DETERMINATION OF PROXIMATE AND MINERAL COMPOSITION OF THREE TRADITIONAL SPICES

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Introduction

- *Zingiber officinalis* , commonly known as ginger belongs to family Zingiberaceaeis cultivated commercially in India, China, SouthEast Asia, West Indies, Mexico and other parts of the world.
- It is consumed worldwide as a spice and flavouring agent and is attributed to have many medicinal properties (Ghosh *et al*., 2011).
- Garlic (*Allium sativum*) is specie of the onion family and is used as flavouring in cooking and pickling, sometimes in the form of whole or grated cloves and sometimes in the form of a cooked extract, as in sauces and dressing.
- Locally, in Nigeria garlic is often paired with ginger to make stews and soups.
- Generally, garlic is used in other foods.In medicine, garlic is used as a digestive stimulant, diuretic and anti-spasmodic (Okolo *et al*., 2012).

Introduction contd

- *Monodora myristica* belongs to the Annonaceae familyand is one of the most important trees of the evergreen forest of West Africa (Burubai *et al*., 2007). It is native to Nigeria, where the seed is called *ehuruorehirorabo-lakoshe* among the Yorubas.

- Its seeds are a popular spice used in cooking to flavour and thicken dishes. Medicinally, the root is chewed to relieve toothaches and arthritis.
- It is also used in treatment of anaemia, haemorrhoids and sexual weakness (Erukainure *et al*., 2012).

Chemical Analysis

- Proximate composition was determined by standard procedures (AOAC, 2008).

- Mineral content of the different traditional spice samples was assessed using standard methods following the methods.

- The sample solutions were analysed for some metals with different hollow cathode lamps for calcium (Ca), iron (Fe), and zinc (Zn) using an atomic absorption spectrophotometer (Jenway, FPSP 210) while sodium (Na) content was determined using a Flame Photometer (Jenway, PFP7).

- The data obtained in this study were subjected to one-way analysis of variance (ANOVA) analysis with Tukey HSD post hoc test using IBM SPSS statistical software (version 23).

Results

Table 1: Proximate Composition of Ginger, Garlic, and African Nutmeg

Parameters	Traditional Spices		
	Ginger	Garlic	African nutmeg
Moisture (%)	$75.20^{a} \pm 0.53$	$59.90^{b} \pm 0.24$	$8.14^{c} \pm 0.02$
Ash (%)	$0.81^{c} \pm 0.01$	$0.94^{b} \pm 0.01$	$1.39^{a} \pm 0.01$
Crude protein	$8.91^{c} \pm 0.04$	$12.41^{b} \pm 0.04$	$13.57^{a} \pm 0.09$
Crude fat (%)	$11.71^{b} \pm 0.19$	$6.13^{c} \pm 0.18$	$46.48^{a} \pm 0.12$
Crude fibre (%)	$1.38^{b} \pm 0.50$	$1.95^{b} \pm 0.23$	$27.39^{a} \pm 0.11$
CHO (%)	$2.01^{c} \pm 0.23$	$18.53^{a} \pm 0.34$	$3.06^{b} \pm 0.08$

Data is presented as Mean ± Standard Deviation of duplicate determinations; mean values with different alphabets within the same row are statistically ($p<0.05$) significantly different; CHO = carbohydrate content

Table 2: Mineral Content of Ginger, Garlic, and African Nutmeg

Mineral contents	Traditional Spices		
	Ginger	Garlic	African nutmeg
Sodium (mg/100g)	$7.32^{c} \pm 0.02$	$9.41^{b} \pm 0.02$	$110.20^{a} \pm 0.04$
Zinc (mg/100g)	$4.99^{c} \pm 0.04$	$1.89^{b} \pm 0.02$	$135.91^{a} \pm 0.24$
Iron (mg/100g)	$9.68^{b} \pm 0.02$	$8.47^{c} \pm 0.01$	$147.28^{a} \pm 0.03$
Calcium (mg/100g)	$182.67^{b} \pm 0.04$	$1016^{a} \pm 0.03$	$166.10^{c} \pm 0.33$

Data is presented as mean ± standard deviation of duplicate determinations; mean values with different alphabets within similar rows are statistically ($p<0.05$) significantly different.

Discussion

- From Table 1, the moisture content of *Monodora myristica* (African nutmeg) (8.14%) was significantly ($p < 0.05$) lower compared to those of ginger and garlic.
- In spite of this, the observed moisture content of African nutmeg in this study was higher than the 3.48% noticed by Enwereuzoh *et al* (2015).
- Ginger and garlic however possessed highest moisture contents than other components (Table 1). Therefore, the low moisture content in African nutmeg compared to other traditional spices is indicative of the fact that it can be stored for a long time without deterioration in quality or microbial spoilage since microbial activity may be reduced to a minimum.

Discussion contd

- African nutmeg have good mineral content, and thus serves as a viable tool for nutritional evaluation.
- Crude protein content of the African nutmeg (13.57%) was fairly high compared to other spices. This was however higher than the 8.92% earlier reported by Okonkwo and Ogu (2014).
- Crude fat (lipid) content of African nutmeg was significantly highest than those of ginger and garlic (Table 1).
- From this study, it was observed that the lipid content of *Monodora myristica* (46.48%) was significantly ($p < 0.05$) higher than that of garlic (6.13%) and ginger (11.71%) higher than the reported 13.66% earlier by Okonkwo and Ogu (2014).
- The high lipid content is indicative of the fact that African nutmeg is a good source of flavour since it is rich in essential oil and this also suggests possible sources of oil - soluble vitamins.

- The percentage of crude fibre was noticed to be higher in African nutmeg (27.39 %) which contradicted the reported 10.47% by Okonkwo and Ogu (2014) and 8.38% reported by Enwereuzoh *et al*. (2015).
- Fibre has some physiological effects in the gastrointestinal tract (Effiong *et al*., 2009) and low fibre in diet is undesirable as it may cause constipation.
- The mineral content of the traditional spices revealed that African nutmeg possessed significantly ($p<0.05$) higher sodium (110.20mg/100g), zinc (135.91mg/100g), and iron (147.28mg/100g) while garlic had the highest calcium concentration of 1016mg/100g.
- The mineral elements found in these traditional spices are very important in human nutrition. Sodium and calcium play a central role in the normal regulation of blood pressure

CONCLUSION

- Based on the results obtained, all traditional spices recorded varying proportions of the proximate components as well as mineral contents.
- However, African nutmeg possessed better crude protein, crude fat, and crude fibre contents with higher sodium, zinc, and iron mineral contents compared to other spices examined while garlic had a better calcium

THANKS