



RESEARCH PAPER

Nutritional Profile of Shea Tree (*Vitellaria paradoxa*) Fruit Pulp in Lapai, Nigeria

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ABSTRACT

Shea tree (*Vitellaria paradoxa*) is widely recognized for the butter produced from the nut. This has overshadowed the pulp's worth. The nutritional composition (proximate and mineral) of shea pulp was investigated. The proximate values of Shea pulp showed that the Carbohydrate content is 70.24 ± 0.52 %, Ash content 10.18 ± 0.13 %, Moisture Content 4.29 ± 0.09 %, Crude Protein 3.68 ± 0.02 %, Crude Fibre 10.93 ± 0.90 % and Crude Lipid Content 0.96 ± 0.14 %. The study presented a value of $81.5 \text{ mg}/100 \text{ g}$ of vitamin C and the mineral composition of the Shea pulp reveals phosphorus with the highest value of 47.62 ± 0.01 %, Sodium 30 ± 0.01 %, Magnesium 1.015 ± 0.01 %, Iron 0.977 ± 0.01 % and potassium with the lowest value of 0.841 ± 0.02 %. The research concluded that the Shea pulp in Lapai, Niger state, Nigeria, has adequate nutritional compositions that are important in the human diet. The high carbohydrate, crude fiber, and vitamin C content of Shea pulp present an appealing combination that will aid in the reduction of hunger in rural areas during the ripening season, as well as increase the Shea value chain and economic value.

Keywords: Cashew, Cashew Apple, Jam, consumer acceptability

INTRODUCTION

The *Vitellaria paradoxa* tree is also known as the Shea tree. It belongs to the *Sapotaceae* family and consists of two species: *Vitellaria paradoxa* (formerly *Butyrospermum paradoxa*) and *Vitellaria parkii*. It is a fruit tree as well as an oilseed crop. When mature, the Shea tree produces a fruit with soft and sweet pulp. The epicarp and mesocarp make up the fruit's nutritious pulp. The fruit is green when mature and yellowish when fully ripe (Aguzue *et al.*, 2013). The Shea fruit is made up of a thin, tart nutritious pulp that surrounds a large, oil-rich seed from which Shea butter is collected. It is widely consumed by rural residents; it is sold in the local market and is also used as livestock feed. The fruit ripens in the early rainy season, providing farmers with food while on the farm and supplementing the reduction of food reserves at that critical time (Adazabra *et al.*, 2013, Aguzue *et al.*, 2013).

Fruits from plants, particularly agroforestry species, have been reported as good sources of dietary supplements in general. This is due to their nutritional compositions, which provide the necessary requirements for the human body

to grow and prevent children's malnutrition (Bala and Bashar, 2017). According to (Akoma *et al.*, 2018), Fruit pulps are high in sugar, calcium, iron, potassium, magnesium, and phosphorus, with Vitamin C being the most abundant. Vitamin C is an antioxidant that lowers the risk of high blood pressure, boosts human immunity, and a lack of it can lead to scurvy. Most of these fruit pulps are anti-carcinogenic and thus have chemotherapeutic properties. They're also used to treat pain in the bones, nerves, inflammation, dislocation, and arthritis. As a result, these fruit pulps are essential components of both human and animal diets for growth and proper function. However, the Shea tree is best known for its butter, which is extracted from its nut. In some parts of West Africa, the Shea butter/oil is regarded as the most important source of cooking oil as reported by (Umali and Nikiema, 2002). It is sometimes used to replace palm oil during rainy seasons when palm trees do not thrive (Aguzue *et al.*, 2013). Several

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researchers have reported that the socioeconomic value of the Shea tree appears to have overshadowed the fruit pulp's value. (Adazabra *et al.*, 2013, Aguzue *et al.*, 2013, Akoma *et al.*, 2018, Mbaiguinam *et al.*, 2007, Ugese *et al.*, 2008). Their research indicates that the Shea pulp is just as important as the rest of the Shea tree.

Furthermore, the nutritional composition of Shea fruit pulp across Nigeria's major distribution zones, excluding Niger state, was reported by (Ugese *et al.*, 2008). In Niger state, detailed information on the nutritional compositions of Shea fruit pulp was deemed necessary in order to determine its nutritional value and potential industrial or commercial value.

METHODOLOGY

Collection and Preparation of Sample

Shea fruit was picked from the study area in Cheche village, Lapai Local Government Area Niger State. It was kept in a clean polythene bag to avoid contamination then labelled and then transported to the department of Food science/Biochemistry laboratory in Ibrahim Badamasi Babangida University, Lapai for analysis. The Fresh fruits were depulped and the fruit pulp, comprising the epicarp and mesocarp, were oven-dried at 50°C to a constant weight (for three days). The dry sample was then milled for further analysis (Aguzue *et al.*, 2013).

Proximate Analysis

Proximate composition (Carbohydrate, Moisture and crude protein content, ash content, and crude fibre) was determined using official methods of analysis (AOAC, 2000). Determinations were done in triplicate and results were expressed as the averages on dry weight basis

Vitamin C Analysis

5g of the sample was dissolve in 500cm³ volumetric flask and made up to the mark with distilled water and filtered 50cm³ of the solution was pipetted in to 100cm³ volumetric flask. 25cm³ of 20% meta phosphoric acid was then added and made up of distilled water. 10cm³ of the solution was then pipetted into the flask and 2.5cm³ of acetone was then added. This was then titrated with indophenol solution until a faint pink color persisted for 15 second.

The vitamin c content was then calculated using the formula below

$$\text{Vitamin C (mg/100cm}^3) = \frac{\text{Sample titre (T)} \times \text{Concentration}}{\text{Standard titre}}$$

Elemental/Mineral analysis

Mineral analysis was done using Atomic Absorption Spectrophotometer. The fruit pulp was analyzed for Calcium (Ca), Sodium (Na), Magnesium (Mg), Iron (Fe), potassium (k) and phosphorus (P). Analyses of the minerals were carried out in triplicate and all values expressed as Mg/l.

Data Analysis

The mean data of triplicate proximate was computed using BM SPSS software version 23 to determine the standard deviation and standard error.

RESULTS AND DISCUSSION

The proximate values of Shea pulp is presented in table 1. The values obtained shows that the Carbohydrate content is 70.24±0.52 %, Ash content 10.18±0.13 %, Moisture Content 4.29±0.09 %, Crude Protein 3.68±0.02 %, Crude Fibre 10.93±0.90 % and Crude Lipid Content 0.96±0.14 % respectively. The estimated energy (Cal 100g⁻¹) is 1278.144Kj/100g. This result is similar to those reported by (Aguzue *et al.*, 2013) and (Ugese *et al.*, 2008), in which carbohydrate was high and crude fibre was low but within range when compared to other agroforestry species such as the star apple (*chrysophyllum albidum*) and Africa pear (*Dacryodes edulis*) with values 4% and 17.9% respectively. Shea fruits, like other fruit pulps, are high in carbohydrates. When consumed, it provides farmers with an immediate source of energy (Okullo *et al.*, 2010). Crude fibre is well known to be an important component of the human diet. It aids in the prevention of bowel disorders, colon diseases, diabetes, cardiovascular disease, and obesity (Vincent *et al.*, 2009). In the Shea pulp samples, crude fibre was found to be within the range of most wild and cultivated fruits. This is also in line with the observations of Shea pulp findings in Uganda. Protein and lipid content were found to be low in the sample, which is typical of most tropical fruits in West Africa (Okullo *et al.*, 2010).

The vitamin c content of Shea fruit pulp is reported in table 2. The study presented a value of 81.5mg/100 of vitamin C. This falls within the same range as citrus and some other fruits as reported by Okullo *et al.*, (2010) in Uganda. And as earlier stated, Vitamin C plays an important role in human diet by boosting immunity and serving as an antioxidant. regular consumption of fruits like the Shea fruit is important (Akoma *et al.*, 2018, Okullo *et al.*, 2010).

The mineral composition of the Shea pulp result reveals phosphorus with the highest value

of 47.62±0.01 %, Sodium 30±0.01 %, Magnesium 1.015±0.01 %, Iron 0.977±0.01% and potassium with the lowest value of 0.841±0.02% (see Table 3). The obtained results revealed lower values than studies in other locations such as Uganda and even some parts of Nigeria (Adazabra *et al.*, 2013, Akoma *et al.*, 2018, Okullo *et al.*, 2010). Their calcium, manganese, and magnesium concentrations were higher and comparable to those reported by Maranz *et al.*, (2004). The variation in these minerals between locations may be due to climatic factors and the rates at which the elements are taken up by plants from the soil.

Table 1: Proximate analysis result of Shea pulp

Parameters	First Analysis	Second analysis	Third analysis	Mean%	Concentration in(SD)
Moisture	4.23	4.25	4.39	4.29	4.29 ± 0.09
Ash content	10.07	10.33	10.14	10.18	10.18 ± 0.13
Crude protein	3.67	3.69	3.70	3.68	3.68 ± 0.02
Crude fibre	11.10	10.79	10.91	10.93	10.93 ± 0.90
Crude lipid	0.97	1.10	0.81	0.96	0.96 ± 0.14
Carbohydrate	70.83	69.84	70.05	70.24	70.24 ± 0.52
Energy value					1278.144KJ/100g

Value are mean ± standard deviation of three triplicate difference

Table 2: Vitamin C result for the Shea pulp

Vitamin	Composition (mg/100g)
Vitamin C (Mg/100)	81.51

Table 3: mineral analysis of Shea pulp

Elements	Concentration in Mg/L
Calcium	1.095 ±0.02
Sodium	1.130±0.01
Magnesium	1.015±0.01
Iron	0.977±0.01
Potassium	0.841±0.02
Phosphorus	47.62±0.01

Values are mean ± standard deviation of three triplicate difference

Conclusion

According to the findings of this study, Shea pulp is a good source of carbohydrate, crude fiber, and vitamin C. Its nutritional value suggests that it aids in the alleviation of hunger in rural areas during its ripening season. It also suggests ways to improve the Shea value chain and the economic value of Shea fruit in general.

The nutritional information also includes suggestions for how to introduce new products, such as juices and jams. This will aid in the preservation and availability of Shea pulp juice throughout the year.

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