

UNIVERSITI TEKNOLOGI MARA

**EFFICACY OF EXTRACTS FROM
SELECTED INDIGENOUS PLANTS
AS POTENTIAL BOTANICAL
PESTICIDES FOR CONTROLLING
GOLDEN APPLE SNAIL,
*Pomacea canaliculata***

**‘AMIRAH SA’AIDAH NAFISAH BINTI
OTHMAN**

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

Faculty of Plantation and Agrotechnology

November 2018

ABSTRACT

Rice is the most important staple food crops after wheat and maize. The production of rice is insufficient due to infestation of the golden apple snail, *Pomacea canaliculata*. Golden apple snail is a major pest in paddy field due to its ability to grow in high water level and caused severe damage on young leaf and stem of paddy bases. Thus, paddy plant will completely damage. Due to this problem, farmers used synthetic pesticides to control infestation of the golden apple snail. However, excessive usage of synthetic pesticides gave negative impact to humans, natural environment and non-target organisms. Hence, farmers began to aware the dangers of synthetic pesticides and looked for an alternative by using botanical pesticide. Botanical pesticides are naturally occurring derived from plants that contain chemical compound act as repellent, antifeedant and insect growth regulatory activities. The aims of this study are (i) to quantify phytochemical compounds of *Ipomoea aquatica*, *Peltophorum pterocarpum* and *Cosmos caudatus* extract in methanol and ethanol using Ultraviolet-Visible (UV-Vis) Spectrophotometer analysis, (ii) to identify the mortality and antifeedant activity of *I. aquatica*, *P. pterocarpum* and *C. caudatus* extract in methanol and ethanol for controlling golden apple snail and (iii) to compare the effective concentration of *I. aquatica*, *P. pterocarpum* and *C. caudatus* extract in methanol and ethanol for controlling golden apple snail. Based on the result of UV-Vis spectrophotometer, the saponin compounds (lupeol) is the highest chemical compounds in *I. aquatica* and *P. pterocarpum* extract in methanol and ethanol while flavonoid compounds (catechin) is the highest compound in *C. caudatus* extract in methanol and ethanol. The result showed after seven days of application, the *P. pterocarpum* extracts in methanol showed the highest antifeedant index (AFI) (46.87%) compared with other treatments. The finding from this study showed *P. pterocarpum* extracts in methanol gave highest antifeedant effect compared with *I. aquatica* and *C. caudatus*. This study is recommended to formulate the effective concentration of *P. pterocarpum* extracts in methanol for formulation and test in laboratory and paddy field. The combination of *P. pterocarpum* and *I. aquatica* extract in methanol also recommended to test under laboratory and field condition towards golden apple snail mortality and antifeedant test.

ACKNOWLEDGEMENT

'In the Name of Allah, the Most Gracious, the Most Merciful. Selawat and Salam to Prophet Muhammad s.a.w.'

Praise to Allah the Almighty for giving me chance and health to finish my research eventhough there are many problems and obstacles. I owe first and foremost my profound gratitude to Almighty Allah s.w.t. the source of all inspiration and help and without whose assistance; this study would not have come into existence.

I wish to thank God for giving me the opportunity to embark on my Master and for completing this long and challenging journey successfully. My gratitude and thanks go to my supervisor Dr. Siti Noor Hajjar Md Latip, and co-supervisor Dr. Zaibunnisa Binti Haiyee and Dr. Neni Kartini Binti Che Mohd Ramli. Thank you for the support, patience and ideas in assisting me with this study. I also would like to express my gratitude to the laboratory assistant in Universiti Teknologi MARA (UiTM) Puncak Alam, Mr. Mohd Shahfie Bin Md Latif and laboratory assistant in UiTM Jengka, Mr Rosdi.

Lots of love and special thanks to my beloved parents, Mr. Othman Bin Mohd and [REDACTED] whose giving support, inspiration and put trust on me during finishing my work. Also to my beloved husband, Mohd Fauzi Bin Abd Aziz, thank you for your support and patience during finishing my labwork and thesis. Last but not least, my sincere gratitude also belonging to all of my others family members.

I also would like to wish special thanks to my friend and others in helping me to finish my study.

TABLE OF CONTENTS

	Page
CONFIRMATION BY PANEL OF EXAMINERS	ii
AUTHOR'S DECLARATION	iii
ABSTRACT	iv
ACKNOWLEDGMENT	v
TABLE OF CONTENTS	vi
LIST OF TABLES	xi
LIST OF FIGURES	xiii
LIST OF SYMBOLS	xvi
LIST OF ABBREVIATIONS	xvii
CHAPTER ONE: INTRODUCTION	1
1.1 Background of Study	1
1.2 Problem Statement	3
1.3 Significance of Study	4
1.4 Scope of Study	5
1.5 Objective of Study	6
CHAPTER TWO: LITERATURE REVIEW	7
2.1 Golden Apple Snail, <i>Pomacea canaliculata</i>	7
2.1.1 Identification and Characteristics	7
2.1.2 Biology and Life Cycle	15
2.1.3 Origin and Distribution	17
2.1.4 Habitats and Host Plant	19
2.1.5 Economic Importance	20
2.1.6 Damage Due to Golden Apple Snail	21
2.1.7 Control Management	22
2.2 Botanical Pesticides	24
2.2.1 Potential Plants as Botanical Pesticides	25

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Rice is the most important staple food crops in the world after wheat and maize based on humans consumption and production (Herman et al., 2015). More than 90% of paddy are planted, produced, and consumed in Asia include Malaysia (Massaguni and Latip, 2012). The Ministry of Agriculture and Agro-based Industry, in action to attain higher self-sufficiency level (SSL) and food security, adopted the National Agro-food Policy 2011-2020, with the policy is on targeting Malaysia to achieve 85% SSL in rice production (Ahmed and Siwar, 2013). There are many factors contributes in insufficient production of rice including infection of weeds, diseases, competition with unwanted plants for getting light, nutrient and enough water for growing. However, the major factor that influences the decreasing of rice production is an infestation by *Pomacea canaliculata* Lamarck, golden apple snail (Dai et al, 2011).

Golden apple snail belongs to genus of *Pomacea* from the family of Ampullariidae is an invasive snail (Cowie et al., 2017). In rice industry, golden apple snail preferred to feed on young seedlings of transplanted or direct-seeded paddy (Latip et al., 2012). Severe damage by golden apple snail will cause complete loss of rice crop (Teo, 2003). Massaguni and Latip (2012) reported that golden apple snail is difficult to control due to its biological characteristic such as high fertility, rapid in growth and reproduces new generation in short time. Golden apple snail also can adopt although during dry season and creep into the mud to hibernate in moist soil within six months by the special characteristics with gill and lung-like organ (Matsukura and Wada, 2017).

There are various types of pest management for controlling golden apple snail in paddy field such as cultural, biological and chemical control. Chemical control is the common method used by farmers because this is the easier and effective way for controlling golden apple snail infestation within a short time. However, the usage of this method become worst due to the chemicals in the pesticides is too toxic and not suitable to the other organism. Bora et al. (2012) reported due to high toxicity and