

**TITLE PAGE**

**THE NUTRITIONAL VALUE OF DIFFERENT PARTS OF A LOCAL CULTIVAR, *MORINGA OLEIFERA* (*OKWE OYIBO*) AND THEIR DIETARY EVALUATION IN WISTAR ALBINO RATS**

**BY**

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## APPROVAL PAGE

This is to certify that Mr. Igwilo Innocent, Reg. no. 2004477001P, of the Department of Applied Biochemistry, Faculty of Bioscience, Nnamdi Azikiwe University, Awka, has satisfactorily completed the requirements for Ph.D in Biochemistry. The work embodied in this dissertation is original and has not been submitted in part or in full for any other degree or diploma of this or any other University.

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## **DEDICATION**

This dissertation is dedicated to my wife, Ego and children: Ebube, KK, Chiagozienam and the baby in the womb.

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I will remain grateful to the almighty God for His immeasurable love, protection and guidance throughout this phase of life. May His name be praised both now and forever, Amen.

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## ABSTRACT

The nutrient composition, amino acid profile, anti-nutrients and dietary evaluation of *Moringa oleifera* (Lam) plant grown in Awka, South-East, Nigeria were determined. The methods of Association of Analytical Chemists were used for the proximate analysis and the amino acid content estimated using Technicon Sequential Multi-sample amino acid analyzer (TSM). The percentage (%) crude protein content was highest in the seeds ( $28.02 \pm 0.01$ ), leaves ( $27.60 \pm 0.14$ ), and flowers ( $25.99 \pm 0.07$ ) in that order, but lower in the roots ( $5.02 \pm 1.52$ ) and stems ( $3.59 \pm 0.96$ ). The seeds ( $33.78 \pm 2.41$ ) and leaves ( $20.00 \pm 2.31$ ) had high amount of % crude lipid compared to the flowers ( $9.44 \pm 3.08$ ), roots ( $6.33 \pm 1.64$ ) and stems ( $1.77 \pm 0.98$ ). The content of essential amino acids (EAA) and non-essential amino acids (NEAA) was almost equal in concentration in all circumstances; for example, the percentage of EAA in the leaves was 50.66 while the %NEAA was 49.33. The proportion of aromatic amino acids in all the parts of the plant studied indicated that it was lower than branched chain, acidic or basic amino acids. The sodium (Na) content was highest in the roots (514.00mg/100g) followed by the stem (378.38mg/100g), the seeds (129.03mg/100g) and the flowers (120.94mg/100g) while the least value was found in the leaves (104.06mg/100g). The calcium concentration was low in the leaves (13.45mg/100g), roots (3.99mg/100g), seeds (2.84mg/100g), flowers (2.32mg/100g) and stems (1.38mg/100g), implying that *Moringa oleifera* grown in Awka might not be a good source of calcium. Only the leaves contained all the water-soluble vitamins estimated in the following proportions: ascorbic acid (773.30mg/100g), thiamine (18.47mg/100g), riboflavin (14.82mg/100g), pyridoxine (57.29mg/100g) and niacin (50.35mg/100g). The tannins were highest in the leaves (420.00mg/100g) followed by the stems (100.00mg/100g), the flowers (60.00mg/100g) and the roots (45.00mg/100g) and lowest in the seeds (40.00mg/100g). On the other hand, the phytates were low in all the parts of the plant studied. The rats fed with commercial rat pellets and *Moringa* leaf diet showed increase in weights(g) from  $51.90 \pm 1.38$  to  $112.14 \pm 7.36$  and from  $46.73 \pm 3.81$  to  $66.59 \pm 5.27$  respectively after 21 days of feeding. The Casilan diet, *Moringa* seed and flower diets did not support growth. This observation

might be due to the presence of some anti-nutrients such as tannins and oxalates in the raw seed and flower diets. These anti-nutrients might be removed by boiling or frying. The results of analysis of variance on the amino acids indicated that there was no significant difference ( $p > 0.05$ ) between the essential and non-essential amino acids present in all the parts of the plant studied. Further research should focus on determining the effects of processing on the nutritional values of the plant to ascertain the suitability as a complete supplement for humans and animals.

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## LIST OF ABBREVIATIONS

- AOAC - - - - Association of Official Analytical Chemists
- TSM - - - - Technicon Sequential Multi-Sample Amino acid Analyzer
- AAS - - - - Atomic absorption spectrophotometer
- HPLC - - - - High performance liquid chromatography
- GPT - - - - Glutamate-pyruvate transaminase
- ALT- - - - Alanine aminotransferase
- U/l - - - - International unit for measuring enzyme activity
- GOT - - - - Glutamate-oxaloacetate transaminase
- AST - - - - Aspartate aminotransferase
- 2, 4-DNPH - - - - 2,4-dinitrophenylhydrazine
- ALP - - - - Alkaline phosphatase
- $A_{TB}$  - - - - Absorbance value for total bilirubin
- $A_{DB}$  - - - - Absorbance value for direct bilirubin
- EAA - - - - Essential amino acid
- NEAA - - - - Non-essential amino acid.

