



Global Advanced Research Journal of Agricultural Science (ISSN: 2315-5094) Vol. 2(5) pp. 137-141, May, 2013.
Available online <http://garj.org/garjas/index.htm>
Copyright © 2013 Global Advanced Research Journals

Full Length Research Paper

Comparative Proximate and Mineral Composition of *Moringa oleifera* Leaf and Seed

P.M. Aja, U. A. Ibiam, A. J. Uraku, O.U. Orji, C.E. Offor and B.U. Nwali

Department of Biochemistry Ebonyi State University, P.M.B. 053, Abakaliki, Ebonyi State, Nigeria.

Accepted 10 May, 2013

The proximate and mineral analyses of *Moringa oleifera* (Drumstick) which are commonly used as Nutritional and Medicinal plant in Nigeria were carried out on both dry leaf and seed. The proximate analysis recorded the concentrations (in percentage) of seed samples as: Ash (5.00 ± 0.05), Carbohydrate (18.0 ± 0.20), Fat and Oil (40.0 ± 0.04), Moisture (7.00 ± 1.0), Protein (9.98 ± 0.01) and Crude Fibre (20.0 ± 0.03). The percentage proximate composition of the leaves was recorded as: Ash (10.0 ± 0.05), Moisture (10.0 ± 0.30), Protein (1.40 ± 0.1), Fat and Oil ($20.0 \pm 0.50\%$), Carbohydrate ($23.6 \pm 0.20\%$) and Crude Fibre (35.0 ± 0.60). The Mineral analysis revealed Calcium concentration of $1.475 \times 10^2 \pm 0.15\text{mg/l}$, Chlorine concentration of $2.482 \times 10^2 \pm 0.01\text{mg/l}$ and Phosphorus concentration of $3.85 \pm 0.20\text{mg}/100\text{g}$ in seed sample whereas the concentration in the leaves recorded calcium ($1.151 \times 10^2 \pm 0.02\text{mg/l}$), Chlorine ($0.319 \pm 0.07\text{mg/l}$) and Phosphorus ($3.85 \pm 0.04\text{mg}/100\text{g}$). The result of Proximate and Mineral Composition of *Moringa oleifera* indicates that both seed and leaf are nutrient-rich food and should be included in our meal for a balance diet.

Keywords: *Moringa oleifera*, carbohydrates, protein, ash, crude fibre, minerals

INTRODUCTION

All Parts of herbaceous Plants eaten as food by

humans, whole or in parts are generally considered as vegetables. Vegetables include leaves, stems, roots, flowers, bulbs, seeds and of course the botanical fruits (Ramachandra *et al.*, 1980).

Vegetables contain water soluble vitamins like vitamin B and vitamin C, fat soluble vitamins including

*Corresponding Author's E-mail: Ovumte@yahoo.com

Vitamin A and D, and also contain Carbohydrates, Proteins, Fat, Fibre and Minerals (Ramachandran *et al.*, 1980).Vegetable contain a great variety of other phytochemicals some of which have being claimed to have antioxidant, antibacterial, antifungal, antiviral and anticarcinogenic properties (Ramachandran *et al.*, 1980).

Moringa oleifera ,which is one of the most widely cultivated species of the genius *Moringa* serves an example of nutritious vegetable tree with a variety of potential uses (Ramanchandran *et al.*,1980).The immature green pods called “Drumstick” are probably the most valued and widely used part of the tree. They are commonly consumed in India and are generally prepared in a similar fashion to green beans and have a slight asparagus taste. The seeds are sometimes removed from more mature pods and eaten like peas or roasted like nuts. The flowers are edible when cooked and are said to taste like mushrooms. The roots are shredded and used as condiment in the same way as horseradish.

However it contains the alkaloid spirochin (Oliveira *et al.*, 1999), a potentially fatal nerve paralyzing agent. The presence of this compound is not worrying, because large amounts are required to elicit deleterious effects, and spirochin even displays antibacterial properties when consumed in smaller amount (Dhar and Gupta, 1982).

Moringa oleifera is a fast growing, aesthetically pleasing small tree. The specie is characterized by its long, drumstick shaped pods that contain its seeds within the first year of growth, *Moringa* has been shown to grow up to 4 meters and can bear fruit within the same first year (Oleveria *et al.*, 1999).

In different parts of the world, *M. oleifera* is known by divers name: among the Igbos, it is known as “Okwe Oyibo”, among the Hausas, it is called Zogale, among the Yorubas, it is called Ewe ile, among the Fulani, it is called gawara, sonjna in Marathi, Nuggekai in Canada, Murungai in Tamil, Mashinga Sanga in Malayalan, Muringa in Konkani. In English language *M. oleifera* is also called Miracle tree, Mother’s best friend, Never die and Benzolive tree (Ramachandran *et al.*, 1980).

Lack of information on the specific nutrients in a large number of the native vegetables species with which Nigeria is richly endowed is partly responsible for their under-exploitation especially in areas beyond the traditional localities where they are found and

consumed. Among the vegetables in which their Proximate and Mineral analyses have not been extensively studied are leaves and seeds of *Moringa oleifera*.

MATERIALS AND METHODS

Collection and Preparation of Samples:

The leaves and seeds of *Moringa oleifera* (Drum Stick) were collected from Ishiagu, Ivo Local Government Area, Ebonyi State, Nigeria and were identified by a taxonomist in the Department of Applied Biology of Ebonyi State University, Abakaliki, Nigeria. The leaves were destalked, washed and sundried by constantly exposing the leaves to the sunlight for 2-3 days and turning of the vegetable leaves to avert fungal growth. The seeds were dried through the same process. The leaves and seeds were later milled to obtain the vegetable leaf meals (VLMs) and seed meals (SMs) using an electric blender and both were stored in refrigerator in well labeled air-tight containers for analysis.

Proximate Analysis

Proximate and mineral analyses were carried out according to the procedure of Association of Official Analytical Chemist (A.O.A.C., 1990) to determine the carbohydrate, protein, oil, crude fibre, ash, moisture, calcium, phosphorus and chlorine components of the sample.

RESULTS AND DISCUSSION

Figure 1 shows the proximate chemical composition of *Moringa oleifera* seeds and leaves samples. The samples contain considerable amount of carbohydrates (18.0 ± 0.20 and $23.6 \pm 0.20\%$), Fat and Oil (40.0 ± 0.04 and $20.0 \pm 0.50\%$), Protein (9.98 ± 0.01 and 1.40 ± 0.1), Crude Fibre (20.0 ± 0.03 and 35.0 ± 0.60), Ash (5.00 ± 0.05 and 10.0 ± 0.05) and Moisture (7.00 ± 1.0 and 10.0 ± 0.30) for seeds and leaves respectively. This indicates that *Moringa oleifera* is a good source of these chemical

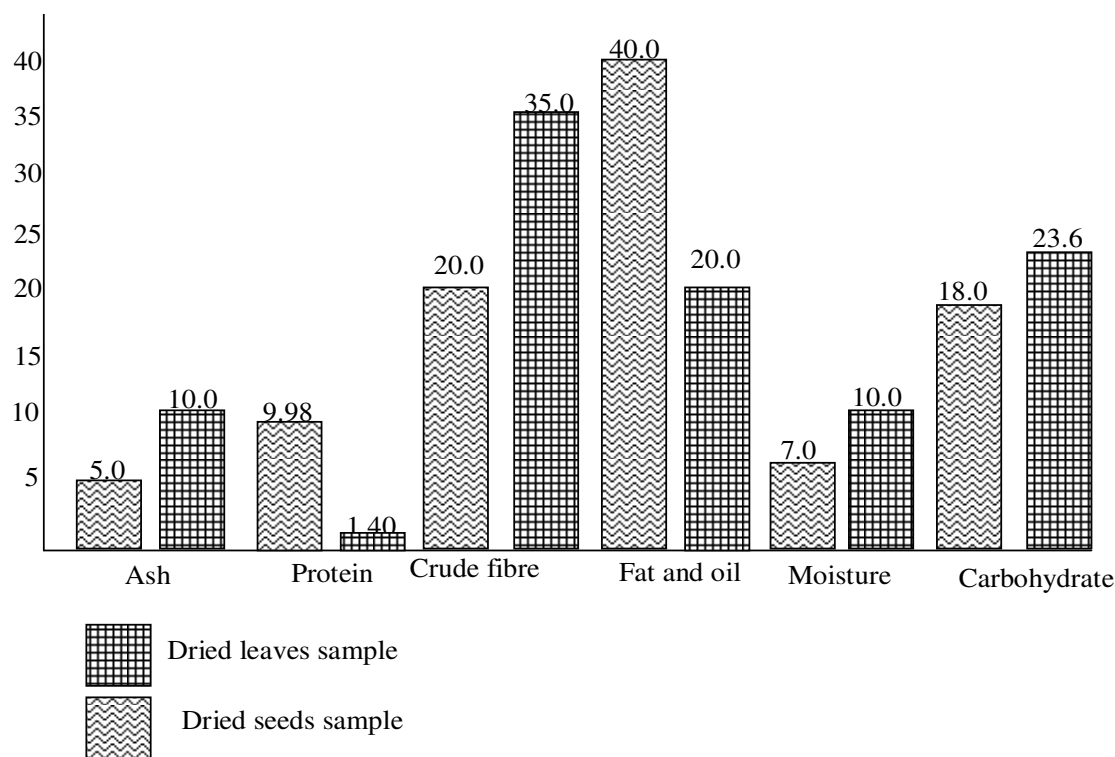


Figure 1. Bar chart representation of the proximate compositions of both seeds and Leaves of *Moringa oleifera*

compositions. Among the two samples-seed and leaf, the oil content of the seed is two times the oil content of the leaf while the Ash content of the leaf is two times the Ash content of the seed. Also the Crude fibre of the leaf is almost double of the seed. Carbohydrate and Moisture content of the leaf is higher than that of the seed with moderate differences. The seed contain higher amount of protein than the leaf with significant differences in amount.

The result of mineral analysis of *Moringa oleifera* samples are shown in figure 2 below. The leaves show a very high concentration of calcium, much higher than chlorine and phosphorus, with high concentration of phosphorus in comparison with chlorine which has the least concentration among the three minerals. The results of mineral analysis of *Moringa oleifera* seed show a very high concentration of chlorine, much higher than calcium and phosphorus, with the concentration of phosphorus much lower than calcium.

Among the leaf and seed samples, the seed contain very high amount of chlorine while the leaf contain very low concentration of chlorine. The seed sample also contains higher amount of calcium than the leaf and equal concentration of phosphorus.

Proximate and mineral composition of *M. oleifera* were carried out in both leaves and seeds samples. Oil, Carbohydrate, Moisture, Ash, Crude fibre, Protein and Calcium, Chlorine and Phosphorus were found to be present in *M. oleifera* (Figure 1 and 2), this shows high levels of its possible dietary value (Abdulkarim *et al.*, 2005). Generally, the leaves proximate composition showed higher level of these nutrients than the seed except for protein (1.40%) and oil (20.0%)(figure 1). These results are in correlation with the findings of Oliveira *et al* (1999) and Booth and Wickens (1988), except for protein with high variation. This variation may be as a result of difference in climatic condition,

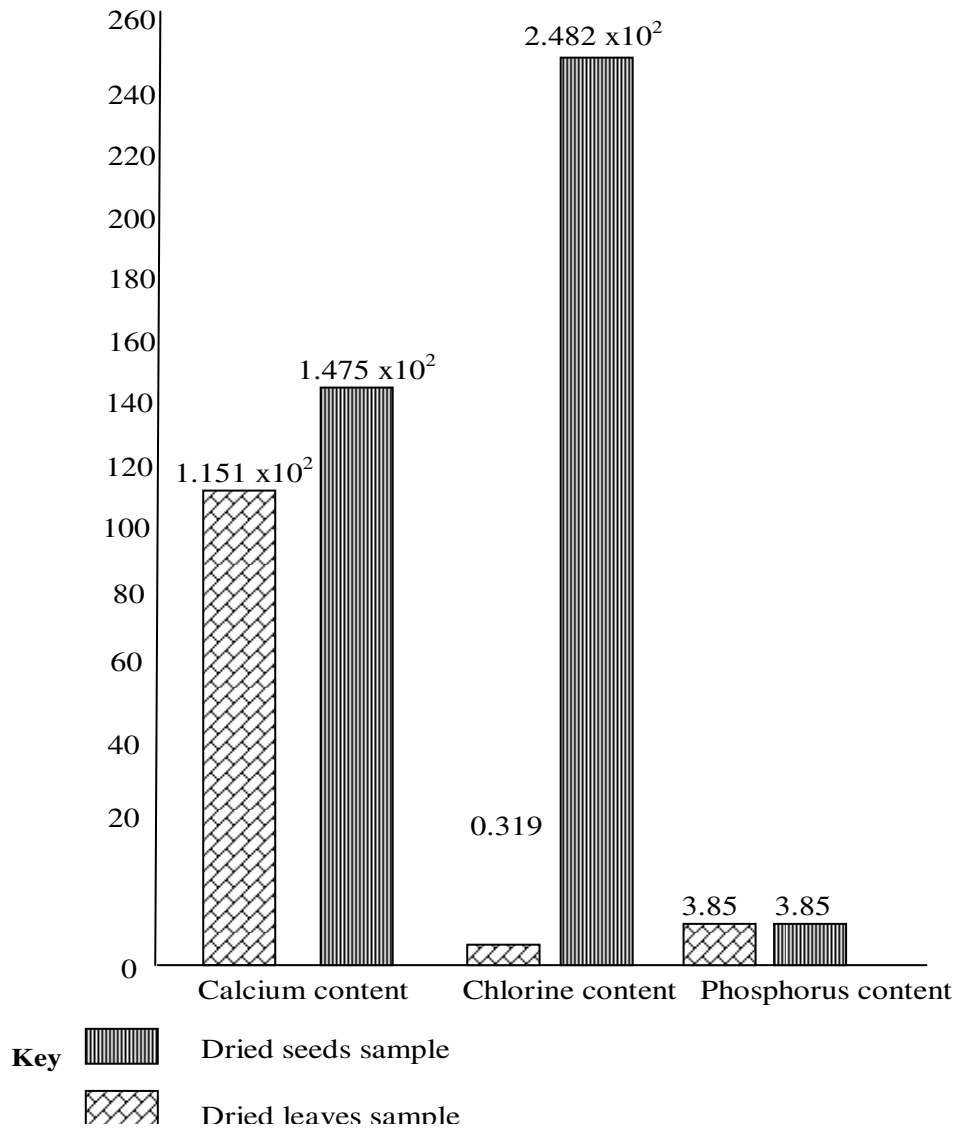


Figure 2. Bar chart representation of the concentration of some mineral composition of both leaf and Seed of *Moringa oleifera*

time of the year and different soil types from which the samples were collected.

High level of oil ($20.0 \pm 0.00\%$ and $40.0 \pm 0.00\%$) in figure 11 shows that *Moringa* leaves and seeds, especially the seeds, are very important in human health as it serves as source of energy and components of biological membranes (Michelle *et al.*,

1993). High level of calcium ($1.151 \times 10^2 \pm 0.00\text{mg/l}$ and $1.475 \times 10^2 \pm 0.15 \text{ mg/l}$) as seen in figure 12 shows that *Moringa oleifera* seeds and leaf are good source of calcium. Calcium is responsible for strong bone and teeth (Ezeilo, 2006).

The results of Proximate and Mineral analyses in figure 11 and 12 show that *M. oleifera* has appreciable

level of Carbohydrates ($18.0 \pm 0.00\%$ and $23.6 \pm 0.00\%$) which serves as a source of energy, Crude fibre ($20.0 \pm 0.00\%$ and $35.0 \pm 0.00\%$) which help in bowel movement, Moisture ($7.00 \pm 1.00\%$ and $10.0 \pm 0.00\%$) which constitute about 80% of the blood, a vital medium for oxygen transport, Ash ($5.00 \pm 0.00\%$ and $10.0 \pm 0.00\%$) which is taken to be a measure of mineral content in food which is required by the body for proper physiological functioning, Phosphorus ($3.85 \pm 0.00\text{mg}/100\text{g}$ and $3.85 \pm 0.00\text{mg}/100\text{g}$) which is necessary for strong bone and cartilage formation and as an essential component of phospholipids, etc and Chlorine ($2.482 \times 10^2 \pm 0.01\text{mg}/\text{l}$) which have antimicrobial activity.

The result of this study indicated that *M. oleifera* is a good source of these nutrients. Low content of protein in both seeds and leaves, and low content of chlorine in leaves in this study is an indication that *M. oleifera* is not a good source of protein and chlorine.

CONCLUSION

The results of this study revealed that both leaves and seeds of *M. oleifera* contain an appreciable amount of Fat and Oil, Crude, fibre, Carbohydrate, Moisture, Ash, serving as a good source of these nutrients with low amount of protein in the seeds and the least in the leaves. It also revealed very high amount of chlorine in the seed and very low level in the leaves, whereas both of them contain high amount of calcium and appreciable amount of phosphorus. It can be concluded thus, that *Moringa oleifera* leaves and seeds can contribute significantly to the nutrient requirements and health management of man and should be recommended in our diet.

REFERENCES

- Abdulkarim SM, Long KS, Lai OM, Muhammad SK, Gahzali HM (2005). Some Physico Chemical Properties of *Moringa oleifera* Seed Oil Extracted using Solvent and Aqueous Enzymatic Methods, *Food Chemistry*, **93** (2): 253-63.
- AOAC (1990). Association of Official Analytical Chemistry, Official Methods of Analysis, 13th ed., Washington DC, USA.
- Booth FE, Wickens GE (1988). Non-timber uses of Selected Arid Zone Trees and Shrubs, *Nutritional Evaluation of Moringa oleifera Leaves* **3**: 92-101.
- Dhar BA, Gupta OP (1982). Nutritional value of Shigni *Moringa oleifera* Lam. *Bulletin of Med. Ethnobotany* **3** (2-4): 280-8.
- Ezeilo GC (2006). Textbook of Physiology, Functions of mineral in human physiology, 3rd Edition. Oxford University press, New Delhi. 274, 316-7, 319-322.
- Michelle A, Hopkins PJJ, Mclaughlin CW, Johnson SE, Warner MQ, Lahart DF, Wright JD (1993). Lipids, Human Biology and Health, Eagle wood Cliffs, New Jersey, USA-Prentice Hall. 1176-180.
- Oliveira JT, Silveira SB, Vasconcelos KM, Cavada BS, Morira RA (1999). Compositional and Nutritional Attributes of Seeds from the Multipurpose Tree, *Moringa oleifera* Lamarck. *J. Sci. and Food Agric.* **79** (6): 815-20.
- Ramachandran CA, Peter KV, Gopalakrishnan PK (1980). Drumstick (*Moringa oleifera*): a multipurpose Indian vegetable. *Economic Botany* **34** (3): 276-83.