

# Heavy Metal Contents and Proximate Analysis of *Telfairia occidentalis* (fluted pumpkin) Brought from Dagbolu along Ikirun, Olorunda Local Government and Irepodun Village Osogbo Local Government, Osun State

ADEKUNLE OLAOYE<sup>1\*</sup>, Adekunle Jelili<sup>1</sup> and Fakorede Kasali Olatunji<sup>1</sup>

<sup>1</sup>Department of Chemistry, Ladoko Akintola University of Technology, Ogbomoso, Oyo State, Nigeria

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**Abstract:** In this study, the leaves of pumpkin purchased from two different markets in Osun State, Nigeria - Dagbolu along Ikirun Olorunda Local Government and Irepodun Village Osogbo Local Government Osun State, were analyzed for proximate and heavy metal content. The results of the proximate analysis revealed that the leaves contained essential nutrients like moisture, ash, crude fiber, fat, protein, and carbohydrate, which makes them a good source of food supplement. And their percentage composition were (2.64 % and 2.15%), (13.33% and 12.98%), (2.32 % and 2.15 %), (11.85 % and 11.20%), (24.54 % and 25.40 %) and (45.32 % and 46.12 %) for A and B respectively. Analysis also showed the concentration of heavy metals like Zn, Cu, Fe, and Mn, which were found to be relatively high in the leaves with following concentration (3.12 mg/g and 2.56 mg/g), (1.95 mg/g and 1.64 mg/g), (6.98 mg/g and 5.89 mg/g), and (0.43 mg/g and 0.36 mg/g) respectively for A and B. Despite this, the high concentration of Zn and Fe makes pumpkin leaves an excellent source of energy and protein for both humans and animals.

**Keywords:** Keyword : Proximate, Pumpkin, Anti – oxidant, Blood pressure and Protein

## 1. Introduction

The vegetable studied in this experiment was *Telfairia occidentalis*, which is commonly known as fluted pumpkin. It is a warm-weather crop that grows well in lowlands and tolerates a few meters above the ground (Ezekiel *etal.*, 2020). Fluted pumpkin is a valuable source of protein, minerals, and vitamins, particularly vitamins A and C, antioxidants, hepatoprotective, and antimicrobial properties (Quilly *etal.*, 2017). Fluted pumpkin is mostly consumed in southern Nigeria and plays a significant role in human and livestock nutrition (Onuguh *etal.*, 2022). The plant's leaves are incredibly useful in the preparation of various delicacies and are rich in essential nutrients required for human and animal nourishment (Mohammed *etal.*, 2014).

Overall, fluted pumpkin has received considerable attention due to its nutritional and health-protective benefits, and it is cultivated as a dry season vegetable in commercial farming. Its root is toxic to humans, but the seeds contain up to 30% protein and can be boiled, ground into powder for soups, or fermented and eaten as a slurry (Akintayo, *etal.*, 2019).

According to Tassew *etal* (2018), the leaves of the fluted pumpkin plant contain both essential and non-essential amino acids, vitamins, and minerals. According to Tassew *etal* (2018), the plant has

\* Corresponding Author: Adekunle Olaoye, Email: [aberin4u@gmail.com](mailto:aberin4u@gmail.com)

been used to treat sudden attacks of convulsion, malaria, and anemia. Scientific investigations have shown that air-dried leaves of the plant can significantly improve red blood cell count, white blood cell count, packed cell volume, and hemoglobin concentration in rats. However, the dietary preparation made with sun-dried leaves had no significant effect on hematological parameters in birds (Abdulssamad *etal.*,2016).

In terms of blood pressure control, hypertension can result from factors such as atherosclerosis, imbalances in the renin-angiotensin system, and hyperinsulinemia, which increase sodium retention in the body. A general nutritional plan to minimize hypertension risk includes maintaining a healthy body weight, consuming a diet rich in calcium, phosphorus, and magnesium, reducing fat intake, increasing dietary fiber, minerals, and vegetable diets, as well as incorporating animal products into the diet (Asaolu *et al.*, 2012).

## **2. MATERIALS AND METHODOLOGY**

### **2.1. EQUIPMENT AND APPARATUS**

- Fume cupboard
- Hot plate
- Micro digestion flask
- Volumetric flask
- Glass funnel

### **2.2. REAGENT S**

- 10-20ml sample
- 40% of 10ml -20ml sodium hydroxide solution
- 2% of 5ml Boric Acid
- 0.1 M HCl or H<sub>2</sub>SO<sub>4</sub>(For titration)
- Indicator (methyl Orange)
- Perchloric acid
- Nitric acid
- Digestion tablet
- Distilled water

### **2.3. SAMPLING**

In the study, samples of fluted pumpkin species were randomly selected from markets in Osun State and analyzed for heavy metal concentration. The results indicated that the concentration of copper, iron, and manganese varied between the samples. The proximate composition of pumpkin samples showed differences in moisture, protein, ash, fat, carbohydrate, and fiber content between the two samples studied.

The varieties of fluted pumpkin were indiscriminately gotten from Dagbolu village and Irepodun village both in Osogbo, Osun State. It was air dried for some weeks and after it crushed

using mortar and pestle, then sieve and stored in an air-proof polyethylene bags in the laboratory before it was needed for analysis.

## 2.4. EXPERIMENT

For each analyte of interest, triplicates samples were taken from each sample and analyzed according to the method of analytical chemist (AOAC, 1990) and all other standard procedures observed. The obtained values are average of these triple analyses.

## 3. RESULT AND DISCUSSION OF RESULT

**Table 1. :** CONCENTRATION OF SOME HEAVY METALS IN FLUTED PUMPKIN

| SAMPLES mg/g | Fe           | Cu           | Mn            | Zn            |
|--------------|--------------|--------------|---------------|---------------|
| A            | 6.98 ±0.007  | 1.95 ±0.005  | 0.43 ± 0.0006 | 3.12 ± 0.0003 |
| B            | 5.89 ± 0.007 | 1.64 ± 0.005 | 0.36 ± 0.0006 | 2.56 ± 0.0003 |

**Table 2.** PROXIMATE COMPOSITION OF PUMPKIN

| Sample | Moisture        | Protein         | Ash             | Fat              | Carbohydrate     | Fibre       |
|--------|-----------------|-----------------|-----------------|------------------|------------------|-------------|
| A      | 2.64<br>±0.0002 | 24.54<br>±0.006 | 13.33<br>±0.003 | 11.85<br>±0.0007 | 45.32<br>± 0.005 | 2.32 ±0.006 |
| B      | 2.15<br>±0.0002 | 25.40<br>±0.006 | 12.98<br>±0.003 | 11.20<br>±0.0007 | 46.12 ±0.005     | 2.15±0.006  |

#### 4. RESULT

The result indicates that the concentration in (*Telfairia occidentalis*) leaves of Zinc (Zn) vary from 3.12 mg/g for A to 2.56 mg/g for B, the concentration of copper (Cu) also vary from 1.96 mg/g for A to 1.64 mg/g for B, likewise the concentration of Iron (Fe) ranged from 6.98 mg/g for A to 5.89mg/g for B while concentration of manganese (Mn) ranged from 0.43mg/g for A to 0.36 mg/g for B respectively.

The result of proximate composition of pumpkin (*Telfairia occidentalis*) varies from moisture 2.64 for A to 2.15 for B, the protein content range from 24.54 for A to 25.40 for B, the ash content ranges from 13.33 for A to 12.98 for B, the fat content varies from 11.85 to 11.20 for A and B the fibre content ranges from 2.32 to 2.15 for A and B while the carbohydrate content varies from 45.32 for A to 46.12 for B respectively.

#### 5. DISCUSSION

The result of the experiment showed that the concentration of heavy metals in each of the sample ranged from one market to the other. Concentration of proximate and mineral analysis of market A differs from B as a result of environmental factor. The moisture content of both sample were range from (2.88 of A to 2.33 B). This varies considerably with those obtained by (Ogunlade *et al.*, 2011, Amoo and Agunbiade ,2009 and Akoja and Amoo 2011) respectively for Guinea peanut, *Pterigotamacrocarpa*, *Hexalobuscrispiflorus* and *Clitandratolana*.

Likewise, the result of moisture of both sample were very close to what gotten by (Ogbe and John 2012), for *Moringaoleifera* leaves but exceptionally lower than what obtained by (Blessing *et al.*,2011). Low amount of moisture in crops makes them not to vulnerable to microbial attack, hence, spoilage .The moisture content is low compare to shoot of *Borassus Aethiopumart*, *xanthosemsagihifolum* *Gnetumbuchhoysianium* and *Adansoniadigitata* respectively as reported by (Gafar *et al.*, 2009).

The result obtained by this study from mineral and proximate analysis is lower for moisture and protein compared to what obtained by Abdussamad, *etal*, 2016, (Adeyeye and Omolayo, 2011) and (Usunobun and Egharebva, 2014). But the ash content, Fat and carbohydrate content of the study is higher than what obtained by Abdussamad, *etal*, 2016, (Adeyeye and Omolayo, 2011) and (Usunobun and Egharebva, 2014). The low moisture content of pumpkin found in this work is an indication that is to a large extent protected from enzymatic decomposition (Fai *et al.*, 2013).

Overall, the study provides insight into the nutritional value of fluted pumpkin and suggests further investigations into the plant's potential health benefits.

#### 6. Conclusion

In the discussion of the experiment, it was discovered that the concentration of heavy metals varied significantly between the two markets where samples were obtained. This was attributed to different environmental factors in Dagbolu along Ikirun Olorunda Local Government and Irepodun Osogbo. The moisture content of the samples ranged from 2.64 in A to 2.15 in B, which is lower than that obtained in other studies for crops like Guinea peanut, *Pterigotamacrocarpa*, *Hexalobuscrispiflorus*,

and Clitandratolana. However, it was similar to the moisture content found in *Moringaoleifera* leaves and lower than that found in research on other crops.

The low moisture content in the pumpkin samples makes them less susceptible to microbial attack and spoilage. The difference in moisture content is due to the varying environmental conditions. Additionally, the ash content of the leaves was found to be high compared to most of the leafy vegetables studied. This suggests that the pumpkin leaves contain important minerals and nutrients that could have potential health benefits.

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