

PROXIMATE AND MINERAL COMPOSITIONS OF *CUCURBITA PEPO* SEED OIL SOURCED FROM EBONYI STATE, NIGERIA

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Abstract

This study was designed to determine the proximate constituents (carbohydrate, protein, moisture, ash, fibre and fat) and mineral contents (calcium, magnesium, iron, copper, manganese and sodium) of *Cucurbita pepo* seed oil. These were done using well known standard methods. The results revealed the following order of occurrence of proximate composition (%): protein (29.42 ± 1.04) > fat (27.86 ± 1.00) > carbohydrates (12.16 ± 0.54) > moisture (4.66 ± 0.06) > ash (3.32 ± 0.04) > fibre (2.58 ± 0.02) with their percentage occurrences in the seed oil. The results also revealed the following minerals in mg/100g: calcium (1.45 ± 0.01), magnesium (3.58 ± 0.10), iron (0.97 ± 0.01), copper (0.40 ± 0.10), manganese (0.60 ± 0.11) and sodium (0.37 ± 0.01). Due to presence of these proximate and minerals, the results obtained from this study shows that *Cucurbita pepo* seed oil is a good source of essential minerals and proximate, thus, could be used as a nutritional supplement to diet.

Key words: **Minerals, Proximate, *C. pepo*, Nutrition and Supplement.**

Introduction

Cucurbita pepo is among the 15 species of genus *Cucurbita* in Cucurbitaceae. *C. pepo*'s local name is 'Kadoo' in Urdu, Saraiki and Hindi while squash in English (Adebayo *et al.*, 2013). In indigenous Yoruba language, it is called "apala". It is also called "úgbògùlù", "ányū" and "úgbòghùrù or úgbòghòrò" in Igbo-Onitsha, Owerri and Umuahaia language respectively (Smith, 1997). It is equally called "akwato or bàkánùwàà" in indigenous Hausa language (Smith, 1997). It is equally called "Ugboma" in Izzi language of Ebonyi State, Nigeria. It is an annual plant with large insect-pollinated flowers which are yellow-orange in colour (Bermejo and León, 2014). The leaves are round and lobed and often come in fine hairy

prickles. The names pumpkin and squash are interchangeably used because their fruit are same, although the species are different from one another. *Cucurbita pepo* is a tropical vine grown mainly in West Africa for its vegetable (Bermejo and León, 2014).

The fruit of the plant is used as cooling agent and also utilized for loose stools, good for teeth, throat infection and eyes infections (Adebayo *et al.*, 2013). The leaves are digestible, used as analgesic, remove biliousness and also used for external burns (Clementina, 2013). The seeds are diuretic, stimulant, cure painful chests, bronchitis, fever, reduce thirst, good for the brain and used for kidney problems (Kirtikar and Basu,

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2009). Pharmacologically, the seed is used for different activities like anti-hypercholesterolemia, anti-hypertensive, anti-inflammatory, anti-parasitic, anti-tumor, ant-oxidant, anti-diabetic, anti-carcinogenic, anti-bacterial and anti-inflammation (Caili *et al.*, 2006). Different categories of phyto-constituents are contained in *C. pepo* such as linoleic acids, oleic acid, alkaloids, flavonoids and palmitic which may be responsible for its medicinal properties (Adebayo *et al.*, 2013).

This crop is primarily grown as leafy vegetable and is used for human consumption and animal fodder. The seed also has many nutritional and industrial uses (Adebayo *et al.*, 2013). Researchers have shown that seeds not only contain nutritionally important bio-compounds but are also sources of other phyto-compounds which at certain critical levels have significant effects. These compounds include oxalate, phytate, nitrate and cyanide (Omotayo and Borokini, 2012).

The growing awareness in recent years of the health promoting and protecting properties of non-nutrient bioactive compounds found in fruits and vegetables has prompted an increased attention to vegetables as vital components of daily diets. This thus underscores the significance of vegetables as vital dietary components in Sub-Saharan

Africa. Knowledge of the nutritive value of local dishes, soup ingredients and local foodstuffs is thus necessary in order to encourage the increased cultivation and consumption of those that are highly nutritive. In this wise, the nutrients of the staple carbohydrate foods of the poor who cannot afford enough protein foods of animal origin can easily be supplemented. Therefore, the need to study other sources of concentrated plant proteins that are widely grown in tropical countries become necessary.

Although, several novel plant protein sources have been suggested for this purpose, cultural food selection, amongst other factors, have minimized the use of some plants as protein sources. In addition, lack of proper knowledge, especially on their nutritive values, methods of production, preservation and full exploitation forms another important deterrent towards the use of some of these plants. The data on the nutrient composition of pumpkin seeds grown in Ebonyi state is scanty and inadequate, hence, the aim of this study was to determine the proximate (moisture, ash, crude fiber, fats/oil, protein and carbohydrate) and mineral (calcium, magnesium, iron, copper, manganese and sodium) compositions of *Cucurbita pepo* seed oil sourced from Ebonyi State, Nigeria.



Plate 1: *Cucurbita pepo* Seed and Fruit

Materials and Methods

Biological Materials

Fresh and mature seeds of *Cucurbita pepo* were collected from Aghara-oza village in Izzi Local Government Area of Ebonyi State and were identified by Prof. S. C. Onyekwelu, a Taxonomist in the Department of Applied Biology, Ebonyi State University, Abakaliki, Ebonyi State, Nigeria. They were cleaned of dirt, dried and stored for subsequent use in the analysis.

Chemicals and Reagents

The chemicals and reagents used were of analytical quality. The chemicals were sourced from May and Baker, England; BDH, England and Merck, Darmstadt, Germany. The reagents used were commercial kits and products of Randox, QCA, USA and Biosystem Reagents and Instruments, Spain.

Extraction of *Cucurbita pepo* Seed Oil

The seed oil of the *Cucurbita pepo* was extracted from the dried seed using mechanical pressing method according to Mathangi (2018).

Proximate and Mineral Analysis of *Cucurbita pepo* Seed Oil

Proximate and mineral compositions of *Cucurbita pepo* Seed Oil were determined using the method of the Association of Official of Analytical Chemists, 1990 and AOAC, 2016 respectively.

Results

Proximate and Mineral Composition of *Cucurbita pepo* Seed Oil

The results of proximate constituent of the seed oil of *Cucurbita pepo* showed the presence of fat, protein, ash, moisture, fibre and carbohydrate. The results revealed that protein was the highest and fibre the lowest among other values. Others were moisture, carbohydrate, ash and fat as shown in Table

1. The results revealed the following order of occurrence of proximate composition (%): protein > fat > carbohydrates > moisture > ash > fibre with their percentage occurrences

in the seed oil. The results also revealed the following minerals in mg/100g: calcium, magnesium, iron, copper, manganese and sodium as shown in Table 2.

Table 1: Proximate Composition of *Cucurbita pepo* Seed Oil.

Proximate	Percentage Composition (%)
Moisture content	4.66 ± 0.06
Crude protein	29.42 ± 1.04
Crude fibre	2.58 ± 0.02
Ash content	3.32 ± 0.04
Fat	27.86 ± 1.00
Carbohydrate	12.16 ± 0.54

Data are shown as mean ± Standard Deviation (n=3).

Table 2: Mineral Component of *Cucurbita pepo* Seed Oil.

Mineral	Concentration (mg/100g)
Calcium (Ca)	1.45±0.01
Magnesium (Mg)	3.58±0.10
Iron (Fe)	0.97±0.01
Copper (Cu)	0.40±0.10
Manganese (Mn)	0.60±0.11
Sodium (Na)	0.37±0.01

Data are shown as mean ± Standard Deviation (n=3).

Discussion

The results of proximate and mineral constituent of the seed oil of *Cucurbita pepo* revealed the presence of fat, protein, ash, moisture, fibre, carbohydrate, sodium, magnesium, calcium, iron, manganese and copper as shown in Table 1 and 2. This is in correlation with the work of Ekpono *et al.* (2018), who reported the following order of

occurrence of proximate composition (%): carbohydrates > protein > moisture > ash > fibre > fat in the ethanol root extract of *Sphenocentrum jollyanum*. This also agrees with the work of Aja *et al.* (2010) who reported that dry and wet samples of *Talinum triangulare* (Water Leaf) leaves contain carbohydrate, protein, β-carotene and crude fibre in both sample respectively. Olajumoke *et al.* (2012) revealed that the aqueous and

organic extracts (ethanol and methanol) of *Rauwolfia vomitoria* contained sodium, potassium, calcium, magnesium, zinc, iron, manganese phosphorus and negligible amount of copper, lead and cobalt. Ojelere, (2014) equally reported that *Rauwolfia vomitoria* seeds contained the following minerals in order of magnitude, $Na > Mg > Ca > K > Zn > Fe > Mn$.

Availability of protein are helpful in maintaining proper growth and development in adults, children and pregnant woman which require good quantity of protein daily (Ishida *et al.* 2000). Carbohydrates are known to be important components in many foods, and the digestible carbohydrates are considered as an important source of energy. Our findings revealed that the seed oil of this plant is a good source of carbohydrate with high energy values which gives the needed energy for good living of human and livestock. Fibers in the diet are necessary for digestion and effective elimination of wastes, and can lower the serum cholesterol, the risk of coronary heart disease, hypertension, constipation, diabetes, colon and breast cancer (Ishida *et al.* 2000).

Minerals are those elements on the earth and in foods that our bodies need to develop and function normally. The daily requirement of sodium for male and female between 9 and 50years is 1500 mg which has been recommended as an adequate intake (Carol, 2011). Magnesium plays an important role in the human body and sufficient amounts of it in the diet protect against heart disease, hypoglycaemia, diabetes and obesity. Iron

deficiency is a major problem in women's diets in the developing world, particularly among pregnant women and especially in Africa. This implies that, these samples will serve as blood building foods and should be desired for human and animal feeds formulations (Orr, 2016). The manganese intake helps in bone growth, proper kidney function and cell growth (Fallon and Enig, 2001). Calcium is an essential mineral for bone development. Copper stimulates the immune system to fight infections, repair injured tissues as well as to promote healing (Stern, 2010).

Conclusion

The results obtained from this study shows that *Cucurbita pepo* seed oil is a good source of essential minerals and proximate, thus, could be used as a nutritional supplement to diet.

Recommendations

The *Cucurbita pepo* seed was found to contain some degree of nutrients required for adequate diet, it is therefore recommended that:

- i. The *Cucurbita pepo* seed should be incorporated into diet of other tribes in Nigeria.
- ii. Further studies should be carried out to isolate, characterize and elucidate the structures of the bioactive compounds present in the *Cucurbita pepo* seed and possibly be used in studies using animal model.

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