Nutrient Composition of *Lasianthera africana* (NKANKA) and its Spoilage Moulds

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DOI: 10.56201/jbgr.v8.no2.2022.pg13.21

Abstract

The research on the nutrient composition of Lasianthera africana (Nkanka) and its spoilage moulds was carried out in the Department of Plant Science and Biotechnology Rivers State University Portharcourt. The nkanka leaves were purchased from Mile 3 Market in Portharcourt and was analysed in the laboratory of of Plant Science and Biotechnology, Rivers State University. The results of the proximate analysis of Lasianthera africana leaves revealed that the leaves are rich in moisture (65.45±0.07%) ash (4.515±0.01%), lipid (3.515±0.02%) fibre (6.48±0.06%), carbohydrate (3.34±0.07%) and protein (16.70±0.07%) respectively. Mineral assessment revealed the presence of Calcium, Iron, Magnesium, Phosphorus, Potassium, Sodium and vitamin C, A and B1. Phytochemical composition showed the presence of Glycoside, Oxalate, saponins, tannins, carotenoid, polyphenol, flavonoid and lignant. The fungal characterization produced three organisms viz; Aspergillus niger, Rhizopus sp, and Mucor sp with perentage incidences of 60% and 20% respectively. In conclusion, lasianthera africana leaves should be regularly consumed as they are used for the treatment of diarrhoea, dysentry, stomach troubles, ulcers and diabetes and also they are prone to fungal contaminations. Therefore, proper care should be taken during harvest and storage to reduce contamination.

Keywords: *Nutrient composition, Lasianthera africana and spoilage moulds*

INTRODUCTION

The *Lasianthera africana* is a perennial, glabrous, shrub that belongs to the family lcacinaceae. It is called Nkanka in Igbo, Editan in Efik, and Ibibio local dialects of Nigeria. It grows up to a height of 61 - 136cm (Hutchinson and Dalziel, 1973). Among the Ibibios, four local varieties (afia, obubit, akai and idim) distinguished by their taste, leaf colour and ecological distribution are known (Bassey *et al.*, 2006). The leaves are consumed as vegetable in southern Nigeria. *L. africana* is commonly used as antacid, analgesic, antispasmodic, laxative, antipyretic, antiulcerogenic, antidiabetic and antimalarial (Okokon, *et al.*, 2007). Biological activities reported on *Lasianthera africana* include bacteriostatic (Itah, 1997), fungicidal (Itah, 1996) antidiabetic (Ekanem, 2006), antiplasmodial (Okokon, *et al.*, 2007), antimicrobial (Andy, *et al.*, 2008) and antiulcer (Okokon, *et al.*, 2009).

The leaf extract has been reported to contain alkaloids, terpenes, saponins, tannins, flavonoids, anthraquinones and cardiac glycosides with LD 50 value of 5000 mg/kg (Okokon, *et al.*, 2009). Traditionally, the leaves of all ethno-varieties are utilized for both food and therapeutic purposes especially in rural communities where they are mostly found. According to Andy *et al.*, (2008), the plant has been exploited since pre-historic time by traditional herbalists for the treatment of various ailments including typhoid fever, diarrhoea and candidiasis which has made it an endangered plant species.

MATERIALS AND METHODS

Procurement and identification of Nkanka Leaves

Fresh leaves of *Lasianthera. africana* were bought from mile 3 market in Portharcourt. The leaves sample were identified and authenticated by the Project Supervisor and by a Taxonomist in the Department of Plant Science and Biotechnology, Faculty of Science, Rivers State University, Nkpolu-Oroworukwo, Port Harcourt.

Nutrient analysis

The proximate composition was determined according to the method of AOAC (1990). Mineral contents were determined according to the methods of AOAC (2010).Analysis of Vitamin C was determined based on the method described by the Association of Analytical Chemist (AOAC, 1990). Analysis of vitamin B1 was determined according to the method of Okorie, (2010).

Determination of Anti-nutrient

Saponin content of the samples was determined by the method described by Harborne (1973), oxalate was determined according to the method of Onwuka (2005), tannin by Pearson, (1976), flavonoid and polyphenols was determined AOAC, (1990).

Plant preparation and processing

The collected leaves of *L. africana* were carefully separated from the stem, freed from sand and debris, and air-dried to a constant weight. The dried plant leaves were pulverized into powdered form and used for crude extraction.

Preparation of Mycological Medium

Sterilisation of conical flask, sties, Petri dishes and all the equipment needed for the experiment was carried out in the laboratory. the glass wares were sterilise in the oven at 120oC for an hour after washing with soap, while other equipment were surface sterilize with 70% ethanol to reduce microbial contamination (Chuku 2009). Inoculating loops and scalpels were sterilise by dipping for 20 seconds in 70% ethanol and heated to red hot. The mycological medium use was Sabouraud dextrose agar prepared in a conical flask using the standard method. The mouth of the flask was plugged with non-absorbent cotton wool and wrapped with aluminium foil. The conical flask containing the mycological medium was autoclaved at 121℃ and pressure 0f 1.1kg cm^{-1} for 15 minutes. The molten agar was allowed to cool to about 40℃ an ispense into petri dishes at 15mls per plate and allowed to further cool and solidify.

Isolation of Fungi

the direct plating method of Mehrotra and Aggarwal (2003) was adopted where sample spoilt were inoculate onto Sabouraud dextrose agar in petri dishes containing ampicillin to hinder the growth of bacteria and this was one in triplicate. The inoculate plates were incubate for 5 days at ambient temperature of 25℃ ±3℃. The entire set up was observed for 7 days to ensure full grown organisms. Pure cultures of isolates were obtained after a series of isolations.

Identification of Fungal organisms

Microscopic examination of fungal isolates was carried out by the needle mount method (Cheesebrough, 2000). The fungal spores were properly teased apart to ensure proper visibility. The well spread spores were stained with cotton blue in laeto proper and examined microscopically using both the low and high power objective. The fungi were identified base on their spore and colonial morphology, mycelia structured and other associated structure using keys of (Barnett and Hunter, 1998).

Determination of percentage Incidence

The percentage incidence of fungal occurrence was determined by the formula state below (Chuku *et al.*, 2019).

$\frac{X}{Y} \times \frac{100}{1} = \%$ Incidence

X=total number of each organism

Y=total number of all identified organism in a variety.

Results and Discussions

Table 1: Proximate composition of *Lasianthera africana* Leaves

Composition	Amount present (%)
Moisture	65.45±0.07
Ash	4.515±0.01
Lipid	3.515±0.02
Fibre	6.48±0.06
Carbohydrate	3.34±0.07
Protein	16.70±0.07

Table 2: Mineral and Vitamin Composition of *Lasianthera africana* Leaves

Mineral parameters/ Vitamin composition	**Concentration (mg/100g)**
Calcium	89.60±0.14
Fe	41.75±0.35
Mg	200.0±0.00
P	75.05±0.07
K	35.15±0.07
Na	50.0±0.00
Vitamin C	211.0±1.41
Vitamin A	0.00±0.0
Vitamin B1 (Thiamine)	11.07±0.034

Legend: Fe= Iron, Mg= Magnesium, P= Phosphorus, K= Potassium, Na= Sodium

Table 3: Phytochemical Composition of *Lasianthera africana* Leaves

Sample	**Concentration (%)**
Glycoside	0.34±0.01
Oxalate	0.45±0.01
Saponins	1.75±0.01
Tannins	0.25±0.00
Carotenoid	25.25±0.07
Polyphenol	6.25±0.01
Flavonoid	2.93±0.02
Lignant	1.96±0.02

Table 4: Fungal Isolates of *Lasianthera africana* leaves and their percentage incidences

Probable organism	**% incidence**
Aspergillus niger	60%

***Rhizopus* sp.**	20%
***Mucor* sp.**	20%

Proximate composition analysis showed high moisture composition, followed by a moderate protein content, fibre content, ash content, lipid content, and carbohydrate (CHO) content of Nkanka leaves. Proximate composition analysis carried out in our study showed that Nkanka leaves are rich sources of nutrients. In another study by Okon and James (2015) the proximate composition of Nkanka leaves was found 77.67% moisture, 63.92% carbohydrate, 7.06% lipid, 15.04% protein, 5.12% fibre, and 8.50% ash. Compared to our study, moisture, lipid and ash were almost similar, protein and fibre was higher while carbohydrate was lower. Similarly Olorunfemi *et al.,* (2011) showed that the leaf of *L. africana* found proximate composition of the leaf revealed crude fat (3.70), crude fibre (10.60), crude protein (10.94), ash (11.40), moisture (13.90) carbohydrate (73.36) and energy (370.50 Kcal).

The findings from mineral content analysis in this study showed a very high Mg content followed by Ca, P, Na, Fe, and K. In a similar study by Ojimelukwe, *et al.*, (2012) showed slightly different values of Mg, Ca, and K contents that is 45.60±0.03 mg/100g, 168.0±1.41mg/100g, and 13.62±0.02mg/100g respectively. Calcium was higher in their study. This may be owing to soil nutrient in the plants environment. Similarly Olorunfemi *et al.*, (2011) showed that the leaf of *L. africana* is rich in K (41.47), Ca (26.91), mg (18.53) and Na (13.16) while Fe, Zn, Cu and Pb are present in trace amount of 0.79, 0.42, 0.01 and 0.01 ppm, respectively.

The vitamin contents of the plant of Nkanka leaves analyses are vitamin C was higher followed by vitamin B1 and no vitamin A found in the study. In a similar study by Ojimelukwe, *et al.*, (2012) showed a slightly different values vitamin C was found to be 23.97±0.01mg/100g significantly lower than the present study content.

The study results showed low amount of anti nutrient such as glycoside, oxalate, saponin, tannin, carotenoid, polyphenol, flavonoid and lignant contents. Similarly, Olorunfemi *et al.*, (2011) showed that the leaf of *L. africana* has low anti nutrients like phytochemical screening proved moderate presence of steroid, trace amount of saponins, alkaloids and flavonoids and absence of tannins, anthraquinones, terpenes and phlobatannins. The leaf is safe for consumption as the antinutrient composition was very low (Olorunfemi *et al.*, 2011). In another study by Brown, (2007) who found the concentrations of the antinutrients in both dark and white varieties of *Lasianthera africana* to be on the low side as to constitute a health hazard, as they are within the safe level. The low concentration of antinutrients makes the plant safe for use (Brown, 2007). Antinutrients are required in low concentrations to effect biochemical changes; hence the plant may be effective as ethnomedicine (Okaka and Okaka, 2001). The presence of phytate (Phytic acid) in these varieties which is a hexaphosphate derivative of inositol is an important, storage form of phosphorus in plant. It causes calcium and zinc deficiency in man when in excess, the deficiency of these minerals results in Oteo-malacia, anaemia and rickets. However, it plays an important role in determining starch digestibility in food (Osagie, 1998). In plants it serves the purpose of preservation. Probably,

because of its presence, the leaves provide anti-inflammatory action on wounds, burns and ulcers.

From the results obtained from fungal characterization analysis of *Lasianthera africana*, macroscopic and microscopic examination showed the presence of *Aspergillus niger* with 60% incidence or occurrences, *Rhizopus sp* with 20% incidence or occurrences and *Mucorsp* with 20% incidences or occurrences respectively. In a similar study by Ebana *et al.*, (2016) the isolates were subjected to sensitivity testing using the extracts, the test isolates were inhibited differently by the various extracts the highest inhibition (25.00mm) was observed with *E. coli* with *Lasianthera africana*. The *Lasianthera africana* extracts were far better than the test isolates. Okoronkwo *et al*. also reported zones of inhibition and were slightly lower than that our findings. The observed inhibitory activity of these plants leaves have been used to explain why they are used in traditional practice and it is on the increase. Obire *et al*, (2016) isolated Rhizopus and Mucor to be associated with yams in barns, Wekhe and Chuku (2017) identified Rhizopus and Mucor to be associated with the spoilage of bread fruits.

CONCLUSION

Lasianthera africana leaves are rich in proximate, mineral and vitamin compositions but low in phytochemicals which makes the plant safe for use and as ethno-medicine but however, are prone to fungal contaminations.

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