



**BUSITEMA
UNIVERSITY**
Pursuing Excellence

OPTIMIZATION OF BIOETHANOL PRODUCTION FROM WATER HYACINTH

AT KIGUNGU LAKE VICTORIA

BY

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DECLARATION

I **THAISI HOPE BRENDA** declare that this report is a result of my own efforts and tremendous work done during the research period and it has never been submitted to any institution of higher learning for any academic award.

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APPROVAL

This is to certify that this final year project report was written under the guidance of my supervisor on the topic “*Optimization of bioethanol production from water hyacinth*” and is now ready for submission to the department of Water Resource and Mining Engineering, Busitema University.

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DEDICATION

I dedicate this report to my dear parents Mr. Atamati Joseph and Mrs. Joyce Atamati.

ACKNOWLEDGEMENT

I would like to extend my sincere thanks to the almighty God who has gifted me with life and has enabled me to reach this academic height as he has been the provider of all the necessary requirements.

Great thanks to my beloved parents Mrs. Joyce Atamati and Mr. Atamati Joseph for their financial and moral support.

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Not forgetting my classmates

LIST OF ACRONYMS

BCR-Benefit Cost Ratio

CF-Cash flow

GoU-Government of Uganda

Kg-Kilogram

KJ-Kilojoule

NPV-Net Present Value

RE-Renewable energy

WH-Water Hyacinth

TABLE OF CONTENT

DECLARATION	ii
APPROVAL	iii
DEDICATION	iv
ACKNOWLEDGEMENT	v
LIST OF ACRONYMS	vi
LIST OF TABLES	x
LIST OF FIGURES	xi
ABSTRACT	xii
CHAPTER ONE: INTRODUCTION	1
1.1 BACKGROUND	1
1.2 PROBLEM STATEMENT	2
1.3 JUSTIFICATION	2
1.4 OBJECTIVES	3
1.4.1 MAIN OBJECTIVES	3
1.4.2 SPECIFIC OBJECTIVES	3
1.5 SCOPE AND LIMITATION	3
CHAPTER TWO: LITERATURE REVIEW	5
2.1 INTRODUCTION	5
2.2 RENEWABLE ENERGY	5
2.3 Major barriers and challenges of renewable energy in Uganda	6
2.4 BIOMASS	6
2.5 ENERGY RECOVERY FROM RENEWABLE ENERGY SOURCES	7
2.6 CLASSIFICATIONS OF BIOETHANOL ACCORDING TO GENERATIONS	7
2.6.1 FIRST GENERATION BIOETHANOL	7
2.6.2 SECOND GENERATION BIOETHANOL	8
2.6.3 THIRD GENERATION BIOETHANOL	8
2.7 ORIGIN OF WATER HYACINTH	9
2.8 HOTSPOTS OF WATER HYACINTH ON LAKE VICTORIA	10
2.9 PROPERTIES OF WATER HYACINTH AS A SUSTAINABLE BIOFUEL FEEDSTOCK	12
2.10 BIOETHANOL PRODUCTION PROCESS	13
2.11 ECONOMIC ANALYSIS OF BIOETHANOL PRODUCTION	14
CHAPTER THREE: METHODOLOGY	16
3.1 MATERIALS AND METHODS	16

3.1.1 RESEARCH DESIGN	16
3.1.2 SOURCE OF RAW MATERIALS	16
3.1.3 SAMPLE PREPARATION	16
3.2 METHODOLOGY FOR SPECIFIC OBJECTIVE ONE	17
3.2.1 DETERMINATION OF LIGNIN CONTENT	17
3.2.2 DETERMINATION OF CELLULOSE CONTENT	17
3.2.3 DETERMINATION OF HEMICELLULOSE CONTENT	17
3.2.4 DETERMINATION OF MOISTURE CONTENT	18
3.3 METHODOLOGY FOR SPECIFIC OBJECTIVE TWO	18
3.3.1 PRETREATMENT OF WATER HYACINTH PRIOR TO FERMENTATION	18
3.4 METHODOLOGY FOR SPECIFIC OBJECTIVE THREE	19
3.4.1 RECOVERY AND DISTILLATION OF BIOETHANOL FROM THE FERMENT	19
3.4.2 DETERMINATION OF CALORIFIC VALUE OF BIOETHANOL	19
3.5 METHODOLOGY FOR SPECIFIC OBJECTIVE FOUR	21
3.5.1 ECONOMIC EVALUATION OF PRODUCTION OF THE BIOEHANOL	21
3.6 DATA ANALYSIS	21
CHAPTER FOUR: DISCUSION OF REULTS	22
4.1 COMPOSITION ANALYSIS	22
4.3 BIOETHANOL YIELD AND QUALITY	23
4.3.1 Bioethanol yield	23
4.3.2 pH	24
4.3.3 Calorific value	24
4.4 BENEFIT COSTS ANALYSIS	25
4.4.1 BENEFIT COST ANALYSIS OF BIOETHANOL PRODUCTION	25
4.4.2 BENEFIT COST ANALYSIS	26
CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS	27
5.1 CONCLUSION	27
5.2 RECOMMENDATIONS	27
REFERENCES	28
APPENDICES	30
Appendix A: Bar graph showing chemical properties of fresh water hyacinth on afresh basis	30
Appendix B: A bar graph showing bioethanol quality and yield obtained from water hyacinth fermentation	30

Appendix c: Summary of mean, standard deviations and Duncan^a test result for data analysis of chemical composition of water hyacinth..... 31

LIST OF TABLES

Table 4. 1 The composition analysis of fresh water hyacinth	22
Table 4. 2 Lignocellulosic contents of fresh water hyacinth	23
Table 4. 3 Bioethanol Quality and yield obtained from water hyacinth fermentation	25
Table 4. 4 Cost for water hyacinth bioethanol produced	25

LIST OF FIGURES

Figure 2. 1 Water hyacinth hotspots on Uganda's L. Victoria waters(Wanda, Namukose and Matuha, 2015).....	11
Figure 2. 3 Coverage of water hyacinth of L. Victoria's hotspots (Wanda, Namukose and Matuha, 2015)	11
Figure 2. 4 Pathways for production of water hyacinth bio ethanol (Bhattacharya and Kumar, 2010)	14
Figure 3.1 Preparation of the sample	16
Figure 3.2 Set up for fractional distillation.....	19
Figure 3.3 Set up of calorimeter	20

ABSTRACT

Water hyacinth has become the world's worst invasive aquatic weed due to its rapid proliferation rate, ecological adaptability and detrimental effects caused on environment, human health and economic development. A large number of weed management strategies such as physical removal, chemical methods and biological control agents are being used to control it. Currently the water hyacinth is removed from the lake and disposed of to some place. This is just temporary since it grows again where it's dumped. On the other hand, water hyacinth has demonstrated abilities to be used as a raw material in various useful applications. With increasing prices of fossil fuels, change in climate and global warming; biofuels are now currently being promoted worldwide as substitutes for fossil fuels. Utilizing the weed by producing biofuels out of it, is seen as a way of controlling it on Lake Victoria in Uganda.

Bioethanol production has been demonstrated as alternative to fuel, as it is considered to be renewable and clean energy. This study explored the use of water hyacinth for bioenergy production, in form of bioethanol. The bioethanol produced in this study will further provide an alternative to the local wood fuels used in Uganda and the rest of the world. Fresh water hyacinth samples were collected and tested for dry matter content, ash content, organic matter, lignin content, cellulose content, hemicellulose content. Different pre-treatments (acid, Alkali) were used in the production of bioethanol. The study indicated that the calorific value of the bioethanol produced was 26.10 MJ/Kg, 26.10 MJ/Kg and 26.23MJ/Kg. The economic evaluation of the project was conducted with the benefit cost ratios of production of the biofuels being less than one, thus the idea of converting water hyacinth into bioethanol is economically feasible.