APPROVAL SHEET

The thesis entitled **"OVICIDAL AND LARVICIDAL EFFECTS OF GOLDTREE, *Tabebuia donnel-smithii* ROSE, 1982 (SCHROPHOLARIALES: BIGNONIACEAE) EXTRACTS ON DIAMONDBACK MOTH, *Plutella xylostella* LINNAEUS, 1758 (LEPIDOPTERA: PLUTELLIDAE)"** prepared and submitted by **NORIELYN N. ABALOS** in partial fulfillment of the requirements for the degree **MASTER OF SCIENCE IN BIOLOGY** has been examined and is recommended for acceptance and approval for oral examination

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ABSTRACT

Insecticidal properties of fractioned extracts of *Tabebuia donnel-smithii* flowers, leaves, bark and roots against *Plutella xylostella* eggs and larvae were investigated in the laboratory The study aimed to determine the most effective concentration and the most active extract, evaluate the effects of the different extract concentrations on the treated eggs and larvae, and to characterize the phytochemical contents of the most effective extract fraction of *T donnel-smithii* Results showed that ethyl acetate fraction is the most effective against eggs (LC_{50} =35 81 ppm) and larvae (LC_{50} =2,019 08 ppm). Egg mortality was highest using 1,000 ppm ethyl acetate fraction (100%). Larval mortality was highest using 10,000 ppm ethyl acetate fraction (93 33%). The ethyl acetate fraction tested positive for saponins, flavonoids, alkaloids, terpenoids and tannins while negative for reducing sugars, anthraquinones and steroids Ethyl acetate fraction of *T donnel-smithii* is an effective botanical insecticide exhibiting larvicidal, ovicidal and antifeedant properties against *P xylostella* thus it can be an alternative to synthetic insecticides. These properties can be attributed to the presence of phytochemicals in the extract namely: saponins, terpenoids, flavonoids, alkaloids and tannins Further work is necessary to evaluate and characterize the active components of the extract fractions and its efficacy in the field

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N N. Abalos

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

CHAPTER I

INTRODUCTION

Gold tree, *Tabebuia donnel-smithii* Rose (1982) is a large tree known for its timber product and ornamental quality due to its impressive floral display Pau d'Arco or Taheebo, *Tabebuia avellanedae*, is a more commonly known tree belonging to the same genus In 1982, E. Paterno first isolated the active compound lapachol, a naphthoquinone, from *T avellanedae* Lapachol is recognized for its wide spectrum of therapeutic activities namely: anti-abscess, anti-ulcer, antileishmanial, anticarcinomic, antiedemic, anti-inflammatory, antimalarial, antiseptic, antitumor, antiviral, bactericidal, fungicidal, insectifugal, pesticidal, protisticidal, respiradepressant, schistosomicidal, termiticidal, and viricidal (Hussain et al , 2007). Anti-inflammatory, antimicrobial, and antineoplasic activities of *T avellanedae* cited in the literature is supported by saponines, flavonoides, cumarines, and other natural antibiotics, such as derivatives of lapachol which are often included among the constituents of the extracted plant material (de Miranda et al , 2001). According to Espanto (2006), wood timbers of the family Bignoneacea are popularly used as bed decks since they are resistant to insect attacks. Additionally, Orwa et al (2009) noted that timber products of *T donnel-smithii* are resistant to white- and brown-rot fungi Medillo (2008) found out that crude extracts of the inner bark of *T donnel-smithii* reduced hatchability of eggs and survival of nymphs of rice black bug, *Scotinophara coarctata* Insecticidal properties of *T donnel-smithii* are worth investigating due to the marked resistance of its timber products to insect attacks and to white- and brown-rot fungi

The diamondback moth (DBM), *Plutella xylostella* L., 1758 (Lepidoptera Plutellidae), is the most important cosmopolitan pest insect of crucifer crops especially of the *Brassica* ssp such as cabbages, broccoli, and cauliflower and its cost of control measures reached to about one billion US dollars annually (Sarfraz et al , 2005, Talekar and Shelton, 1993) In the Philippines, cabbage *Brassica oleracea* L , chinese cabbage, *Brassica campestris* L. ssp *pekinensis*, and radish, *Raphanus sativus* L are one of the most important vegetables In 2008, the Bureau of Agricultural Statistics reported total production of cabbage reached 128, 865 metric tons. Cabbage is one of the cheapest of the vitamin-protective foods and is also one of the most healthful vegetables. It is a good source of vitamins A, B_1, B_2, B_6, and C. It also contains folate, manganese, potassium, magnesium, omega-3 fatty acids, calcium and protein. Cabbage has a year round demand as it is an important ingredient of food recipes such as soups, salads, and noodles (Department of Agriculture, 2007) Magallona (1986) considered DBM as a serious limiting factor in the production of crucifers in the Philippines, reducing yields up to 100% if pesticides are not used for control Various control methods mainly the conventional chemical insecticides are used for pest control in agriculture. However, though synthetic pesticides are valued for their effectiveness and convenience they can pose certain problems, including phytotoxicity and toxicity to non-target organisms, environmental degradation, and health hazards to farmers They may also hasten development of the pest biotypes resistant to specific pesticidal chemicals (Asogwa et al., 2010)

Control of DBM has been difficult primarily because of its high reproductive potential reaching to about 15 generations in a year (Poelking, 1990) Second the lack and

elimination of natural enemies such as *Diadegma* species caused by excessive use of insecticides Thirdly, the development of resistance by the pest to all insecticides in most countries including toxins of the microbial agent *Bacillus thuringiensis* Berliner (Vickers et al , 2004; Tabashnik et al., 1990) Due to selection pressure resulting from intense and prolonged exposure to pesticide, DBM has developed resistance to most synthetic chemical classes registered in the United States (Lasota et al., 1996) This eventually leads to control failure

Pesticides worth more than 30 billion US dollar are intentionally released into the global environment every year A high proportion of these is highly toxic and has immediate adverse effects on human health, wildlife, local food sources such as cattle or fish, beneficial insects and biodiversity (Bissdorf, 2008). New approaches in pest management systems are now highly encouraged because of resistance problems, over-pollution of the environment, carcinogenicity and toxic residues of synthetic pesticides

Lately, natural botanical extracts started to get greater attention. Botanical pesticides are good alternatives to chemical pesticides because they are eco-friendly, economic, target-specific and biodegradable (Ignacimuthu, 2004). They have long been considered as acceptable alternatives to synthetic chemical insecticides for pest management It is because they are non-persistent under field conditions as they are readily transformed by light, oxygen and micro-organisms into less toxic products, leaving no residues on harvested products or in the environment. They also have little mammalian toxicity, resulting in good selectivity and wide public acceptance (Bhathal and Singh, 1993; Isman, 2000, 2005; Sampson et al., 2005, Digilio et al., 2008). Botanicals have become a focus of interest of chemists and biologists because of their