



## CONTENTS

Title Page .....	i
Validation Page .....	ii
Declaration of Authenticity .....	iii
Acknowledgements .....	iv
Contents .....	v
List of Tables .....	vii
List of Figures .....	viii
Intisari .....	ix
Abstract .....	x
CHAPTER I INTRODUCTION .....	1
1.1. Background .....	1
1.2. Problem statement .....	2
1.3. Objectives .....	3
1.4. Expected outcomes .....	3
CHAPTER II LITERATURE REVIEW .....	4
2.1. Lipase .....	4
2.1.1. Lipase structure and mechanism .....	4
2.1.2. Pattern of microbial lipase production .....	8
2.1.3. Microbial lipase sources .....	9
2.1.4. Bacillus lipase .....	12
2.2. Factors affecting rate of lipase production .....	13
2.2.1. Nutritional factors .....	14
2.2.2. Physico-chemical factors .....	18
2.2.3. Other components .....	21
2.3. Agricultural waste as substrates for lipase production .....	22
2.4. Tuna condensate .....	24
2.5. Hypothesis .....	26
CHAPTER III MATERIALS AND METHODS .....	26
3.1. Materials .....	26
3.2. Methods .....	27
3.3. Analytical methods .....	31
CHAPTER IV RESULTS AND DISCUSSION .....	37
4.1. Screening of variables using Plackett-Burman design .....	37
4.1.1. Influence of variables studied using Plackett-Burman design on lipase production .....	37
4.1.2. Influence of variables studied using Plackett-Burman design on protease production .....	42
4.1.3. Influence of variables studied using Plackett-Burman design on pH of medium .....	43



4.1.4. Influence of variables studied using Plackett-Burman design on biomass production .....	44
4.2. Effect of tuna condensate dilution on lipase production.....	45
4.3. Medium optimization using response surface methodology by Box-Behnken design .....	48
4.4. Time course of lipase production.....	54
CHAPTER V CONCLUSION AND SUGGESTION .....	59
5.1. Conclusion .....	59
5.2. Suggestion .....	59
REFERENCES.....	60
APPENDIX.....	69