

UNIVERSITI TEKNOLOGI MARA

**A COMPARATIVE STUDY OF *HYLOCEREUS*
UNDATUS (WHITE DRAGON FRUIT) FOLIAGE
AND PEEL FOR ANTIOXIDANT ACTIVITY AND
PHENOLIC CONTENT**

NUR MARDHIYYAH BINTI AZIZUDDIN

Thesis submitted in fulfillment
of the requirements for the degree of
Bachelor (Hons) Chemical Engineering

Faculty of Chemical Engineering

July 2018

ABSTRACT

Hylocereus undatus foliage is believed to have high antioxidant compared to peels of *Hylocereus undatus*, which are already known to contain high total phenolic content and antioxidant activities. Total phenolic content and antioxidant activity for two different solvent extractions namely; chloroform and methanol were done by Folin-Ciocalteu method and DPPH free radical scavenging assay. In determining total phenolic content, the results show that methanol extraction (30.30 ± 0.0065 mg GAE/100 g extract in foliage; 45.815 ± 0.0233 mg GAE/100g extract in peel) gives higher phenolic content than chloroform extraction (5.92 ± 0.0148 mg GAE/100 g extract in foliage; 18.89 ± 0.0055 mg GAE/100g extract in peel). However, in DPPH scavenging assay, methanol extraction (88.81 ± 0.0012 % in foliage; 97.42 ± 0.0061 % in peel) has high scavenging activity compared to chloroform extraction (38.30 ± 0.0080 % in foliage; 18.71 ± 0.0068 % in peel) which shows that antioxidant activity in chloroform solvent extraction is higher compared to methanol solvent extraction . When a comparison is made between foliage and peel, it shows that the peel contains more antioxidants than foliage. This experiment has prove that *Hylocereus undatus* foliage has the same potential as *Hylocereus undatus* peel in scavenging free radicals in human body.

ACKNOWLEDGEMENT

First of all, I wish to thank Almighty God for giving me the opportunity to complete my thesis for final research project through this long journey despite facing challenges along the way.

I would like to show my gratitude to my supervisor, Assoc Prof Dr. Ayub Md Som and the other collaborators namely; Assoc Prof Dr. Norizan Ahmat and Mrs. Hairul Amani Abdul Hamid from the Faculty of Applied Sciences that always advise me to improve my writing skills in order to form a good thesis. They also always make sure my progress is on schedule. I would also like to give a special thanks to lab staff from the instrumentation lab Faculty of Applied Sciences, En. Faizal and all my friends for helping me in completing this research.

Finally, I feel grateful to thanks my parents that always give support to me and encourage me throughout duration of my study.

TABLE OF CONTENTS

	Page
CONFIRMATION BY PANEL OF EXAMINERS	ii
AUTHOR’S DECLARATION	iii
ACCEPTATION	iv
ABSTRACT	v
ACKNOWLEDGEMENT	vi
TABLE OF CONTENTS	vii
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF PLATES	xi
LIST OF ABBREVIATION/NOMENCLATURE	xii
 CHAPTER ONE: INTRODUCTION	 1
1.1 Research Background	1
1.2 Problem Statement	3
1.3 Objectives	4
1.4 Scope of Study	4
 CHAPTER TWO: LITERATURE REVIEW	 5
2.1 Introduction	5
2.2 Water Pollution	6
2.2.1 Cause of Water Pollution	6
2.2.2 Coagulation in Water Treatment Process	7
2.3 Synthetic Antioxidant	9
2.4 Plant-Based Antioxidant	10
2.4.1 <i>Actinidia Deliciosa</i> (Green Kiwi)	11
2.4.2 <i>Fragaria x Ananassa</i> (Strawberry)	11
2.4.3 <i>Lycopersicon Esculentum L.</i> (Tomato)	12

CHAPTER ONE

INTRODUCTION

1.1 RESEARCH BACKGROUND

Dragon fruit plant that consists of its foliage and fruit is locally known as pitahaya fruit and it is one of the cactus family, *Cactaceae* (Ruzlan et al., 2010). There are many types of dragon fruit species, but one of it that is commonly cultivated in Malaysia is *Hylocereus undatus* (dragon fruit with red peel and white pulp). *Hylocereus undatus* is a native fruit from Mexico and Central South America (Mello et al., 2015). The best climate condition for dragon fruit plantation is dry, tropical or subtropical with annual rainfall ranges from 22 to 50 inches per year. The flowers of dragon fruits with diameter up to 30 cm only can bloom twice in a month, around 1st and 15th days of the lunar calendar (Halimoon & Hasan, 2010). Ruzlan et al., (2010) has stated on their research that in the cultivation of dragon fruit, one plant can only produce about four to six cycles of fruits per year and the fruits are harvested when they are fully expanded and matured as their skins form 85% of red colour. Plate 1.1 shows the *Hylocereus undatus* fruit whereas Plate 1.2 shows its foliages and flowers.



Plate 1.1: *Hylocereus undatus* Fruit