as well as their high nutritive level of vitamins and minerals. Fruits constitute the major sources of pro – vitamin A, carotenoids, ascorbic acids and many mineral as well as digestible carbohydrate and fibre. Wide differentiations in colour, texture and flavor exists among fruits varieties some of which are best suited for fresh market distribution while others are appropriate for processing.
At one time, the supplies of fresh fruits were limited by their seasonal nature but following the development and refinement in transportation, packaging, canning and freezing technologies, availability of these fruits have been extended. Freezing and canning of fruit is done soon after harvesting to help preserve optimum quality and nutritional value in the finished product.

1.2 Proximate Composition

Describes the basic nutrient composition of foods in terms of protein, moisture content, fat, ash (minerals) and carbohydrate (www.encyclopedia.com). In these determinations, estimations are made of Nitrogen (as an index of protein) and carbohydrate is usually determined by difference after adding up protein, ash, fat and fibre and then subtracting the sum from 100. Proximate composition is usually carried out on representative samples. In most cases, the analyses are carried out on dry samples except moisture determination. The result may however be reported either on wet or dry matter basis.

1.3 Moisture Content

The amount of water found in a food sample is influenced by the type of food, age or maturity, variety and geographical location. At harvest, the moisture of the food item determines the storage potential of the item. Moisture content determination gives an indication of the amount of water found in the food substance and the storage characteristics of such food. True moisture content is not easy to be accurately determined as part of the water may be tightly bound. However, it is possible to determine the water content that is not bound in the structure of the food molecule. True moisture is determined by the Karl Fischer method.

1.4 Ash Content

This represents the minerals or inorganic residue of a biological material. It may not represent the absolute contents of inorganic matter because there may be volatilization of some minerals. It however gives an idea of the amount of total mineral content of the food material.

1.5 Crude Fibre

The fraction of the nutrient which includes those materials in food that is of low digestibility. These includes; cellulose, certain hemi celluloses and some of the lignin. It is used in the analysis of various foods and food products to detect adulteration and to determine conformity to existing standards of quality and identity.

2. Materials and Method

- Preparation and analysis of the pulp

Ripe *Napoleona imperialis* pods were harvested from bushes in Egbechukwu quarters of Ezira in Orumba South L.G.A of Anambra State, Southeastern Nigeria. The pods were opened with a kitchen knife and the pulp peeled from the seed. The pulp was blended and refrigerated until ready for use. Proximate analysis was conducted on the blended pulp using standard methods (AOAC, 1990).

- Utilization of *Napoleona imperialis* fruit.

The pulp of *Napoleona imperialis* fruit can be processed into fruit jam. The recipe for the preparation consists of the following:

i) Fruit pulp (blended)
ii) Water
iii) Sugar
iv) Pectin
v) Acid solution (lemon juice)

The preparation of the jam involves placing one half of the sugar and all the fruit pulp in the boiling pan followed by heating and stirring to dissolve. 50% of the acid solution was mixed with pectin and poured into the boiling pulp. Heating and stirring continued until sufficient water has been evaporated at about 1040C. The jam is then cooled over running tap and filled into sterilized glass jars for storage.
The production process is outlined as shown below:

Ripe fruit
↓
Wash
↓
Break pod
↓
Peel the pod
↓
Blend pulp (with other ingredients)
↓
Heat
↓
Acid
↓
Pectin gel
↓
Cooling
↓
Canning

3. Analysis of Results

The result of the formula for the production of jam using *Napoleona imperialis* fruit, proximate analysis and minerals are given in tables. Table 2 gave the proximate composition of *Napoleona imperialis* pulp and fruit jam. Table 3 gave the analysis of minerals in *Napoleona imperialis* fruit jam. Table 4 gave the moisture composition of some fruits per 100g of edible portion.

4. Conclusion

The pulp gave a good fruit jam which revealed moderate protein and high calorific value in its proximate composition. The presence of sodium and potassium in concentrations admissible for human consumption makes the jam good for the maintenance of acid – base balance in the body. Some of the wild fruits in our locality should be utilized in the production of various other fruit based products. Since they are readily available and relatively cheap in terms of production, they can serve as a source of income for the cottage industry and also reduce unemployment among our teaming youths.

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Table 1: Formula for production of *Napoleona imperialis* jam.

parameters	values
Fruit pulp	10.4kg
Water	400ml
Sugar	16.0kg
Pectin gel	64kg
Acid solution	0.2ml
Colour	0.5g
Preservatives	1g

Table 2: Proximate composition of *Napoleona imperialis* pulp and fruit jam.

parameters	values	
	jam	Pulp
Moisture content	80.5%	87.5%
Protein	0.4%	1.5%
Crude fibre	2.5%	1.0%
Ash	0.25%	0.35%
Carbohydrate	18.7%	9.9%
Specific gravity	1.0g	0.5g
Calorific value	78.2kj	53.8kj
Crude fat	0.2%	1.0%
Total Sugar	1.2%	2.5%

Table 3: Analysis of minerals in *Napoleona imperialis* fruit jam.

Minerals	Values	
	Concentration (mg/g)	Absorbance (nm)
Potassium	0.13	13
Sodium	0.16	15

Table 4: Moisture composition of some fruits per 100g of edible portion

Fruits	% water	Energy	% protein	% fat	% carbohydrate
Banana	75	85	1.1	0.2	24
Pineapple	85	65	0.4	0.4	15
Mango	83	63	0.6	0.1	15
Guava	80	58	1.0	0.4	13
Orange	85	49	1.0	0.2	12
Lemon	85	58	1.0	0.9	11
Cashew	85	-	0.7	-	13
Ripe pawpaw	81	40	0.5	0.8	16

Adapted from (Ihekereonye and Ngoddy, 1985)