

Nutritional Evaluation of *Cola lepidota* Nut (Yellow Monkey Kola) from the Niger Delta Region of Nigeria

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Abstract

Cola lepidota fruit is an edible plant material that is local to the Niger Delta Region of Nigeria. This study was carried out to determine the nutritional potentials of *Cola lepidota* nut. The fruit was sourced from an outdoor outlet in Yenagoa, Bayelsa State, Nigeria. The deshelled nut was blended and then subjected to proximate analysis via AOAC methods, mineral contents via atomic absorption spectrophotometry, AAS and its Vitamin C content analysed using titrimetric method. The proximate analysis showed that the nut contained moisture (18.43 ± 0.03 %), ash (0.32 ± 0.00 %), crude fibres (17.55 ± 0.04 %), crude lipids (9.72 ± 0.07 %), crude protein (19.12 ± 0.12 %) and carbohydrate (34.86 ± 0.08 %). The mineral analysis revealed the presence of major and trace elements such as K (2.505 mg/l), Na (2.560 mg/l), Ca (0.649 mg/l), Mg (1.043 mg/l), Fe (0.216 mg/l), Cu (0.065 mg/l), Zn (0.017 mg/l), Pb (0.000 mg/l), Cd (0.002 mg/l) and Mn (0.012 mg/l). The vitamin C analysis was revealed to be (105.35 ± 4.15). These results have established that *C. lepidota* has phytoesters, nutritional value, essential trace elements and vitamin C.

Keywords: Proximate, minerals, vitamin C

Introduction

Nuts were cultivated as alternative or complimentary sources of essential micro-, macro- and anti-nutrients, vital energy, vitamins and mineral elements (Sachdeva *et al.*, 2013). They are essentially used ethnomedicinally as remedies for human health challenges due to their phytochemical composition such as phenols, flavonoids, tannins, alkaloids, terpenoids, and saponins could serve as targets in drug discovery and synthesis with known bioactivities such as antioxidant, anti-inflammatory and cardio-protective (Bailey *et al.*, 2009).

Cola lepidota is one of the species that is commonly called monkey kola. It belongs to the family “Malvaceae” (Ogbu and Umeokechukwu, 2007). It is locally called “Achicha” and “Ndiyah” amongst the Igbos and Efiks ethnicity respectively (Oni *et al.*, 2019). The plant is native to the lower Guinea, Gabon, Western Cameroon and Eastern Nigeria. The plant is also found growing in the wild in the Niger Delta region of Nigeria. The fruit has a brownish pericarp, yellow mesoparp

(pulp) and a roundish endocarp (nut). It is edible, crunchy and tasty, and are consumed in large quantities by humans due to the enormous nutritional value of its pulp (Okudu *et al.*, 2016). The present study seeks to evaluate the nutritional, mineral and vitamin C contents of the nut of *Cola lepidota*.

Materials and Methods

Collection and Identification of Plant Material

The *C. lepidota* fruits were sourced from an outdoor outlet in Yenagoa, Bayelsa State, Nigeria. The fruits were identified by a Biologist with the Department of Biology, Federal University, Otuoke, Bayelsa State. The fruit was deshelled, the mesocarp removed and the endocarp (nut), NCL was profiled for its proximate composition, minerals and vitamin C contents.

Proximate Composition

Moisture, lipid, protein, ash and fibre composition of NCL were evaluated by the procedure of AOAC (1990). The carbohydrate content of NCL was obtained of the difference of the total sum of Moisture, lipid, protein, ash and fibre from 100% (Pearson, 1976).

Determination of Minerals

The mineral content of NCL was evaluated using the procedure of Idouraine *et al.* (1996). 0.5 g NCL was and dried-ashed with a muffle furnace at 550 °C. The ash was subjected to digested using 2 ml conc. nitric acid. The digest was filtered and the filtrate made up to 100 ml in a standard volumetric flask with deionized water. Mineral contents were evaluated using flame photometer (Jenway model PFP7) and atomic absorption spectrophotometer (Perkin Elmer Model 3030). The minerals analyzed for were: K, Na, Ca, Mg, Fe, Cu, Zn, Pb, Cd and Mn.

Determination of Vitamin C

The vitamins C content of NCL was determined using titrimetric method of AOAC (2006). 25 ml of the filtrate of aqueous extract of 2 g NCL was transferred into a 100 ml conical flask. 1 ml of starch solution (0.5 % w/v) was added to the solution as an indicator. The sample was then titrated against iodine solution (0.005 M). The endpoint of the titration was identified as the first permanent trace of a dark blue-black colour due to the starch-iodine complex. The analysis was repeated thrice and the amount of vitamin C in the sample was calculated. Every 1 ml of 0.005 mole of iodine consumed is equivalent to 0.0008806 g vitamin C (Odokwo and Uzoekwe, 2024).

Statistical Analysis

Data obtained were expressed as mean of triplicates determinations \pm standard deviation (SD). The Statistical Package for Social Scientists (SPSS version 20.0) was used for all data analysis.

Results and Discussion

Table 1 Proximate Analysis of NCL

S/N	Proximate composition	Amount
1.	% Moisture Content	18.43±0.03
2.	% Crude Lipids	9.72±0.07
3.	% Crude Fibre	17.55±0.04
4.	% Crude Protein	19.12±0.12
5.	% Ash Content	0.32±0.00
6.	% Carbohydrates	34.86±0.08

*Mean±standard deviation

The proximate composition of NCL is presented in table 1. The analysis shows that the nut has high carbohydrate content and least in ash content. Udousoro and Essien (2017) reported moisture content (55.00±0.50%), ash content (4.53±0.025%), fibre (3.47±0.025%), protein (6.12±0.0185%), lipid (1.53±0.026%) and carbohydrates (84.33±0.165) for the fruit pulp; moisture content (24.80±0.22%), ash content (2.84±0.015%), fibre (2.44±0.038%), protein (8.05±0.350%), lipid (0.59±0.021%) and carbohydrates (86.07±0.385) for the seed; moisture content (30.50±0.05%), ash content (5.90±0.00%), fibre (4.41±0.021%), protein (8.28±0.404%), lipid (0.73±0.115%) and carbohydrates (80.68±0.230) for the fruit pericarp. The lipid, fibre and protein contents of the nut of *Cola lepidota* in the present study were higher when compared to those reported for the seed by Udousoro and Essien (2017). The waxy aril of *C. lepidota* was reported by Ogbu *et al.* (2007) to contain 82.6 g/100 (moisture content), 1.58 g/100 g (fibre), 1.75 g/100 g (crude protein) and 25.8 g/100 g (carbohydrate).

The nut of *C. lepidota* is rich in mineral elements such as the potassium, sodium, calcium, magnesium and other trace metals such as iron, copper, zinc and manganese. Higher amount of potassium, sodium, calcium and magnesium were also observed by Udousoro and Essien (2017); Ene-obong *et al.* (2016). Heavy metal of concern such as lead was not detected. Cadmium level was below the tolerance limit (FAO. WHO, 1996; Pan and Han, 2023). Potassium and sodium are known intracellular and extracellular principal base ions notably in maintenance of electrical potential of the nervous system and activity of nerves, regulation of water-electrolyte and acid-base balances in biochemical systems (Kpomah and Odokwo, 2020). The presence of calcium and magnesium is significant for the bone and teeth development amongst the metabolic roles they are directly or indirectly involved. The result of the present study also indicated the presence of trace amount of iron known for its traditional oxygen transport support, copper notably for cardiovascular integrity, adequate growth, lung elasticity, red blood cells, maintenance of nerve cells, formation of collagen and energy production and also helps the body systems absorb iron (Kpomah and Odokwo, 2020; NRC, 2000). Zinc is also present in NCL and has been reported to be found in bones and teeth, essential for the formation of hemoglobin, aid oxygen transport, used as supplement in the treatment of diarrhea and also exhibit aphrodisiac activity (Roohani *et al.*

(2013); Bialek and Zyska, 2014; Dissanayake *et al.* (2009), Abbaspour *et al.* (2014); Fontaine, 2001).

Table 2 Mineral Contents of *Cola lepidota*

SN	Metal	level (mg/g)
1	Potassium, K	2.505
2	Sodium, Na	2.560
3	Calcium, Ca	0.649
4	Magnesium, Mg	1.043
5	Iron, Fe	0.216
6	Copper, Cu	0.065
7	Zinc, Zn	0.017
8	Lead, Pb	0.000
9	Cadmium, Cd	0.002
10	Manganese , Mn	0.012

The vitamin C content of NCL ranges from 100.56 to 100.75 mg/100g with a mean value of 105.35 ± 4.15 mg/g of NCL. This shows the nut is rich in vitamin C. Similar work carried out by Udousoro and Essien (2017) using chromatography technique revealed the presence of vitamin C per 100 g of *Cola lepidota* to be 6.496900 mg (fruit), 0.527443 mg (seed) and 6.136570 (fruit pericarp). Vitamin C is needed essentially as an oxidant and in the biosynthesis of collagen, L-carnitine, neurotransmitters and protein metabolism (Li and Schellhorn, 2007; Carr and Frei, 1999).

Conclusion

The nut of *C. lepidota* contains substantial level of nutrients, vital mineral elements and vitamin C. The present study has established that the nut of *C. lepidota* could serve as supplement in feedstock production and other agro-based formulations for the provision of essential nutrients, minerals and vitamins.

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