

**THE USE OF *Moringa oleifera* SEED AS A NATURAL  
COAGULANT IN WATER QUALITY TREATMENT**

**NUR AFIQAH SYAHIRAH BINTI MUSE**

**BACHELOR OF SCIENCE (Hons.) BIOLOGY  
FACULTY OF APPLIED SCIENCE  
UNIVERSITI TEKNOLOGI MARA**

**JULY 2019**

This Final Year Project Report entitled “**The Use Of *Moringa oleifera* Seed As A Natural Coagulant In Water Quality Treatment**” was submitted by Nur Afiqah Syahirah Binti Muse, in partial fulfillment of the requirements for the Degree of Bachelor of Science (Hons.) Biology, in the Faculty Of Applied Science, and was approved by

---

Sarini Binti Ahmad Wakid  
Supervisor  
Faculty of Applied Science  
Universiti Teknologi MARA  
72000 Kuala Pilah,  
Negeri Sembilan

---

Siti Norazura Jamal  
Project Coordinator FSG661  
B. Sc. (Hons.) Biology  
Faculty of Applied Science  
Universiti Teknologi MARA  
72000 Kuala Pilah,  
Negeri Sembilan

---

Dr. Aslizah Mohd Aris  
Head School of Biology  
Faculty of Applied Science  
Universiti Teknologi MARA  
72000 Kuala Pilah,  
Negeri Sembilan

Date: \_\_\_\_\_

## TABLE OF CONTENTS

	<b>PAGE</b>
<b>ACKNOWLEDGEMENTS</b>	<b>iii</b>
<b>TABLE OF CONTENTS</b>	<b>iv</b>
<b>LIST OF TABLES</b>	<b>vi</b>
<b>LIST OF FIGURES</b>	<b>vii</b>
<b>LIST OF ABBREVIATIONS</b>	<b>viii</b>
<b>ABSTRACT</b>	<b>ix</b>
<b>ABSTRAK</b>	<b>x</b>
<b>CHAPTER 1: INTRODUCTION</b>	
1.1 Background of Study	1
1.2 Problem Statement	3
1.3 Significance of the Study	3
1.4 Objectives of the Study	4
<b>CHAPTER 2: LITERATURE REVIEW</b>	
2.1 <i>Moringa oleifera</i>	5
2.2 Use of <i>Moringa oleifera</i> in water treatment	7
2.3 Effects of alum in humans	8
2.4 Standard water quality analysis	9
2.5 Total coliform and <i>E.coli</i>	13
<b>CHAPTER 3: METHODOLOGY</b>	
3.1 Materials	14
3.1.1 Raw materials	14
3.1.2 Chemicals	14
3.1.3 Apparatus	14
3.2 Methods	15
3.2.1 Water sampling method	15
3.2.2 Preparation of <i>Moringa oleifera</i> powder	15
3.2.3 Jar test flocculation	16
3.2.4 pH parameter	16
3.2.5 Turbidity parameter	17
3.2.6 Serial dilution and spread plate method	17
3.3 Statistical analysis	18

<b>CHAPTER 4: RESULTS AND DISCUSSION</b>	
4.1 Turbidity reductions by coagulation of <i>Moringa</i> and alum treatment	19
4.2 pH values by coagulation of <i>Moringa</i> and alum treatment	21
4.3 Total coliform reductions by coagulation of <i>Moringa</i> and alum treatment	22
4.4 Effect of <i>Moringa</i> treatment on turbidity removals	24
4.5 Effect of <i>Moringa</i> treatment on pH	26
4.6 Effect of <i>Moringa</i> treatment on total coliform	27
4.7 Relationship between parameters and National Water Quality Standards Of Malaysia	28
<b>CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS</b>	31
<b>CITED REFERENCES</b>	33
<b>APPENDICES</b>	36
<b>CURRICULUM VITAE</b>	42

## ABSTRACT

### THE USE OF *Moringa oleifera* SEED AS A NATURAL COAGULANT IN WATER QUALITY TREATMENT

The use of alum as chemical coagulants in water treatment gives potential health and environmental problems thus the use of *Moringa oleifera* seed as a natural coagulant was proposed. A study was carried out in Kampus UiTM Kuala Pilah, UiTM Cawangan Negeri Sembilan to determine the effectiveness of *Moringa oleifera* approach in increasing water quality eco-friendly technology by comparing to several variables of turbidity, pH and total coliform with standard quality of water in Malaysia. The efficiency of *Moringa oleifera* seeds coagulant in the process of coagulation/flocculation in the treatment was seen from water samples of pond water and wastewater. The data for variables were determined in lab except turbidity was observed in-situ. Study found that *Moringa* achieved 95% for pond water and 93% for wastewater in terms of turbidity removals from the initial turbidity of 45 NTU to 2 NTU and 47 NTU to 3 NTU respectively. As for pH, the findings readings are 7.05 for pond water and 6.58 for wastewater which maintained the pH values as it has natural buffering capacity even after the addition of *Moringa oleifera* seed powder. In contrast to alum treatment where pH adjustment are required as addition of alum drop the pH values to be slightly acidic. Meanwhile, total coliform achieved 95.4% to 95.6% of reductions. All parameters observed were classified to be under the Class 1 water bodies under the National Water Quality Standards for Malaysia indicating the effectiveness of *Moringa oleifera* seed as a natural coagulant. There is no significant difference between turbidity removal between *Moringa* treatment and alum treatment which means *Moringa* treatment is as effective as alum treatment This research might be beneficial for *Moringa oleifera* seed to be used in the treatment for domestic use in tropical developing countries as it is low cost and bio-based coagulant.