Assessment of Polycyclic Aromatic Hydrocarbons and Heavy Metals on Soils and Crops of Agro-Industrial Cassava Production Area at Ido Local Government, Ibadan, Nigeria.

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Being a MSc Project Submitted to the Department of Biological Sciences, Faculty of Natural & Applied Sciences, Lead City University, Ibadan, Oyo State, Nigeria

In Partial Fulfilment of the Requirements for the Award of Master of Science Degree (MSc.) in Environmental Management and Toxicology

2025

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Certification

This is to certify that **Grace Opeoluwa OJEKUNLE** with Matriculation Number LCU/PG/005220 carried out this research titled "**Assessment of Polycyclic Aromatic Hydrocarbons and Heavy Metals on Soils and Crops of Agro-Industrial Cassava Production Area at Ido Local Government, Ibadan, Nigeria"** in the Department of Biological Sciences Faculty of Natural & Applied Sciences, Lead City University, Ibadan, Oyo State, Nigeria, for the award of Master of Science Degree (M.Sc.) in Environmental Management and Toxicology, and this has not been previously submitted.

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Head of Department

Dedication

This seminar is dedicated to the Almighty God, and to my amazing family.

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Acknowledgement

My greatest gratitude and appreciation goes first and foremost to the Almighty God for His faithfulness throughout this work. I would like to express my profound gratitude to the management of Lead City University for a conducive learning environment.

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Abstract

Nigeria's extensive agro-industrial processing of cassava, especially in Ido Local Government Area in Ibadan, has sparked environmental worries because it may contaminate crops and soil with dangerous chemicals like heavy metals and polycyclic aromatic hydrocarbons (PAHs). This study examines the concentrations, distribution, and possible health hazards of PAHs and specific heavy metals (Pb, Cd, Cr, Zn, Ni, and As) in soils and cassava roots that were taken from the study area's control sites and cassava processing zones. Ten samples were taken from processing and non-processing locations, five of which were soil samples and five of which were cassava plants. After being air-dried and sieved, soil samples were put through Soxhlet extraction to determine PAH levels and acid digestion to analyze metals. Standard extraction procedures were used to peel, dry in an oven, grind, and examine cassava roots. Atomic Absorption Spectrophotometry (AAS) was used to measure the amounts of heavy metals, and Gas Chromatography-Mass Spectrometry (GC-MS) was used to quantify PAHs. To guarantee analytical reliability, quality control procedures were used, such as the use of blanks and replicates. When comparing processing locations to control sites, the results showed higher concentrations of PAHs and heavy metals in the soils and cassava roots, with certain values surpassing international safety limits (e.g., WHO/FAO guidelines). Among the most prevalent PAHs found were benzo[a]pyrene and chrysene. Long-term exposure to tainted cassava products may provide both non-carcinogenic and carcinogenic dangers, according to health risk assessments, especially for susceptible groups. According to the study's findings, Ido LGA's cassava agro-industrial operations greatly increase environmental pollution, which could endanger public health and food safety. To lessen the long-term effects of contamination in the area, it suggests more stringent control of waste disposal procedures, ongoing agricultural land monitoring, and public awareness initiatives.

Keywords: PAHs, heavy metals, cassava, soil contamination, Ido, health risk, agro-industrial pollution

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Table of Contents

Title	Page
Title page	i
Certification	ii
Dedication	iii
Acknowledgement	iv
Abstract	v
Table of Contents	vi
List of Tables	x
List of Figures	xi
List of Acronyms	xii
Chapter One: Introduction	1
1.1 Background to the Study	1
1.2 Statement of the Problem	3
1.3 Justification of the Study	4
1.4 Significance of the Study	5
1.5 Aim and Objectives of the Study	6
1.6 Research Questions	7
1.7 Scope of Study	7
1.8 Limitations of the Study	8
Endnotes	9
Chapter Two: Literature Review	11
2.1 Conceptual Review	11

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2.1.1 The Role of Cassava in Nigeria's Agro-Industrial Sector 11

2.1.2 Environmental Pollution from Cassava Processing Activities 13

2.1.3 Impact on Soil and Water Quality 15

2.2 Polycyclic Aromatic Hydrocarbons (PAHs) 17

2.2.1 Heavy Metals in Soils and Crops 20

2.2.2 Agro-Industrial Pollution 25

2.2.3 Soil Contamination 26

2.2.4 Food Safety 27

2.3 Theoretical Review 28

2.3.1 Ecological Systems Theory 28

2.3.2 Risk Assessment Theory 29

2.3.3 Environmental Degradation Models (DPSIR Framework) 30

2.4 Review of Empirical Studies 33

2.4.1 Previous Studies on PAH and Heavy Metal Contamination in Cassava Processing Areas 33

2.4.2 Studies on Cassava Processing Waste and Soil/Crop Contamination in Nigeria 38

2.4.3 PAHs and Cassava Processing- Nigerian Case Studies 41

2.4.4 Nigerian Studies on Food Crop Contamination and Health Risk 42

2.5 Theoretical and Conceptual Framework 45

2.6 Summary of Gaps in the Literature 48

Endnotes 52

Chapter Three: Methodology 62

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3.1 Description of the Study Area 62

3.1.1 Population and Sample 65

3.1.2 Sampling Technique and Layout 65

3.2 Sample Collection 67

3.2.1 Soil Samples 67

3.2.2 Cassava Plant (Leaf) Samples 67

3.2.3 Cassava Effluent (Wastewater) Samples 68

3.3 Sample Analyses 68

3.3.1 Crop Analysis (Cassava Leaves) 69

3.3.1.1 Heavy Metal Analysis in Leaves 69

3.3.1.2 PAH Analysis in Leaves 70

3.3.2 Soil Analysis 71

3.3.2.1 Physicochemical Parameters of Soil 71

3.3.2.2 Heavy Metal Analysis in Soil 74

3.3.2.3 PAH Analysis in Soil 75

3.3.3 Effluent (Wastewater) Analysis 76

3.4 Data Analysis 81

3.5 Ethical Approval 84

Endnotes 85

Chapter Four: Results and Discussions of Findings 87

4.1 Results of Findings 87

4.1.1 Result of Physicachemical Properties of Cassava Effluents from the Sample Locations 87

4.2 Discussion of Findings 102

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4.2.1 Discussion of Physicochemical Properties of Cassava Effluents from the Sample Locations 102
4.2.2 Physicochemical Parameters of Soil Samples 105
4.2.3 Physicochemical Characteristics of Plant Samples 106
4.2.4 Heavy Metals in Environmental Matrices 107
4.2.5 Soil Samples Analysis 108
4.2.6 Plant Samples Analysis 108
4.2.7 Effluent Samples Analysis 109
4.3 PAHs Contamination in Soil and Plant Samples 109
4.4 Essential Heavy Metals 111
4.4.1 Toxic Heavy Metals 112
4.5 Environmental and Health Implications 113
4.6 Cluster Analysis of Physicochemical Parameters of Cassava Effluent 114
4.6.1 Overview of Data and Analytical Framework 114
4.6.2 Interpretation of Cluster Results 114
Endnotes 116
Chapter Five: Conclusion 119
5.1 Summary of Findings 119
5.2 Conclusion 120
5.3 Recommendations 121
5.4 Contribution to Knowledge 121
5.5 Suggested Areas for Further Research 122
Bibliography 124
Appendices 140
Bio-data 149
University Compliance Certification 151

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List of Tables

Table	Title	Page
4.1	Result of Physicochemical Properties of Cassava Effluents from Sample Locations	89
4.2	Physicochemical Properties of Soil Samples from all Locations	90
4.3	Physicochemical Properties of Plant Samples from all Locations	91
4.4	Concentration of PAHs in Plant Samples Across Sample Location	92
4.5	Concentration of PAHs in Soil Samples Across Sample Location	93
4.6	Descriptive Statistics of Heavy Metals Concentrations in Plant Samples Across all Sample Locations	94
4.7	Descriptive Statistics of Heavy Metals Concentrations in Soil Samples across all Sample Locations	95
4.8	Descriptive Statistics of Heavy Metals Concentrations in Effluent Samples across all Sample Locations	96

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List of figures

Figure	Title	Page
2.1	DPSIR Feedback Loop	31
2.2	Cassava Processing in Nigeria (a.) Peeled Cassava (b.) Grating Cassava (c.) Cassava Peels	40
3.1	Map Showing the Location of Ido Community	66
4.1	Heavy Concentration in Plant Samples Across Location	97
4.2	Heavy Concentration in Soil Samples Across Location	98
4.3	Heavy Concentration in Effluent Samples Across Location	99
4.4	PAHs Concentration in Plant Samples Across Location	100
4.5	PAHs Concentration in Soil Samples Across Location	101

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List of Acronyms

Abbreviation	Meaning
PAHs	Polcyclic Aromatic Hydrocarbons
LGA	Local Government Area
FAO	Food and Agriculture Organisation
DPSTR	Drivers – Pressure – State – Impact – Response
HCA	Hierarchical Cluster Analysis
CoD	Chemical Oxygen Demand
WHO	World Health Organization
SON	Standard Organization of Nigeria
ANOVA	Analysis of Variance
DO	Dissolved Oxygen
TDS	Total Dissolved Solids

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