ETHNOBOTANY AND GENETIC INTRA-SPECIFIC VARIABILITY OF *Moringa oleifera* LAM. (DRUMSTICK) IN NIGERIA

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A THESIS SUBMITTED TO THE DEPARTMENT OF BIOLOGICAL SCIENCES, SCHOOL OF NATURAL AND APPLIED SCIENCES, COLLEGE OF SCIENCE AND TECHNOLOGY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF DOCTOR OF PHILOSOPHY (Ph.D) IN BIOLOGY (PLANT MOLECULAR SYSTEMATICS)

April, 2015.

CERTIFICATION

This is to certify that Jacob Olagbenro POPOOLA (Matric. No: CUGP100228) carried out this research work in partial fulfillment of the requirements for the award of a Doctor of Philosophy (Ph.D) degree in Biology (Plant Molecular Systematics) of Covenant University, Ota, under our supervision.

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DECLARATION

It is hereby declared that this research work titled "Ethnobotany and Genetic Intraspecific Variability in *Moringa oleifera* LAM. (Drumstick) in Nigeria was undertaken by Jacob Olagbenro POPOOLA.

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DEDICATION

This Ph.D thesis is dedicated to God Almighty for His Exceeding Grace. To Him alone be all glory and honour.

ACKNOWLEDGEMENTS

I express my sincere gratitude to my supervisors, Prof. O.O. Obembe and Dr. A.C. Omonhinmin for their guidance, constructive advice, and assistance during the course of my studies. The roles played by Dr. A.C. Omonhinmin during survey trips cannot be forgotten. I wholeheartedly appreciate the opportunity given to me to study at Covenant University and the enabling environment provided. I thank the Acting Head, Department of Biological Sciences, Dr. E. J. Iweala for the positive roles played during the course of this study. I express my gratitude to Professor A. E. Adegbite for his guidance, mentoring and advice. I highly appreciate the support I got from him. I also appreciate the administrative support and encouragement provided by Dr. I. S. Afolabi. I also acknowledge Dr. Solomon Oranusi for assistance provided during the course of this study.

I am highly indebted to Deacon Richard Adewoyin, Mr. Francis Okusodo, Tosin Adelani and the entire staff members of Covenant University farm for all the field assistance and encouragement provided during field experiments and data collection. My appreciation also goes to the entire members of staff of the Department of Biological Sciences for their encouragement, support and prayers.

I will be ungrateful if I fail to acknowledge the efforts of Tope Owoeye and Victoria Nwagbara of BioScience, International Institute of Tropical Agriculture (IITA), Ibadan, Oyo State, Nigeria for the roles they played during molecular characterization of the samples. I sincerely appreciate Hon. Oladapo Popoola, Mrs. Taiwo Oladoyinbo and Rev. Ben Atoyebi for their support, prayers and encouragement throughout the period of the study. To my wife Mabel Aderonke Popoola and children David and Daniel Popoola, I say thank you for your understanding, care, love, support, encouragement and prayers.

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ABSTRACT

Moringa oleifera is an underutilized tree crop with enormous potential to contribute to improved food security and nutrition, medicine, incomes and environment in Nigeria. The plant has not received systematic research attention to enhance its genetic management and improvement. The local knowledge base on its utilization is weak. Genetic diversity details and knowledge about its intra-specific differences are also poorly understood. This study was aimed at collating and documenting the indigenous knowledge variation and local uses of *M. oleifera*, sampling germplasm for maintenance and use, assess geographical distribution and characterize the sampled accessions. Ethnobotanical data were collected using semi-structured questionnaires and Participatory Rural Appraisals (PRA) method. Intra-specific variabilities were evaluated using morphometric traits and Amplified Fragment Length Polymorphisms (AFLP) markers. Thirty one (31) morphometric traits involving qualitative and quantitative vegetative, floral, pod and seed traits, seed set and germination percentages were used for morphometric analysis. Two AFLP selective primer combinations (M-CAC/E-ACC and M-CAG/E-ACA) were employed for the AFLP analysis. Correlation coefficient, principal component (PCA), cluster (CA) and discriminant analysis (DA) were employed to evaluate the intraspecific relationships. Medicinal use recorded 93% fidelity level (FL), food and nutritional purposes (FL = 71.1%), fodder (FL = 60.9%), fencing (FL = 53.2%), gum (FL = 38.9%), coagulant (FL = 38.8%), and firewood (FL = 27.9%). There were significant differences ($P \leq 0.05$) among the ethnic, gender and age groups regarding the ethno-botanical use value. The use pattern of *M. oleifera* varied from one ethnic group to another. Primer M-CAG/E-ACA generated 859 bands while primer M-CAC/E-ACC gave 413 bands. Morphometric and AFLP cluster analyses using UPGMA segregated the 40 accessions into six groups. The pattern of spread of *M. oleifera* in Nigeria is southward from the North. The use of morphometric traits are less reliable, less efficient and time consuming in the assessment of genetic relationships compared to AFLP marker. AFLP proved to be more robust, fast and reliable. Accessions that are far apart based on genetic similarity coefficient (such as KnN077, ogN026, oyN003 and edN037) could be selected for breeding trials in future. Findings from this study revealed poor management and conservation of *M. oleifera* germplasm in the different agro-ecological zones of Nigeria, which calls for the development of a more effective and coordinated strategies for improved management, utilization, conservation and genetic improvement of *M. oleifera*.