

UNIVERSITI TEKNOLOGI MARA

**TOXICITY OF FRESH AND DRIED
NEEM SEED EXTRACTS AGAINST
GOLDEN APPLE SNAIL,
*Pomacea canaliculata***

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ABSTRACT

TOXICITY OF FRESH AND DRIED NEEM SEED EXTRACTS AGAINST GOLDEN APPLE SNAIL, *Pomacea canaliculata*

The golden apple snail, *Pomacea canaliculata* is an invasive alien species that seriously affects rice cultivation in many Asian countries. These freshwater mollusc devour young rice seedlings, causing extensive damage to both transplanted and direct seedling. Most Asian farmers resort to short-term solutions by using molluscicides that have negative impacts on non-target organisms, aquatic biodiversity, and the environment. Due to the toxic hazards of the synthetic insecticides, biological control through botanical pesticides is the best alternative for reducing the golden apple snail damage in paddy fields. Neem or also known as *Azadiractha indica* was proven to have the molluscicidal potential for controlling golden apple snails. The purposes of this study were to determine toxicity of different neem seed extracts for controlling golden apple snail and also to identify the antifeedant activity of different neem extract for controlling golden apple snail. Azadirachtin content was quantified using spectrophotometer. Bioassay and antifeedant test was conducted with five different concentration of neem seed extract. The mortality golden apple snail increased with increasing concentration of extract 100,000 ppm to 500,000 ppm and exposure time from 24 to 96 hours. The methanol extraction with dried neem seed ($LC_{50} = 180,590$ ppm) showed high mortality rate compared to the fresh neem seed extract ($LC_{50} = 267,960$ ppm). Meanwhile, water extraction with fresh neem seed ($LC_{50} = 248,880$ ppm) showed high mortality rate compared with the dried neem seed extract ($LC_{50} = 388,320$ ppm). Methanol extraction with fresh neem seed showed high antifeedant activities compared with other treatments with 81% feeding deterrent index (FDI). Azadirachtin content in the neem seed extract showed in range 53.36 to 54.08 ppm for methanol extraction and 52.95 to 53.97 ppm for water extraction. Methanol extraction with dried neem seed showed high mortality and antifeedant activity towards golden apple snail compared with fresh neem seed. Meanwhile, water extraction with fresh neem seed showed high mortality and antifeedant activity compared dried neem seed. Based on the finding, the neem seed has potential to be formulated as biopesticide for management of golden apple snail in the field. For further study, application of neem in real situation in the paddy field should be done to determine the effect of the neem extracts under different environmental situation.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF STUDY

Rice is the most important food crop in Malaysia (Vengedasalam et al., 2011). It has been put as a top priority by the government based on the strategic importance of rice as a staple food commodity. The government is implementing a food security policy for the rice industry towards self-sufficiency by 2020 by encouraging paddy farmers to increase their yield (Shamsudin et al., 2015). Based on the paddy productivity, Malaysia is one of the lowest producer in term of paddy yield among paddy producing countries in the world (FAO, 2008). Since Malaysia does not have a comparative advantage in rice production it has to perform a variety of interventions to achieve the targeted rice production level (Alias et al., 2011). One important strategic component to increase rice productivity and to promote global food security in pest management practices by sustaining the natural balance and reduces reliance on pesticides.

Paddy is the second highest grain produced in worldwide after maize. Insufficient production of rice is due to many factors that include disease infection, competition with the weeds and pest infestation. Paddy cultivation is suitable to countries and regions with high rainfall, as rice cultivation requires large amounts of water. Paddy in Malaysia is planted twice a year and under irrigated system and scheduled planting. This system can control the production of paddy (Murad et al., 2008). In Peninsular Malaysia, rice is grown in ten granary areas mostly as wet paddy (617,028 ha) while small acreage (70,912 ha) in Sarawak and Sabah with dry land paddy (DOA, Malaysia, 2014). The distribution of Golden Apple Snail (GAS) is higher in Peninsular Malaysia due to the wet paddy cultivation method.

The government regards food security as an integral national policy objective for overall development and has stressed that food security is synonymous with rice security. Thus, Malaysia's self-sufficiency program has consistently focused on rice, being the staple food of the vast majority of the population (Murad et al., 2008). The continuously increasing population in Malaysia requires increase in the rice