

**PHYTOREMEDIATION OF HEAVY METALS POLLUTANT  
IN LANDFILL AREA BY  
*Sida Rhombifolia* sp**

MOHAMAD NORAZLIE BIN MOHAMAD RAZALI

**Final Year Project Report Submitted in  
Partial Fulfilment of the Requirements for the  
Degree of Bachelor of Science (Hons.) Chemistry  
in the Faculty of Applied Sciences  
Universiti Teknologi MARA**

**JANUARY 2015**

## **ACKNOWLEDGEMENTS**

*Assalamu'alaikum warahmatullahi wabarakatuh*

Firstly, my gratefulness and appreciation is due to The Almighty ALLAH S.W.T. because gave me a healthy body and mind to attend the University Technology MARA in order to join the community of knowledge. My deep appreciation to my supervisor, Dr. Mohd Zahari Abdullah @ Rafie who is responsible that gave me a support and patience in helping. He is also guided me a lot for every single time trying to give me helpful suggestions for improving my proposal project until is completed. My gratitude also goes to, Miss Wan Noni Afida binti Abd Manan for her support and assist me constantly as my second supervisor. In addition greatest thanks to En. Zahir Ismail and En. Fauzi Idrus that helping and gave me other additional input and suggestion to be added in my proposal and thesis report and laboratory. For my parents and siblings for their love, support, pray for me day and night for their son successful and my spirit to complete this thesis is caused of them.

Mohamad Norazlie bin Mohamad Razali

## TABLE OF CONTENTS

	<b>Page</b>
<b>APPROVAL SHEET</b>	ii
<b>ACKNOWLEDGEMENT</b>	iii
<b>TABLE OF CONTENTS</b>	iv
<b>LIST OF TABLES</b>	vi
<b>LIST OF FIGURES</b>	vii
<b>LIST OF ABBREVIATIONS</b>	viii
<b>ABSTRACT</b>	ix
<b>ABSTRAK</b>	x
<b>CHAPTER 1 INTRODUCTION</b>	<b>1</b>
1.1 Background Of Study	1
1.2 Significance Of Study	3
1.3 Objective Of Study	3
1.4 Scope Of Study	4
<b>Chapter 2 LITERATURE REVIEW</b>	<b>5</b>
2.1 Environmental Problems Of Landfill	5
2.1.1 Heavy Metals In Soil And Ground Water	6
2.2 Heavy Metals Pollution	7
2.2.1 Sources Of Heavy Metals	8
2.2.2 Harmful Effects Of Heavy Metals	10
2.3 Phytoremediation	13
2.3.1 Phytoremediation For Treating Metal	14
2.4 Determination Of Phytoextraction Efficiency	16
2.5 Limitations Of Phytoremediation	16

<b>CHAPTER 3 RESEARCH METHODOLOGY</b>	<b>18</b>
3.1 Sampling Area	19
3.2 Sampling Strategies	21
3.3 Sample Collection	22
3.4 Sample Preparation And Analysis.	23
<b>CHAPTER 4 RESULT AND DISCUSSION</b>	<b>25</b>
4.1 Introduction	25
4.2 Concentration of Heavy Metals in Soils	27
4.3 Accumulation of Heavy Metals in Plant Tissue	29
4.4 Overall Absorption of Heavy Metals	34
<b>CHAPTER 5 CONCLUSION AND RECOMMENDATIONS</b>	<b>36</b>
<b>REFERENCES</b>	<b>38</b>
<b>APPENDICES</b>	<b>44</b>
Appendix A	<b>45</b>
Appendix B	
<b>CURRICULUM VITAE</b>	<b>48</b>

## ABSTRACT

### Phytoremediation of Heavy Metals Pollutant in Landfill Area

by *Sida Rhombifolia* sp

Soils contaminated with pollutant especially heavy metals can caused a serious problems to the environment including aquatic life and the food chains. Laboratory studies has proved that phytoremediation is a natural, safest, and feasible method on dealing with contaminated soils of landfill area. This research focused on the potential of plants to naturally act as metal remover on the landfills soil contaminated with iron (Fe), manganese (Mn), lead (Pb), copper (Cu) and zinc (Zn). The plant sample and landfill soil used in the study was obtained from the landfills area near Felda Jengka 10, Pahang. One plant species was selected to act as phytoremediator which is *Sida Rhombifolia* sp. The plant was taken from two different places which is at twenty meter and fifty meter far away from the waste collection area. For the control, same plant species was taken near main road at plantation area at UiTM Pahang. The heavy metals concentrations were determined by using Flame Atomic Absorption Spectroscopy (AAS). The results showed that the absorption of heavy metals by *Sida Rhombifolia* at 20 meter away was in the order of  $Zn > Mn > Fe > Pb > Cu$ . The absorption of heavy metals by *Sida Rhombifolia* at 50 meter away was in the order  $Zn > Mn > Fe > Pb > Cu$ . Based on the results obtained, it was concluded that the plant species has a high potential to significantly act as metal remover especially for zinc metal.