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## RELATIVE VITAMIN CONTENT OF ETHANOL LEAF EXTRACT OF *MORINGA OLEIFERA* L FROM CHOSEN LOCATIONS IN SOUTH-EASTERN NIGERIA.

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### ABSTRACT

*Comparative analysis of the vitamin content compositions (A, C, E, B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub> and B<sub>6</sub>) of a set of five samples of dried Moringa oleifera L. leaves from each of the selected locations (Afikpo, Abakaliki, Owerri, Okigwe, Umuahia and Aba) in South-Eastern Nigeria were investigated using standard methods. The results of the vitamin compositions of Moringa oleifera leaves varied significantly ( $P < 0.05$ ) from one source to another. Vitamin A content was highest in Umuahia ( $7.72 \pm 0.13$ ) and lowest in Owerri ( $2.96 \pm 1.10$ ); vit C was highest in Umuahia ( $50.10 \pm 0.87$ ) and lowest in Owerri ( $30.27 \pm 1.10$ ); vit E was highest in Umuahia ( $10.00 \pm 0.71$ ) and lowest in Owerri ( $5.31 \pm 1.33$ ); vitamin B<sub>1</sub> was highest in Afikpo ( $4.50 \pm 0.19$ ) and lowest in Aba ( $3.75 \pm 0.14$ ); vitamin B<sub>2</sub> was highest in Abakaliki ( $2.03 \pm 0.56$ ) and lowest in Aba ( $1.67 \pm 0.02$ ); vit B<sub>3</sub> was highest in Okigwe ( $2.84 \pm 0.11$ ) and lowest in Aba ( $2.49 \pm 0.17$ ) and vit B<sub>6</sub> was highest in Okigwe ( $3.01 \pm 0.15$ ) and lowest in Aba ( $2.61 \pm 0.28$ ). The vitamin A, C and E contents obtained in samples from Umuahia, vitamin B<sub>1</sub> content in sample obtained from Afikpo, and vitamin B<sub>6</sub> content in sample from Okigwe were significantly ( $p < 0.05$ ) higher than those from samples of other locations respectively. While vitamin B<sub>2</sub> and B<sub>3</sub> contents in samples obtained from all the locations were not significantly ( $p > 0.05$ ) different among each other. The vitamin values obtained in samples from different locations indicate, that the samples have nutritional and medicinal potentials with Umuahia leading in value and these differences observed could be as a result of variations in soil nutrients from the various sources and seasonal variations.*

**Keywords:** *Moringa oleifera* L leaves, Vitamins, Nutritional and Medicinal values, Selected locations in South- Eastern Nigeria.

## INTRODUCTION

*Moringa oleifera lam* is among those herbs that exhibit nutritional potentials and other uses. It originated from India, has been naturalized in many locations in the tropics and now widely cultivated in other countries (Ramachandran, Peter & Gopal Krishnan, 1980). Every part of *M. oleifera* is edible, has medicinal properties and is commercially exploitable for the development of medicinal and industrial by-products (Shindano & Kasase, 2009). Locally, the leaves, fruits, flowers and pods of *Moringa oleifera* tree are used as nutritious vegetable in countries like India, Pakistan, the Philippines, Hawaii and some African nations (Anhwange, Ajibola & Oniye, 2004; Anwar, Ashraf & Bhanger, 2005; Oluduro, 2012).

For long, shrubs and herbs have been an important source of micronutrients and can also be used as supplements in medicine. Nigeria is endowed with trees and shrubs that have medicinal and nutritional potentials (Akubugwo, Obasi, Chinyere, & Ugbogu, 2008). According to the World Health Organization (WHO), many people now resort primarily to traditional remedies such as herbs for their nutritional supplement and medicines (Ekor, 2014). The presence of a variety of phytochemicals and nutritional constituents in these plants account for their medicinal and nutritional values (Fallah, Alvian, Heydari & Abolmaali, 2005). These findings explain the need to carry out a research to ascertain their levels in many plants both in Nigeria and elsewhere (Edeoga, Okwu & Mbaebie, 2005). The antioxidant properties of plant's constituents reveal their medicinal roles in disease prevention or control. Usually these compounds are amphipathic molecules which are also known as polyphenolic compounds (Demiray, Pintado & Castro, 2009). There is an increase in the dietetic and medicinal uses of plants and vegetables globally because of their use in the maintenance of health and disease prevention. (Shindano & Kasase, 2009).

Recent studies have shown that parts of *Moringa* trees have been used to combat

malnutrition, especially among infants and nursing mothers. *Moringa* leaves can be eaten fresh, cooked, or stored as dried powder for many months without refrigeration and reportedly without loss of nutritional value (Fuglie, 2000). According to Fuglie (1999), *Moringa* leaves contain more vitamin A than carrots, more vitamin C than oranges, and that the protein quality of *Moringa* leaves is as high as that of milk and eggs. In the work of Witt, (2013), *Moringa oleifera* leaves have been described as a good nutrient source because of its appreciable amount of proximate, mineral and vitamin compositions. High nutritional content found in the leaves of *Moringa oleifera* enables it to serve as a vitamin source for animal and human feed formulations (Moyo, Masika, Hugo & Muchenje, 2011). *Moringa oleifera* tree is used as an alternative food supplement to imported one to treat and fight malnutrition because of the usefulness of its chemical constituents in developing countries (Dhakar, Pooniya & Gupta, 2011). Moreover, *Moringa oleifera* tree contain trace elements that are essential to human health.

Despite the use of this plant for such a wide variety of purposes ranging from dietetic and medicinal values, a detailed comparative studies on the vitamin constituents of *M. oleifera* leaves that is native to South-Eastern States of Nigeria has not yet been reported, and as such, this work will generate baseline data to bridge this scientific gap. The aim of the study was to compare the vitamin compositions of dried ethanol leaf extract of *Moringa oleifera* L from selected locations in South-Eastern Nigeria.

## MATERIALS AND METHOD

### Collection and preparation of Plant Material:

The leaves of *Moringa oleifera* were selectively obtained from Afikpo, Abakaliki (Ebonyi State), Aba, Umuahia (Abia State), Okigwe and Owerri (Imo State) locations, South-Eastern Nigeria, and were authenticated at the Botany Unit of Akanu Ibiam Federal Polytechnic, Unwana, Afikpo, Ebonyi State by Dr. Mrs. S. E. Obasi, the

Polytechnic Taxonomist. A set of five samples of *Moringa oleifera* leaves from each of the geographical locations were randomly collected, cleaned, air-dried, pulverized using Blender/Miller 111, (Model MS-223, China) and the resulting powder were stocked in well labeled – dried black plastic containers inside the storeroom at room temperature of 25°C.

### Vitamin Determinations.

Determination of vitamin A was carried out by Davies (1976) Method.

Determination of Thiamine (Vitamin B<sub>1</sub>), Riboflavin (Vitamin B<sub>2</sub>), Niacin (vitamin B<sub>3</sub>), Vitamin E were done using AOAC Spectrophotometric Method (1990).

Determination of Pyridoxine (vitamin B<sub>6</sub>) was done by using AOAC Titrimetric Method (1990).

Determination of Vitamin C was carried out using Baraket, Shehab, Darwish, & Zahermy, (1973) Method.

### STATISTICAL ANALYSIS

One-way analysis of variance (ANOVA) followed by Duncan's multiple range test (DMRT) by Statistical Package for Social Sciences (SPSS) Window 16.0 were used for the statistical analysis of the results.

### RESULTS AND DISCUSSION

The result of the vitamin compositions are recorded in Table 1 in mg/100g. Vitamin A content was highest in Umuahia (7.72±0.13) and lowest in Owerri (2.96±1.10); vit C was highest in Umuahia (50.10±0.87) and lowest in Owerri (30.27±1.10); vit E was highest in Umuahia (10.00±0.71) and lowest in Owerri (5.31±1.33); vitamin B<sub>1</sub> was highest in Afikpo (4.50±0.19) and lowest in Aba (3.75±0.14); vitamin B<sub>2</sub> was highest in Abakaliki (2.03±0.56) and lowest in Aba (1.67±0.02); vit B<sub>3</sub> was highest in Okigwe (2.84±0.11) and lowest in Aba (2.49±0.17) and vit B<sub>6</sub> was highest in Okigwe (3.01±0.15) and lowest in Aba (2.61±0.28). The vitamins A, C and E contents obtained in samples from Umuahia were significantly ( $p < 0.05$ ) higher than those from samples of other locations. Vitamin B<sub>1</sub> content in sample obtained from Afikpo was

significantly ( $p < 0.05$ ) higher than samples from other locations. Vitamin B<sub>2</sub> and B<sub>3</sub> contents in samples obtained from all the locations were not significantly ( $p > 0.05$ ) different among each other, while vitamin B<sub>6</sub> content in sample from Okigwe was significantly ( $p < 0.05$ ) higher than those from other locations.

The results showed that the dried powdered *Moringa oleifera* leaves studied have low range levels of Vitamins: Vitamin A (7.72-2.96 mg/100g), Vitamin C (50.10-30.27 mg/100g) Vitamin E (10.00-5.31 mg/100g), Vitamin B<sub>1</sub> (4.50-3.75 mg/100g), Vitamin B<sub>2</sub> (2.03-1.67 mg/100g), B<sub>3</sub> (2.84-2.49 mg/100g) and B<sub>6</sub> (3.01-2.61 mg/100g). Vitamin A, C and E levels were abundant in Umuahia cultivar, B<sub>1</sub> in Afikpo, Vitamin B<sub>2</sub> in Abakaliki, whereas, vitamin B<sub>3</sub> and B<sub>6</sub> were higher in Okigwe cultivar. In ruminant animals, vitamin A helps in maintenance of epithelial tissue, bone growth, vision, immunity and maintain adequate iron levels in plasma- that supply the different body tissues including the bone marrow (Thurber & Fahey, 2009). The values of vitamin A in this study was lower than the levels obtained by Witt, (2013). *Moringa* is reported to be rich in vitamin C which increases iron absorption in the animal's body (Anwar, Sajid, Muhammad & Anwarul, 2007). The values of vitamin C observed in this work was lower than the levels obtained in the work of Witt, (2013). Vitamin E with selenium contains antioxidant that work together in the body to help destroy free radicals (Rock, Kincaid, & Carstens, 2001). The levels of vitamin E observed in this study were also lower than the levels observed in the work of Witt, (2013). Vitamin B<sub>1</sub> revealed in this study is in close agreement with levels previously reported by Witt, (2013). The mean values of vitamin B<sub>2</sub> and B<sub>6</sub> compositions of *Moringa oleifera* leaves obtained from various parts of Eastern Nigeria agreed with those found by Witt, (2013), while the values of vitamin B<sub>3</sub>, in this study were lower than the levels observed in his work. *Moringa oleifera* leaves have been reported to be rich in vitamin A, B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, B<sub>6</sub>, K, biotin, ascorbic acid and tocopherol (Der-Jiun, Shahid & Maznah, 2012).

**Table 1: Vitamin Composition of *Moringa oleifera* Leaves Obtained from Various Locations of South-Eastern Nigeria.**

Source	Vitamin composition (mg/100g)													
	A		B <sub>1</sub>		B <sub>2</sub>		B <sub>3</sub>		B <sub>6</sub>		C		E	
Aba	5.98 <sup>b</sup>	0.6	3.75 <sup>c</sup>	0.1	1.67 <sup>a</sup>	0.02	2.49 <sup>a</sup>	0.1	2.61 <sup>c</sup>	0.2	40.45 <sup>b</sup>	1.0	6.01 <sup>b</sup>	0.32
	7		4		5		7		8		8			
Umuahia	7.72 <sup>a</sup>	0.1	3.82 <sup>c</sup>	0.2	1.78 <sup>a</sup>	0.13	2.55 <sup>a</sup>	0.0	2.82 <sup>b</sup>	0.1	50.10 <sup>a</sup>	0.8	10.00 <sup>a</sup>	0.7
	3		2				5		3		7		1	
Owerri	2.96 <sup>c</sup>	1.1	3.85 <sup>c</sup>	0.1	1.80 <sup>a</sup>	0.19	2.60 <sup>a</sup>	0.1	2.74 <sup>c</sup>	0.2	30.27 <sup>c</sup>	1.1	5.31 <sup>b</sup>	1.33
	0		0				6		1		0			
Okigwe	3.24 <sup>c</sup>	0.5	4.07 <sup>b</sup>	0.1	1.92 <sup>a</sup>	0.71	2.84 <sup>a</sup>	0.1	3.01 <sup>a</sup>	0.1	38.11 <sup>c</sup>	0.5	5.50 <sup>b</sup>	0.37
	5		1				1		5		5			
Afikpo	3.19 <sup>c</sup>	1.6	4.50 <sup>a</sup>	0.1	1.85 <sup>a</sup>	0.34	2.71 <sup>a</sup>	0.1	2.95 <sup>b</sup>	0.3	33.88 <sup>d</sup>	0.8	5.43 <sup>b</sup>	0.50
	7		9				4		1		2			
Abakaliki	3.08 <sup>c</sup>	2.0	4.12 <sup>b</sup>	0.4	2.03 <sup>a</sup>	0.56	2.80 <sup>a</sup>	0.2	2.91 <sup>b</sup>	0.1	38.75 <sup>c</sup>	0.3	5.46 <sup>b</sup>	1.12
	1		2				6		1		8			

- Figures are mean ± standard deviation of three (3) replicates.
- Values bearing different alphabets are significant at ( $p < 0.05$ ).

## CONCLUSION

This study has provided scientific evidence that the chemical composition in *Moringa oleifera* leaves varies with different locations. Samples from Umuahia recorded the highest concentrations of vitamins A, C, E, more than other towns studied, with appreciable amount of vitamins B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, and B<sub>6</sub>. These differences observed may be as a result of differences in climate conditions, soil types and plant's stages. The presence of high contents of flavonoids and alkaloids in *Moringa oleifera* leaves might have accounted for the speculated antioxidant potentials observed in this study.

Further studies are needed to completely characterize the bioactive components of *Moringa oleifera* leaf extracts in order to fully harness their nutritional and medicinal potentials. The plant leaves could be incorporated in herbal remedies to boost immune system in animals.

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