

UNIVERSITI TEKNOLOGI MARA

**EXTRACTION OF LEMONGRASS
(*Cymbopogon citratus*) OLEORESIN,
CHARACTERISATION AND SHELF
LIFE OF CYCLODEXTRIN-
LEMONGRASS OLEORESIN
INCLUSION COMPLEX**

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Thesis submitted in fulfillment
of the requirements for the degree of
Master of Science

Faculty of Applied Sciences

May 2014

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. The thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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Oleoresin, Characterisation and Shelf Life of
Cyclodextrin-Lemongrass Oleoresin Inclusion Complex

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ABSTRACT

Lemongrass is a well-known plant in Malaysia due to its lemony aroma used for cooking. Citral, which consists of two isomers, neral and geranial is the compound responsible for the unique flavour of lemongrass. Due to susceptibility of citral to oxidation, encapsulation of lemongrass oleoresin was carried out to increase stability of the oleoresin. Optimisation of lemongrass oleoresin extraction using Pressurised Liquid Extraction (PLE) was based on temperature, pressure and static time. The optimised PLE parameters obtained were temperature of 167.5°C, a pressure of 1203 psi and static time of 20 minutes. Sensory evaluation data revealed that the lemongrass extract obtained using standard PLE method (100°C, 1000 psi, 30 minutes) was significantly ($p < 0.05$) more acceptable than the extract obtained from the optimised conditions. Phase solubility study concluded that β -cyclodextrin-lemongrass oleoresin inclusion complex was highly stable with stability constant (K_c) of 2091 M^{-1} and 1192 M^{-1} for neral and geranial; respectively. Lower K_c obtained for γ -cyclodextrin indicates formation of unstable inclusion complex with K_c values of 59 M^{-1} and 51 M^{-1} for neral and geranial; respectively. Inclusion complex of cyclodextrins-lemongrass oleoresin was formed using kneading, co-precipitation and physical mixture methods. Further characterisation of the complex using Differential Scanning Calorimetry (DSC), Fourier Transmission Infrared Spectroscopy (FTIR) and Scanning Electron Microscopy (SEM) revealed that co-precipitation was able to form a new solid phase. However, based on kinetic modeling and percentage retention of neral and geranial upon storage, encapsulation of lemongrass oleoresin with cyclodextrins was unable to improve stability of compound neral and geranial upon storage for 217 days.

ACKNOWLEDGEMENT

Upon completion of this thesis project, I would like to express my gratitude to many parties.

First and foremost, I would like to thank the Almighty Allah for giving me the opportunity to accomplish this written research thesis successfully.

My heartfelt thanks go to my supervisor, Dr. Zaibunnisa Abdul Haiyee for her guidance, assistance, encouragement, ideas and helpful remarks throughout this project. My appreciation also goes to Associate Professor Dr. Halimahton Zahrah Mohamed Som as the co-supervisor for her personal guidance and help during the preparation of this thesis.

Not forgetting, to all food laboratory staffs, Mrs. Norahiza, Mrs. Siti Marhani and our late Mr. Osman who had been helpful in sharing their knowledge, experience and cooperation. A special thank you goes to Professor Dr. Norashikin Saim and Mr. Nasir of Block G, Institute of Science for providing ASE facilities throughout this project. I would also like to thank my colleagues especially to the lab members of WB 210, Food Research Laboratory for their endless support and concern towards the success of this project. The financial support from FGRS grant (FRGS/FASA 2-2010/(SAINS GUNAAN)/(UiTM)/(600-RMI/ST/FRGS 5/3/Fst (210/2010)) is gratefully acknowledged.

Finally, endless thanks dedicated to my beloved family for their never ending support and love. Thank you so much.

TABLE OF CONTENTS

AUTHOR'S DECLARATION	ii
ABSTRACT	iii
ACKNOWLEDGEMENT	iv
TABLE OF CONTENTS	v
LIST OF TABLES	viii
LIST OF FIGURES	x
LIST OF ABBREVIATIONS	xiii

CHAPTER ONE: INTRODUCTION

1.1	Background of the Study	1
1.2	Statement of Problem	3
1.3	Objectives of the Study	3
1.4	Scope of the Study	4
1.5	Significance of the Study	4

CHAPTER TWO: LITERATURE REVIEW

2.1	Lemongrass	5
2.1.1	Lemongrass Marker Compounds	6
2.1.2	Usage of Lemongrass	8
2.1.3	Oleoresin	8
2.2	Extraction Methods	
2.2.1	Pressurised Liquid Extraction (PLE)	10
2.2.2	Hydrodistillation	11
2.2.3	Soxhlet Extraction	12
2.2.4	Other Non-Conventional Extraction Methods	13
2.3	Encapsulation	
2.3.1	Mechanism of Encapsulation	14
2.3.2	Cyclodextrin	15
2.3.2.1	Application of Cyclodextrins in Industries	17
2.3.3	Phase Solubility Study	17
2.4	Characterisation of Inclusion Complex	