

UNIVERSITI TEKNOLOGI MARA

**LARVICIDAL POTENTIAL FROM
THE MIXTURE OF *Allium sativum*
(GARLIC) AND *Piper nigrum*
(BLACK PEPPER) AGAINST
MOSQUITOES**

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In the name of Allah, The Most Gracious, The Most Merciful.

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ABSTRACT

Mosquito-transmitted pathogens cause major public health problems and contribute substantially to the global burden of disease. For many years, chemical synthetic insecticide are used to vector control intervention. Continuous exposure of chemical synthetic insecticide has induce resistance of the mosquitoes, rendering it to be useless. Excessive usage of synthetic insecticides has also proven to cause biological control systems disruption as it leads to the development of insecticides resistance among the mosquito species. This concern urges to find an environment friendly, cost-effective and biodegradable insecticides against mosquitoes in order to tackle the obstacles on the effectiveness of vector control intervention. Hence, this study is important to expand the bio-insecticide alternatives against 3 different mosquito species based on the active component present in *Piper nigrum* (Black pepper) & *Allium sativum* (Garlic). The method included field collection of the mosquito eggs, rearing of mosquitoes, plant extraction using Soxhlet apparatus and Rotary Evaporator, phytochemical screening and larval rearing for larvicidal bioassay test to determine the lethal concentration (LC₅₀ and LC₉₀). The phytochemical screening of the plants mixture showed the positive detection of flavonoids, tannins, phenols and terpenoids. The plant mixture has higher potency on the lab mosquito species compared to the wild mosquito species. As for the comparison for the 3 different mosquito species, the plant mixture is most effective towards *Aedes aegypti* followed by *Culex species* and lastly, *Aedes albopictus*. Further studies should be carried out to optimize the potential insecticide abilities of these plants extract combination. Furthermore, other plants with larvicidal potential should be explored and studied to maximize the use of natural resources as effective larvicide.

Keywords: *Aedes aegypti*, *Aedes albopictus*, *Culex species*, *Allium sativum*, *Piper nigrum*, Larvicide, Phytochemical screening

CHAPTER 1

INTRODUCTION

1.1 Background of study

For decades, presence of mosquitoes in human population have been reported as it become nuisances due to its biting characteristics. However, it is reported that mosquitoes can carry and transmit the vector-borne diseases like dengue fever, malaria, chikungunya, filariasis and other diseases (Tolle, 2009; Caraballo & King, 2014; Aziz et al., 2016 & Pavela et al., 2019) which threaten the human life. Shockingly, the arthropod-borne diseases reported has reached an alarming rate as there are approximately 700,000,000 infected cases (Caraballo and King, 2014) where highly reported among Indian population which are 40,000,000 (Ghosh et al., 2012). This is occurring due to its existence that mainly found in almost all tropical and subtropical countries including Malaysia (Ghosh et al., 2012) and also in some developed and temperate regions like Europe and Asia Pacific countries (Fradin, 1998).

The first reported mosquito-borne diseases in Malaysia is the malaria incidence as it reported before 1900s and documented in 1990 with the higher situation of malaria cases (Ministry of Health (MOH), 2014). Then, the first dengue case is reported in Penang on 1902 (Skae, 1902), followed by major outbreak in 1970 (Aziz et al., 2016). Moreover, Malaysia also be shocked with the first chikungunya virus infection in 1998 in Selangor with largest outbreak in 2008 until 2010 which affect the entire country (Sam et al., 2009). Furthermore, the first Japanese encephalitis case is reported in 1951 (Cruickshank, 1951) which cause viral infection in humans that also be found among domestic animals like bovines, goats and dogs (Pond et al., 1954).