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Comparative Proximate Analysis of T. Occidentalis (Fluted Pumpkin) Leaves Sold In Three Different Markets in Benin City, Nigeria

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Abstract: ***Research was carried out to investigate the proximate analysis of Telfairia occidentalis (Fluted pumpkin) leaves sold in three different markets in Benin-City, Edo State Nigeria. Samples of each substrate were randomly purchased from three different sellers in each market. The proximate analysis was carried out using standard methods of food analysis. Experimental results revealed that across the markets, moisture content was the highest and ranged from 91.25±0.38 to 92.45±1.02%, crude fibre content ranged from 2.98±0.22 to 3.51±0.13%, carbohydrate content ranged from 2.65±0.05 to 3.29±0.15%, the protein content ranged from 1.05±0.03 to 2.06±0.15%, the fat content ranged from 0.25±0.05 to 0.45±0.04% and the ash content ranged from 0.18±0.02 to 0.28±0.04%. The results were compared using an analysis of variance test. There were no significant differences in the nutritional composition of Telfairia occidentalis (Fluted pumpkin) leaves sold in the three different markets considered (p > 0.05).***

Keywords: ***Tropical, Telfairia Occidentalis, Benin-City, Vegetable, Proximate Analysis, Nutritional Composition.***

1. INTRODUCTION

Telfairia occidentalis (Fluted pumpkin) leave is a greenish nutritious vegetable grown in Nigeria and other tropical regions around the world. It is a creeping vegetable with lobed leaves and thrives best in soils containing organic matter (Samson and Isaac, 2019). In Nigeria, it is popularly known as 'Ugu' by the Igbos, 'Kabewa' by the Hausas, 'Iroko' or 'Akporoko' by the Yorubas, 'Ubong' by the Efiks, 'Umee' by the Urhobos and 'Umeke' by the Edos (Akoroda, 1990). The leaves can be taken or cooked along with other foods; they can also serve as vegetable salad or juiced using water to make the juice extract. There are many proven health benefits of fluted pumpkin leaves. They are known to promote good heart health and help in the prevention of cardiovascular diseases (Oboh *et al*., 2006). They

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increase breast milk production for lactating and breastfeeding mothers (Nwufo, 1994). They have sufficient fibre which is essential for blood sugar control and prevention of diabetes. They are also known to enhance fertility and help in the prevention of prostate cancer (Akoroda, 1990). They also boost blood production and flow in the body, help the brain and nervous system function optimally, and are used in the preparation of herbal medicine used to treat convulsion and anaemia (Samson and Isaac, 2019). Lastly, the blood schizontocidal activity of the *Telfairia occidentalis* root is comparable to that of chloroquine (Okokon *et al.*, 2007). Thus, it can be effectively applied in the treatment of malaria.

The need to study variations in the nutritional composition of fluted pumpkin leaves within a particular region is essential in order to ascertain possible significant differences that may have arisen as a result of contamination. This research work is aimed at (1) knowing the nutritional composition of *Telfairia occidentalis* (Fluted pumpkin) leaves consumed at different locations within Benin-City, Edo State Nigeria and (2) supplying information on possible variations in its nutritional composition. The results were also compared with others from other states.

2. MATERIALS AND METHODS

Sample Collection

Freshly harvested *Telfairia occidentalis* (Fluted pumpkin) leaves were randomly purchased from four different sellers each in Oba Market, Evbuotubu market and Ikpoba market, Benin-City, Nigeria. They were washed with distilled water, air-dried and sliced to about 2 – 3 cm with a clean knife.

Determination of Percentage Moisture Content

Five (5) g of sample was weighed into a known-weight crucible and placed in an oven at 105°C for 2 hr. The sample and crucible weights were recorded and constantly checked until a constant weight was achieved. Loss in weight was calculated as the percentage moisture content according to the expression in equation 2 below (Moronkola *et al.*, 2011).

$$\% \text{ Moisture} = \frac{\text{Loss in weight due to dryness}}{\text{Weight of sample taken}} \times 100 \quad (1)$$

$$= \frac{W2-W3}{W2-W1} \times 100 \quad (2)$$

Where; W1 = weight of empty crucible,
W2 = weight of crucible + sample before drying and
W3 = weight of crucible + sample after attaining constant weight on drying

Determination of Percentage Ash Content

A porcelain crucible with cover was ignited in a hot Bunsen burner flame and then cooled in a desiccator before being weighed. Five (5) g of sample was accurately weighed into the crucible and gently placed in the muffle furnace at 600°C for 4 hr. The crucible was placed in

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the desiccator to cool. After cooling, the ashed sample in the crucible was weighed. Using the formula in equation 3 below, the ash content was calculated (Moronkola *et al.,* 2011).

$$\% \text{ Ash content} = = \frac{W3-W1}{W2-W1} \times 100 \qquad (3)$$

Where, W_1 = weight of empty crucible,
W_2 = weight of crucible + sample before ashing and
W_3 = weight of crucible + sample after ashing

Determination of Percentage Crude Protein Content
On ashless filter paper, five (5) grams of finely dried material were weighed. The paper with sample was folded and dropped into the digestion flask. Twenty (20) ml of sulphuric acid (H_2SO_4) and 4 pieces of granulated zinc were added and then heated gently inside a fume cupboard for 6 hr. The flask's contents were allowed to cool. Diluted with distilled water, the solution was transferred to an 800 ml Kjehldah flask. 100 ml of 40% NaOH was added and distilled. This was followed by titration against 0.05% of boric acid solution using methyl red as indicator. The protein content was estimated from the amount of nitrogen present in the sample according to equation 4 and 5 (AOAC, 1990).

$$\% \text{ N} = \frac{0.014 \text{ x M x V x } 100 \text{ x D.F}}{\text{Weight of Sample}} \times 100 \qquad (4)$$

$$\% \text{ Crude Protein} = \% \text{ N x } 6.25 \qquad (5)$$

Where M = the molarity of acid, V = the volume of acid used, and D.F = the volume ratio of solution.

Determination of Percentage Crude Fat
Two (2) gram of sample was put in a beaker and weighed; the weight was noted as "W". Thereafter, 10 ml of water was added, and the solid was dispersed by agitation. The solid particle was dissolved and the slurry turned brown when ten (10) ml of conc. HCl was added and placed in a boiling water bath. This was allowed to cool and 10 ml of ethanol was added and agitated vigorously. A clean flask "W1" was weighed and recorded. The ether layer was poured into the flask and placed in a boiling water bath in order to evaporate the ether. Using 50 mL diethyl ether, the extraction was repeated such as to evaporate the ether and leave the fat behind. The fat and flask were weighed and labeled "W2". The fat content was thereafter calculated as a percentage as shown in equation 6 below (Moronkola *et al.,* 2011).

$$\% \text{ Fat} = \frac{W2-W1}{W} \times 100 \qquad (6)$$

Where, W = weight of the sample,
W1 = weight of dried flask and
W2 = weight of dried flask fat residue.

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Determination of Crude Fibre

In a beaker, five (5) grams of sample was heated with 200 ml of 1.25 percent H_2SO_4 for 30 minutes and filtered. The residue was acid-free after being rinsed with distilled water. It was then boiled for 30 minutes with 200 ml of 1.25 percent NaOH, then filtered and rinsed with distilled water until it was alkaline-free. It was washed once with 10% HCl, twice with ethanol and thrice with petroleum ether. The residue was placed in a crucible and dried overnight at 105°C in an oven. It was ignited in a muffle furnace at 550°C for 90 minutes after cooling it in a desiccator to ascertain the weight of the ash (AOAC, 1990).

Determination of Carbohydrate

The percentages of other components were added together and deducted from 100 percent to calculate the crude carbohydrate content of the sample (Moronkola *et al.*, 2011).

Carbohydrate % = 100 – (moisture % + protein % + ash % + lipid % + crude fiber %). (7)

Statistical Analysis

SPSS data analytic software version 25 was used to perform the statistical analysis. One-way analysis of variance (ANOVA) was used to analyze data. Differences were considered significant at $p < 0.05$.

3. RESULTS AND DISCUSSION

TABLE 1: PROXIMATE ANALYSIS OF T. OCCIDENTALIS (FLUTED PUMPKIN) LEAVES SOLD IN THREE DIFFERENT MARKETS IN BENIN CITY, NIGERIA.

	%Moisture	% Fat	% Ash	% Fibre	% Protein	% Carbohydrate	TN
Oba Market	91.25±0.38	0.25±0.05	0.28±0.04	3.51±0.13	2.06±0.15	2.65±0.05	8.75
Evbuotubu Market	92.45±1.02	0.29±0.03	0.23±0.06	2.98±0.22	1.05±0.03	3.00±0.94	7.55
Ikpoba Market	91.40±0.72	0.45±0.04	0.18±0.02	3.35±0.03	1.33±0.11	3.29±0.15	8.60
Nutrient Range	1.20±1.09	0.2±0.06	0.10±0.04	0.53±0.26	1.01±0.15	0.64±0.16	

Mean ± Standard deviation of four replications TN = % Total Nutrient contribution in the absence of moisture

TABLE 2: PERCENTAGE CONTRIBUTIONS OF OTHER NUTRIENTS IN THE ABSENCE OF MOISTURE

	% Fat	% Ash	% Fibre	% Protein	%Carbohydrate	% Total
Oba Market	2.86	3.20	40.11	23.54	30.29	100
Evbuotubu Market	3.84	3.05	39.47	13.91	39.73	100

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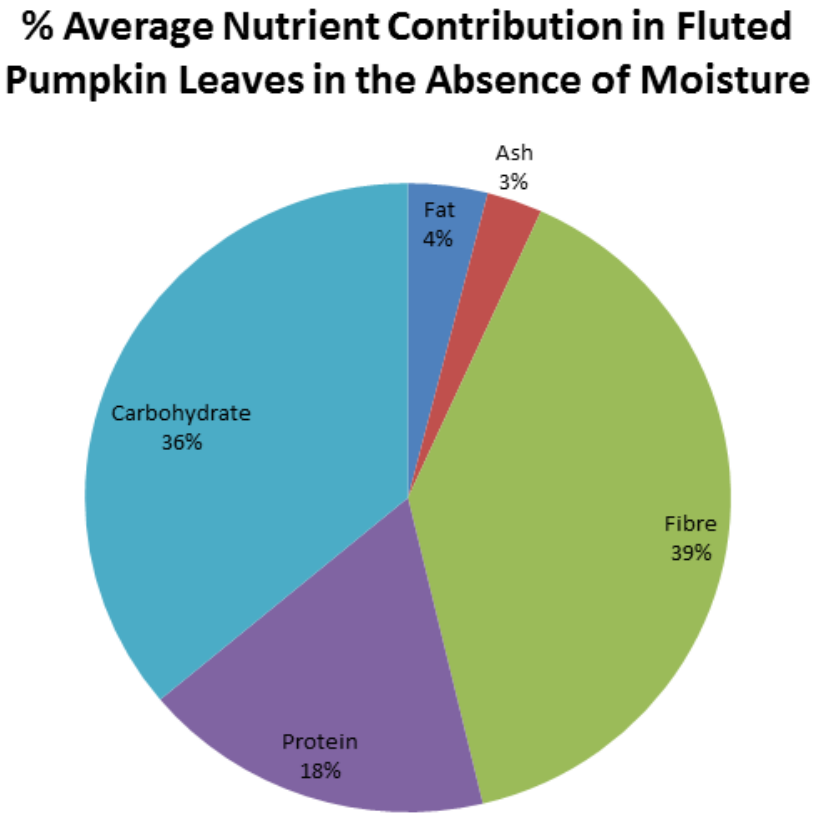
Ikpoba Market	5.23	2.09	38.95	15.47	38.26	100
% Average Nutrient Contribution	3.98	2.78	39.51	17.64	36.09	100

Percentage contribution of a nutrient in the absence of moisture = $\frac{\%\ contribution\ of\ a\ nutrient}{TN}$ *x 100*



The proximate analysis of *Telfairia occidentalis* (Fluted pumpkin) leaves purchased from three markets across Benin-City Nigeria is shown in Table 1. Results revealed that the moisture content was the highest and ranged from 91.25±0.38 to 92.45±1.02%. Water is an essential nutrient as it carries other nutrients to the cells in the body. The crude fibre content ranged from 2.98±0.22 to 3.51±0.13%, carbohydrate content ranged from 2.65±0.05 to 3.29±0.15%, the protein content ranged from 1.05±0.03 to 2.06±0.15%, the fat content ranged from 0.25±0.05 to 0.45±0.04% and the ash content ranged from 0.18±0.02 to 0.28±0.04%. The availability of other nutrients became pronounced when the moisture content was completely ignored as seen in Table 2. Table 2 revealed a high average fibre content of 39.59%. Dietary fibre helps to lower the body cholesterol level and consequently decreases the risk of cardiovascular diseases (Oboh *et al*., 2006). Table 2 also revealed high carbohydrate and protein contents of 36.09% and 17.64% respectively. Carbohydrates are the major energy fuel source for all cells of the body and central nervous system while proteins provide structure to bones, muscles and skin (Samson and Isaac, 2019). When the results

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were compared using an analysis of variance test. There were no significant differences in the nutritional composition of *Telfairia occidentalis* (Fluted pumpkin) leaves sold in the three different markets considered ($p > 0.05$). The result obtain in Ogun State Nigeria (Noah and Alaba, 2020), indicated that the moisture, crude fibre, carbohydrate, protein, fat and ash contents were 90.81±0.17%, 1.09±0.01%, 9.14±0.10%, 2.95±0.06%, 0.73±0.01%, and 3.70±0.01% respectively. The moisture was comparable with the average result in Table 1 but other nutrients varied significantly.

4. CONCLUSION

This research work has shown that fresh *Telfairia occidentalis* (Fluted pumpkin) leaves sold in Benin City Nigeria has very high moisture content. They also have high fibre content which helps to lower the body cholesterol level and consequently decreases the risk of cardiovascular diseases. They also contained appreciable carbohydrate and protein contents. Carbohydrates are the major energy fuel source for all cells of the body and central nervous system while proteins provide structure to bones, muscles and skin. When the results were compared using an analysis of variance test, there were no significant differences in the nutritional composition of *Telfairia occidentalis* (Fluted pumpkin) leaves sold in the three different markets considered ($p > 0.05$).

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