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Analysis of the Proximate and Mineral Contents in Uziza (*Piper guineense*) Seeds from Three Different States (Ebonyi, Cross-River and Delta) in the Southern Part of Nigeria

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Abstract Studies were carried out to determine the proximate and mineral contents in Uziza seeds from three different states (Ebonyi, Cross-River, Delta) in the Southern part of Nigeria using established standard laboratory procedures. ANOVA showed that the proximate and mineral contents of uziza seeds in the three state of study differ significantly at $p < 0.05$. Of the three states, the proximate and mineral contents of the plant seeds from Ebonyi was the highest in crude protein, ash, dry matter, Mg, Zn, Fe, Cu, Na, K and Ca with values of 12.62%, 16.33%, 0.14ppm, 0.33ppm, 0.57ppm, 0.08ppm, 0.80ppm and 0.94ppm respectively. The plants seeds from Cross-River was the highest in carbohydrates, moisture content, crude fibre and crude fat with values of 54.31, 9.17, 13.61 and 11.04% respectively. The mineral compositions of the *P.guineense* seeds in the three locations decreased in the following order: K > Ca > Na > Fe > Zn > Mg > Cu. The seeds from the selected states contain the mineral elements in the following decreasing order: Ebonyi > Delta > Cross-River.

Keywords Uziza (*Piper guineense)* seeds, Mineral contents, Proximate contents and Spices

1. Introduction

P. guineense is a spice plant from the family *Piperaceae* and from genius piper. It is a West African spice plant commonly called ashanti pepper (Okoye and Ebeledike, 2013). It is known as Uziza in Igbo and Iyere in Yoruba. Other common names are benin pepper, guinea pepper, false cubeb and Kale (Tapsell *et al.*, 2006). The plants that provide the pepper are vines that grow up to 20m tall climbing up bole of trees by means of adventitious roots. It is a perennial plant that is characterized by heart shaped leaves and oval, petiole, alternate and 12cm long (Besong *et al.*, 2016). The fruits of *P. guineense* occurs in clusters, small, reddish or reddish brown when ripe and black when dry (Nwankwo *et al.*, 2014). The plant is native to tropical regions of Central and Western Africa and is semi-cultivated in countries like Nigeria, where it is found commonly in the southern part (Okwu 2001). It grows in evergreen rain forest, forest edges, usually in wet places, gallery forest along rocky rivers of an elevation of 750 – 1680m (Besong *et al.*, 2016). There are more than 700 species of this plant throughout the tropical and sub-tropical regions of the world (Anyanwu and Nwosu, 2014). The different parts of the plant have been characterized and their chemical compositions determined and are used as therapeutic agents in minor ailments (Okwu, 2001).

According to Daba *et al.*, (2013), *Piper guineense* is a local spice made of dillapol, 5.8% piperine, elemicine and 10% myristicine and safrole and these chemicals exhibit bactericidal and anti-microbial effects on certain microorganisms. In traditional herbal medicine, the seeds of *P. guineense* are put into a variety of uses; for instance in some parts of Nigeria, the seeds are consumed by women after child birth to enhance uterine contraction for the expulsion of placenta and other remains from the womb (Mbongue *et al.*, 2005). The seed and leaf extracts are capable of exhibiting a depolarizing neuromuscular activity in a concentration related manners (Ojinnaka *et al.*, 2016).

P. guineense have nutritional and non-nutritional factors which are responsible for its aroma, flavour and preservative properties and proximate analysis of the plant shows that it contains crude protein, fat carbohydrates and vitamins (Nwankwo *et al.*, 2014). Okonkwo and Ogu (2014) reported that the plant contains vitamin C in considerable amount and this could aid the good health of teeth and gums and also

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promote healing.

According to Anyanwu and Nwosu, (2004), *P. guineense* by its nature is aromatic and carminative and that it is a natural antioxidant, act as anti-inflammatory, anti-cancer and anti-pyretic agents.

Memudu *et al*., (2015) studied the effects of dry fruits of *P. guineense* on male fertility parameters using adult sprague darhey rats. 200mg/kg of the extract was given to two groups of the rats for four weeks and eight weeks respectively. The result showed that the extract improved male reproductive functions, sperm motility, sperm function and testicular spermatogenesis. In essence, they recommended that the plant should be used for the treatment of male and female fertility problems especially those associated with hormonal secretions in humans. Based on the general usefulness and importance of the seeds of *P. guineense*, studies were carried out to determine its proximate and mineral contents in three selected states (Ebonyi, Cross-River and Delta) in southern parts of Nigeria.

2. Materials and Methods

Sample collection: The seeds of uziza (*P. guineense*) were respectively purchased from major markets in the three selected states (Ebonyi, Cross-River and Delta) and were sorted to remove debris. The seeds were separated from their shells and washed with distilled water and subsequently oven-dried at 65℃ for 4hours and milled into powder with blender. It was then stored in air tight containers until required for analysis.

Proximate Analysis

The seed samples were analyzed for crude protein, ash, crude fibre, crude fat, moisture and dry matter contents according to the method of AOAC, (2000) while carbohydrate content was determined by difference.

Mineral Analysis: Magnesium, zinc, potassium, iron, copper, sodium and calcium were determined with flame atomic absorption spectrometer.

Statistical Analysis

The data obtained were subjected to analysis of variance (ANOVA) using SPSS version 18.0 for windows and the level of significance was taken up as $p < 0.05$.

3. Results and Discussion

Table 1 shows that the crude protein content of uziza seeds from Ebonyi (12.62%) was significantly higher than that from Delta (10.4%) and Cross-River (7.67%).

According to Asaolu *et al.*, (2002), a diet is nutritionally satisfactorily if it contains a high calorie value and a sufficient amount of protein. Effiong *et al.*, (2009) stated that any plant foods that provide about 12% of the calorie value from protein are considered good sources of protein. The carbohydrate content of uziza seeds from Cross-River (54.31%) was significantly higher than that from Delta (50.92%) and Ebonyi (48.57%).

Okonkwo and Ogu, (2014) reported that *P. guineense* has a high carbohydrate, so its consumption could help the body with the energy needed for daily activities. The carbohydrate contents of uziza seeds reported in this study compares favourably with that (57.33%) reported by Okonkwo and Ogu (2004) in their study on *P. guineense* from South-Eastern part of Nigeria.

Ash contents in seeds of *P. guineense* from Ebonyi (10.33%) was significantly higher than that from Delta (8.65%) and Cross-River (4.51%).

Nnamani *et al*., (2009) stated that the proportion of ash content is a reflection of the mineral contents present in that food material.

The crude fat content of *P. guineense* seeds from Cross-River (9.17%) was significantly higher than that from Delta (7.60%) and Ebonyi (6.39%).

Ekeanyanwu *et al.*, (2010) reported that fat is a high energy nutrient and does not add to the bulk of the diet. The crude fat contents of the seeds of *P. guineense* obtained in this study was significantly less than 17.30% reported by Bolanle *et al*., (2004) for the plant seeds from Ekiti state in Southern Western, Nigeria. The moisture content of uziza seeds from Cross-River (13.61%) was significantly higher than 12.28% from Delta and Ebonyi (11.13%). The result of this study compared very well with 12.35% and 11.72% for *P. guineense* and *Myristica frangras* respectively by Okonkwo and Agu, (2014) in their analysis of selected spices commonly used in South Eastern Nigeria. Ojinaka *et al.*, (2016) stated that the moisture content of any food is an index of its water activity and is used as a measure of stability and susceptibility to microbial contamination. Hence, foods with low moisture content are less prone to microbial attack and deterioration. The crude fibre content of *P. guineense* seeds from Cross-River (11.04%) was significantly higher than that of Ebonyi (9.85%) and Delta (8.26%). Crude fibre is the part of food that is not digested by humans but the mineral functioning of the intestinal tract depends upon the presence of fiber. It increases stool bulk and decreases the time that waste materials spend in the gastro intestinal tract.

Okonkwo and Ogu (2014) reported that fiber helps in the maintenance of human health and has been known to reduce cholesterol level of the body. A low fiber diet has been associated with heart diseases, cancer of the colon, phlebitis, Obesity and diabetes.

Table 2 shows that the magnesium contents of uziza seeds from Ebonyi (0.14ppm) were significantly higher than in Delta (0.086ppm) and Cross-River (0.05ppm). The values obtained in this study were higher than 0.03ppm reported by Bolanle *et al.*, (2014) for the plant seeds from South-Western part of Nigeria. Magnesium is a component of chlorophyll and it is an important content in connection with ischemic heart diseases and calcium metabolism in bones.

Zinc concentration in *P. guineense* seeds for Ebonyi

(0.33ppm) was significantly higher than 0.210 and 0.085ppm for Delta and Cross River respectively. According to Okonkwo and Agu (2014), zinc is involved in normal functioning of immune system and is associated with protein metabolism. Iron, copper, sodium, potassium and calcium contents of uziza seeds from Ebonyi with values of 0.57, 0.08, 0.80, 1.46 and 0.94ppm respectively was significantly higher than these minerals in the seed samples from the other two locations. The mineral content of seeds from Delta was the second with values of 0.15, 0.27, 0.58 and 0.41ppm for iron, sodium, potassium, and calcium respectively. *P. guineense* seeds from Cross-River contained the least mineral contents with values of 0.39, 0.04, 0.48, 0.87 and 0.63ppm for iron, copper, sodium, potassium and calcium respectively.

Iron is an essential trace elements for haemoglobin formation, normal function of central nervous system and in the oxidation of carbohydrate, protein and fats (Ekeanyanwu *et al.*, 2010).

According to Bolanle *et al.*, (2014) minerals such as sodium, potassium, calcium, phosphorus and copper are vital for mental and physical well-being and are important constituents of bones, teeth, tissues, muscles, blood and nerve cells. The results of the mineral contents of this study was higher than 0.30, 0.32, 0.81, 0.096 and 0.04ppm for calcium, sodium, potassium, iron and magnesium respectively reported by Bolanle *et al.*, (2014) in the uziza seeds from south western part of Nigeria. The disparity in the proximate and mineral compositions of *P. guineense* seeds from Cross-River, Ebonyi and Delta States respectively could be attributed to factors such as stage of maturity of the seeds before harvesting, edaphic and climatic influences.

Table 1. Proximate composition of Uziza seeds from Ebonyi, Cross River and Delta states

Parameters (%)	Ebonyi	Cross-River	Delta	F tests P value
Crude protein	12.62 ± 0.15	7.67 ± 0.10	10.14 ± 0.33	0.02
Carbohydrates	48.57 ± 0.30	54.31 ± 0.09	50.92 ± 0.71	0.03
Ash	10.33 ± 0.04	4.51 ± 0.06	8.65 ± 0.22	0.02
Crude fat	6.39 ± 0.11	9.17 ± 0.07	7.60 ± 0.03	0.02
Moisture content	11.13 ± 0.05	13.61 ± 0.14	12.28 ± 0.21	0.04
Crude fibre	9.85 ± 0.32	11.04 ± 0.08	8.26 ± 0.05	0.02
Dry matter	91.3 ± 1.61	82.2 ± 1.80	86.05 ± 2.71	0.02

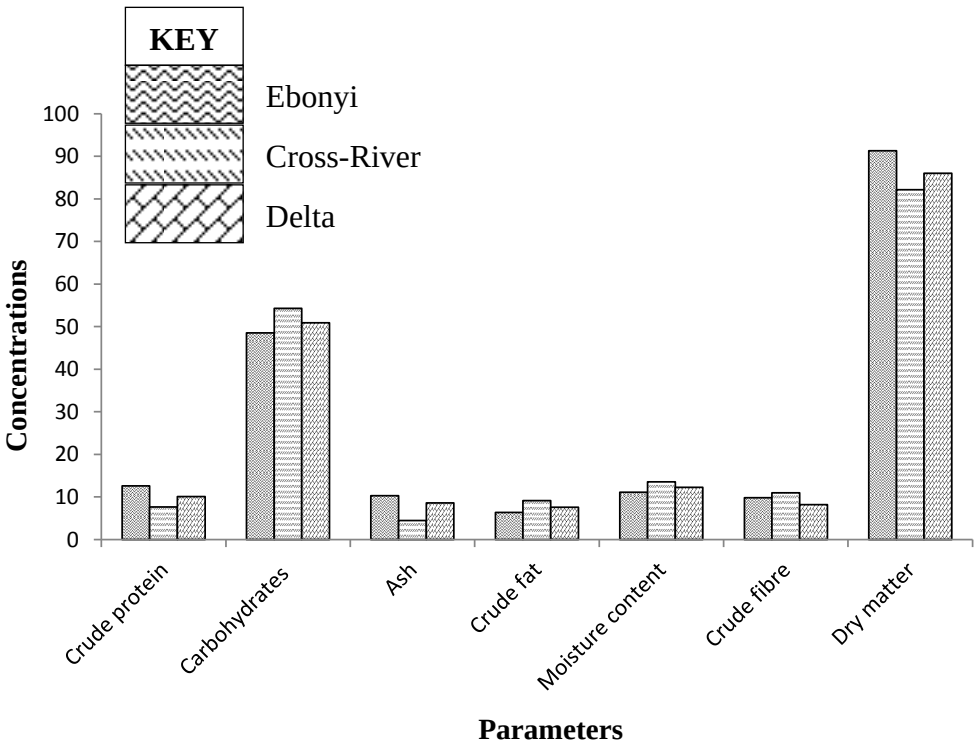

Figure 1. Bar chart representation of the proximate composition of Uziza seeds from Ebonyi, Cross-River and Delta states respectively

Table 2. Mineral composition uziza seeds from Ebonyi, Delta and Cross-River State respectively

Minerals	Ebonyi	Cross-River	Delta	F tests P value
Mg	0.140 ± 0.06	0.051 ± 0.01	0.086 ± 0.33	0.04
Zn	0.330 ± 0.07	0.085 ± 0.04	0.210 ± 0.06	0.01
Fe	0.570 ± 0.03	0.15 ± 0.02	0.39 ± 0.08	0.02
Cu	0.08 ± 0.01	-	0.04 ± 0.02	0.00
Na	0.80 ± 0.14	0.27 ± 0.06	0.48 ± 0.04	0.00
K	1.46 ± 0.22	0.58 ± 0.10	0.87 ± 0.21	0.00
Ca	0.94 ± 0.11	0.41 ± 0.05	0.63 ± 0.07	0.02

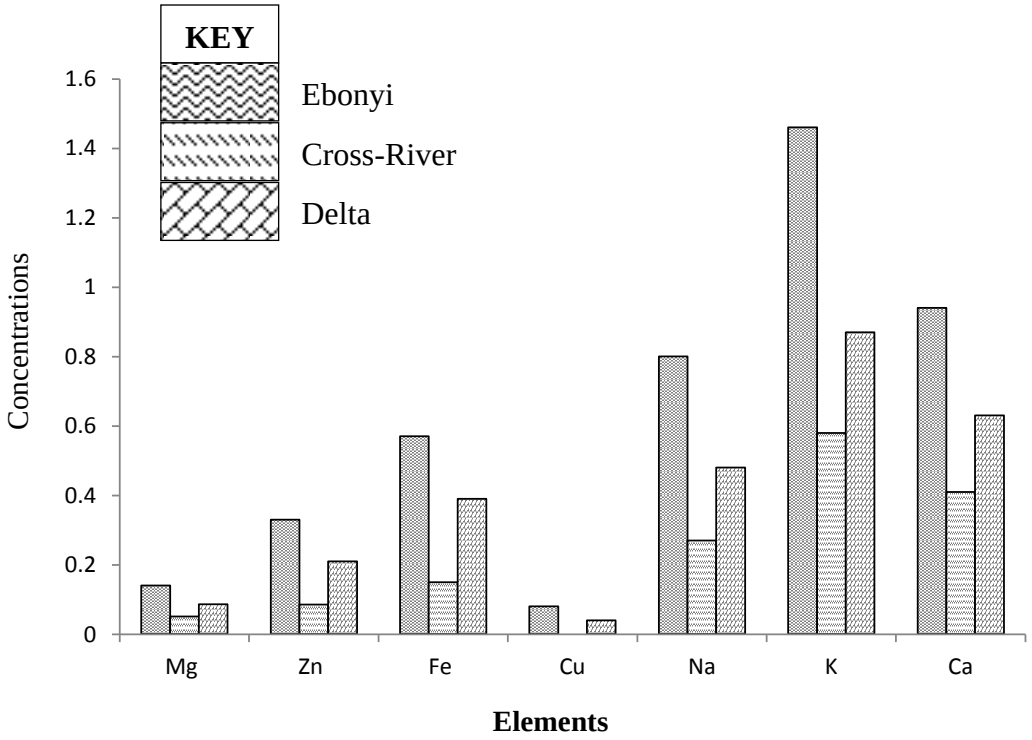

Figure 2. Bar chart representation of the mineral contents of uziza seeds from Ebonyi, Cross-River and Delta states respectively

4. Conclusions

The study shows that seeds of *P. guineense* from the three studied locations (Cross-River, Ebonyi and Delta) are good sources of protein, carbohydrates, fats and fibre and equally contain the essential elements such as calcium, potassium, zinc, potassium and iron required for healthy living in appreciable amounts.

The order of decrease in mineral composition of uziza seeds in the three studied locations was: Ebonyi > Delta > Cross-River. This was attributed to differences in stage of maturity of the seeds, edaphic and climatic influences in the different locations.

REFERENCES

[1] Anyanwu C.U. and Nwosu G.C. (2004). Assessment of antimicrobial activity of aqueous and ethanolic extracts of *Piper guineese* leaves. *Journal of Medical Research, 8(10): 337 – 439.*

[2] AOAC (2000). Association of Official Analytical Chemists. Official methods of Analysis vol. II, 17th Edition, Washington D.C., USA.

[3] Asaolu S.S., Adefemi O.S., Oyakhilome I.G. and Ajibulu K.E. (2012). Proximate and Mineral Composite of Nigeria leafy vegetables. *Journal of Food Research, 1(3): 214 – 218.*

[4] Besong E.E., Balogun M.E., Djobissie F.D., Mbamelu S.O. and Obinna J.N. (2016). A Review of *Piper guineense* (African Black Pepper). *International Journal of Pharmacy and Pharmaceutical Research, 6(1): 368 – 384.*

[5] Bolanle A.O., Fumilola S.A. and Adedayo A. (2014). Proximate analysis, mineral contents, amino acid composition, anti-nutrients and phytochemical screening of Brachystegia surycoma Harns and *Piper guineense* Schum and Thonn. *American Journal of Food and Nutrition, 2(1): 11 – 17.*

[6] Dada A.A., Ifesan B.O.T and Fashakih J.F. (2013). Anti-microbial and anti-oxidant properties of selected local spices used in "kunun" beverage in Nigeria. *International Journal of Plant Sciences and Ecology 1(4): 167 -171.*

[7] Mbongue F.G., Kamtchouing P., Essame O.J. and Yewah P.M. (2005). Effect of aqueous extract of dry fruits of *Piper guineense* on the reproductive function of adult male rats. *Indian Journal of Pharmacology, 7: 30-32.*

[8] Memudu A.E., Akinrinade I.D., Ogundele O.M. and Dave B.J. (2015). Effect of Crude extract of dry fruits of *Piper guineenses* on male fertility parameters of adult sprague rats. *European Journal of Medicinal plants, 5(3): 297 – 303.*

[9] Nwankwo C.S., Ebenezer I.A., Ikpeama A.I. and Asuzu F.O. (2014). The nutritional and anti-nutritional values of culinary herbs – uziza leaf (*Piper guineense*) and scent leaf (*Ocimum grastissium)* popularly used in Nigeria. *International Journal of Science and Engineering Research, 5(12): 1160 – 1163.*

[10] Ojianaka M.C., Odimegwu E.N. and Chidiebere F.E. (2016). Comparative study on the nutrient and anti-nutrient composition of the seeds and leaves of uziza (*Piper Guineense*). *IOSR Journal of Environmental Science, Toxicology and Food Technology, 10(8): 42 – 48.*

[11] Okonkwo C. and Agu A. (2014). Nutritional evaluation of some selected spices commonly used in South-Eastern part of Nigeria. Journal of Biology, Agric and Health Care, 4(15): 45 – 51.

[12] Okoye E.I. and Ebeledike A.O. (2013). Phytochemical constituents of *Piper guineense* (uziza) and their health implications on some micro-organisms. *Global Research Journal of Sciences, 2(2): 42 – 46.*

[13] Okwu D.E. (2001). Evaluation of the chemical composition of indigenous species of flavour agents. *Global Journal of Pure and Applied science, 7: 455 – 459.*

[14] Tapsell L.C. Hemplull I. and Coblac L. (2006). Health benefits of herbs and spices. The past, the present and the future. *Medical Journal of Austria, 184(4): 24 – 84.*

[15] Nnamani C.U., Oselebe H.O. and Agbatutu A. (2009). Assessment of the nutritional values of three underutilized indigenous leafy vegetables of Ebonyi State, Nigeria. *African Journal of Bio Technology, 8(9): 2321 – 2324.*