Evaluation of the Diverse Nutrients of *Lasianthera africana* Leaf

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KEYWORDS

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ABSTRACT

A proximate analysis was conducted to evaluate the minerals, vitamins and macro-food molecules of endemic Lasianthera africana leaves in the natural forest of Nnamdi Azikiwe University, Awka. The results showed relatively low ash (6.40), crude protein (13.83%) and moisture content (9.14%) but high crude fibre (5.37%), fat (2.61%), carbohydrate (62.7%) and Energy Value (329.5k/cal).These suggested that it is an energy giving food source even though its relatively low protein but high in calcium (143.7mg) and iron (5.94), as well as Vitamins A(294.2±0.1ug/100g) and C (10.52±0.01mg/100g). The study indicates that leaves of this forest shrub constitutes a good source of carbohydrate, protein, minerals and vitamins that could augment as a source of food condiment for the teeming population particularly in the rural communities, with significant economic and nutritional challenges

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INTRODUCTION

The preponderance of leafy vegetables in the tropics has been a significant source of food nutrient and sustainable livelihoodin developing countries, especially asa none-wood timber forest produce (Sale *et al*, 2019; Egbonwole *et al*, 2018). This is attributable to the potentials of green leafy vegetable to augment for the inadequacies in vitamins and essential proteins often associated with the high in-take of carbohydrates in africa.*Lasiantheraafricana (E*ditan) is one of the top six commonly consumed green leafy vegetables bythe Efik and Ibibio ethnic groups of Nigeria in the South Eastern part of the country (Williams *et al*., 2009). It belongs to the family *Icacinacae*. It is called Nka- nka by the igbos, Editan by the Efik and Ibibio of southern Nigeria (Burkill H.M, 1985) It is a perennial shrub that reaches a height of 61-136cm (Hutchinson and Dalziel, 2000). Four local varieties among the Ibibios, have been reportedly distinguished by the taste, leaf colour and ecological distribution are well documented (Basse*yet al*.,2006). The varieties are “Afia” (white variety), “Obubit” (black variety), “Akai” (forest variety)and “Idim” (riverine variety). The leaf has been used since pre-historic time for preparing soup and traditional concoctions for the treatment of various ailments (Sofowora, 2009).

Ebana*et al*.(2006) reported that the leaves of *Lasiantheraafricana*are rich in chemical compounds such as alkaloids, flavonoids, saponins, anthraquinones, glycosides and tannins in the four Ethno-varieties (Basse*yet al*., 2006). One unique characteristic of *Lasiantheraafricana*leaf is thebitter taste that requires de-bittering prior to cooking.The petioles of the leaves are short, approximately 5 to 10mm long with slightly undulate margins. The leaf apex is acute or acuminate while the leaf base is acute or rounded. The leaves of Lasiantheraafricana have a mild and slightly repulsive odor.

The high ash content of vegetables is a determinant of its mineral content with a high percentage of ash content in leafy vegetables for some Nigerian vegetables ranging between 9.7%±0.1 - 18.6±0.1%(Asibey-Berko and Tayie, 1999;Lockeeth*et al*., 2000).Review of studies on crude protein determination showed that green leafy vegetables are potential protein source but of low value and due to low protein levels, high consumption is normallyrecommended for daily dietary allowance of protein (Roger *et al*., 2005). Studies reported byRoger *et al*. (2005) showed the percentage crude protein range of leafy vegetables to be between 17.22±0.05 to 22.16±0.04 %.The main aim of this study is to evaluate the nutritional composition of *Lasianthera Africana (*Editan) leaf in Unizik natural forest reserve.Therefore this study evaluated the minerals, vitaminsand macro-food molecules contents of *Lasiantheraafricanan (*Editan*)* leaf in view of the need to consistently augment these essential nutrient values that could lead to malnutrition in developing climes as Nigeria. Furthermore, information will be useful to nutritionists, foresters, botanist and health practitioners.

MATERIALS AND METHODS

Study Area

This work was carried out in the Department of Forestry and Wildlife natural forest of Nnamdi Azikiwe University Awka, Anambra State, between latitude 6.245º and 6.283ºN and longitude 7.115º and 7.122ºE, within the humid tropical rainforest Belt. The forest zone is characterized by shrubs, evergreen and deciduous trees species, thick undergrowth, open vegetative Lowland that is interspersed with oil palm trees and deciduous trees. It has an average annual rainfall of 1600-2000 mm. It has Mean annual temperature rangesbetween 27ºC and 35ºC (Richard, 2005).

Collection of samples

Samples of *Lasianthera africana* leaf were obtained from the natural forest of the Department of forestry and Wildlife, Nnamdi Azikiwe University Awka, Anambra State. The leaves of Nka-nka were identified by a professional Forester for its varieties and collected with the aid of a knife. The leaves were collected in the evening between the hours of 4 and 5pm when the plants have completed light stage of photosynthetic process for the day. The quantity of leaves was air-dried at an average room temperature of 27°C for seven days and then milled with a blender. The milled samples were further sieved with a 0.02mm pore size filter to obtain a fine powdery dust. The powdered test samples were stored in a dry, clean container with lid for laboratory analysis.

Proximate composition

The analysis was conducted at the Food Profiling Biotechnology Laboratory,National Root Research Institute (NRCRI) Umudike, Umuahia. The proximate analysis was carried out on the leaf of *Lasianthera africana.* The method that was used for the proximate analysis was official analytical Chemistry (AOAC, 2010).

Statistical Analysis

Analysis of variance (ANOVA) was carried out on the data obtained from the Laboratory using Genstat 12 edition.

RESULTS

Proximate content of Lasianthera africana

The result showed relatively low ash (6.4%), crude protein (13.83%) and moisture content (9.14%) but high crude fibre(5.37%),fat(2.61%),carbohydrate(62.7%) and Energy value (329.5k/cal).

Table 1: Proximate Analysis of *Lasianthera africana* (Editan)

MC (%)	CP (%)	CF (%)	FAT (%)	ASH Mg/100g	CHO Mg/100g	EV K/cal
9.15±0.04	13.83±0.02	5.37±0.02	2.61±0.01	6.40±0.08	62.7±0.08	329.5±0.19

Where,MC-Moisture Content, CP- Crude Protein, CF- Crude Fibre, CHO- Carbohydrate, EV-Energy value

Mineral composition of *Lasianthera africana*

The mineral composition is showed in Table 2. There was a high calcium content of 143.7±0.08mg/100g and Sodium (131.9±0.09mg/100g).It showed relatively low magnesium content of 38.08±0.05mg/100gand a high potassium content of 227.1±0.06mg/100g.For Iron, this result showed a relatively high iron content of 5.94±0.25mg/100g.

Table 2: Minerals composition analysis *Lasianthera africana* (Editan)

Calcium Mg/100g	Sodium Mg/100g	Magnesium Mg/100g	Potasium Mg/100g	Iron Mg/100g
143.7±0.08	131.9±0.09	38.08±0.05	227.1±0.06	5.94±0.25

Vitamin content of Lasianthera africana

Table 3 shows the vitamin compositions. There was a high Vitamin A content of 294.2±0.1ug/100g and

vitamin B1(0.757±0.03mg/100g). The vitamins B2 content of 0.61±0.01mg/100g and B3 content of 0.38±0.01mg/100g. Vitamins C was 10.52±0.01mg/100g and E(0.30±0.01mg/100g

Table 3: Vitamin composition analysis of *Lasianthera africana* (Editan)

VIT A ug/100g	VIT B1 Mg/100g	VIT B2 Mg/100g	VIT B3 Mg/100g	VIT C Mg/100g	VIT E Mg/100g
294.2 ±0.1	0.757±0.03	0.61±0.01	0.38±0.01	10.52±0.01	0.30±0.01

VIT: Vitamin; VITA (Retinol), VIT B1 (Thiamin), VIT B2(Riboflavin), VIT B3(Niacin), VIT C (Ascorbic acid).VIT E (tocopherol)

DISCUSSIONS AND RECOMMENDATION

The results generally revealed that the minerals, vitamins and Macro food molecules compositions of *Lasianthera africana* leaves gotten from Nnamdi Azikiwe University Natural Forest, Awka.The proximate analysis showed a moisture content of 9.147±0.08% which was relatively low but within the standard condition that can enhance shelf life during storage. This result is in agreement with Mohammed *et al.* (2020) and Yakubu*et al.* (2012) which states that reported the effect of high moisture content can cause spoilage and reduce the shelf life of the food plant materials. However, it also asserted that low moisture content could lead to significant taste of bitterness and loss of nutritional value probably due to poor hydrophilic responses that allows for intermediate hydrolysis that could minimize the bitterness. This state can worsen with dry climatic conditions especially in the dry season within the tropics where this trees species is endemic.

The Crude protein content was relatively high (13.83±0.02%) because the food materials have been proportionally required to provide crude protein more than 12% of their caloric value from proteins as shown by Illondu (2010). The result therefore reveals that Ethan may be good sources of protein particularly in the midst of poor intake of protein diets due to cost of dairy products in the region of study. The *Lasianthera africana* leaves could therefore be classified as rich in proteins and serve as substitutes for protein, especially among rural dwellers, with economic challenges. Proteins are building block units and the food protein is needed to make vital hormones, important brain chemicals, antibodies, digestive enzymes, and necessary elements for the manufacture of DNA.

However, the crude fiber content compared to result obtained by Oboh*et al*. (2018), Eromosele*et al*. (2012) and Ojinnaka*et al.* (2019) showed a low value of of 5.373±0.015%. It was also lower than the result obtained by Adesina *et al.* (2020) and Abdulrahman *et al.* (2015). This may not be unconnected with either the method of preparation or location of the plant, especially the ecological zone which play key role in species differentiation for shrubby trees species. But the fat content (2.61±0.01%) was similar to the result obtained by Owolabi *et al.* (2015) and Adetunji *et al.* (2019).

Furthermore, ash content was low (6.4±0.08mg/100g) compared to earlier results obtained by Omoregie *et al.* (2012) and ogbonna *et al.* (2014) probably due to the location of the plant or method of analysis . Carbohydrate content of 62.7±0.08mg/100g showed similar result obtained by Gbadamosi *et al.* (2015) but slightly differed from Olajide*et al.* (2017) perhaps as a result of variation in photosynthetic potentials owning to leaf arrangement as well as ecological adaptation traits. This invariably influenced the high energy value of 329.5K/cal which was higher than the result obtained by Olatunde *et al*. (2015) to suggest that *Lasianthera africana* leaves represent good sources of energy and fiber.

The mineral composition was high in calcium content (143.7±0.08mg/100g) when compared with the earlier results obtained by Akindele *et al.* (2010), Adeniji *et al*. (2018) Oyetayo *et al*. (2018) and Onwukaeme *et al.* (2011). Although the methods of preparation have been adduced as probable reason, the individual capacities of studied plant species in response to nutrient retention during early growth could be contributory. For Sodium, the result showed high sodium content of 131.9±0.09mg/100g. This result was higher than the result obtained by Odeyemi and Akinloye (2017) and Ajiboye *et al*. (2012). Magnesium was low magnesium content of 38.08±0.05mg/100g. this result was lower than the result obtained by Oluwole *et al.* (2018). Potassium composition was relatively a higher (227.1±0.06mg/100g) than the result obtained by Ajayi *et al*. (2015) while the Iron content, (5.94±0.25mg/100g) was lowerthan the result obtained by Oboh *et al.* (2017) and Akindahunsi *et al*. (2015). The minerals content in *Lasianthera africana was* K > Ca > Na > Mg >Fe with potassium (K) as the predominant mineral element detected while Fe^{2+} was the least detected minerals element. This finding confers significant food value to this Ethan as critical source of inorganic mineral elements such as potassium and calcium which are known to play vital roles in the maintenance of normal glucose-tolerance and the release of insulin from beta cells of islets of Langerhans that helps to control the glucose level of in humans.

The study also revealed *Lasianthera africana* as a rich source of Vitamins A, C, E, B1, and B2 and hence a probable effective value in the treatment of of common ailments as postulated by (Adenuga*et. al.*,2010). Although the *Lasianthera africana* leaf contains more vitamin B1 (0.76mg/100g) and vitamin E (0.30mg/100g),.the higher contents of Vitamins A and C which have been reported to avert the formation of cancer-causing N-nitrous compounds (Kaur and Kapoor, 2001) presents the study findings as critical to the search for readily available non-concomitant sources of antidotes in food plants for the combat of cancer in man. The high content of Ascorbic acid of Lasiantheraafricana indicates the leaves might be a source of vitamin C. Although there are variations in Lasiantheraafricana leaf vitamins composition, this finding is in line with that of (Nwaoguikpe, 2010) Proximate analysis of *Lasiantheraafricana*leaves has revealed that they are a rich source of essential nutrients, including carbohydrates, proteins, fiber, vitamins, and minerals. This suggests that the consumption of Lasiantheraafricana leaves could contribute to meeting the daily nutritional requirements of individuals.Overall, the findings of the proximate analysis of *Lasiantheraafricana*leaves suggest that they have significant potential as a source of both medicinal and nutritional benefits.

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