

CHAPTER 1

INTRODUCTION

1.1 Background

Ants are dominant arthropods which can be found in nearly every terrestrial ecosystem. Their presence is important in turning soil, dispersing seeds, and channeling nutrients and energy. (Holldobler and Wilson,1990). They are very important on earth because they can be found in many levels of the ecosystem, where they can be both predator and prey, and also can function as detritivores. (Pacheco,2007). However they can do harm to people. They are only detected by human when they become pests. (Pacheco,2007). Among them, the most nuisance insects is fire ants and people try to control them. The genus *Solenopsis* are mostly known for fire ants. (Pacheco,2007). Fire ants are classified as from Family- *Formicidae*, and order- *Hymenoptera*.

Stinging or biting of insects, including fire ants, can be hazardous to outdoor workers. Outdoor workers who are at risk of exposure to fire ants include farmers, foresters, landscapers, groundskeepers, gardeners, painters, roofers, pavers, construction workers, laborers, mechanics, and any other workers who spend time outside. Thousands of people are stung by insects each year, and as many as 90–100 people in the United States die as a result of allergic reactions. (Anonymous, 2012.). About 40 to 100 Americans have been reported to die from anaphylaxis to insect stings although this number may be markedly underestimated (National Institute of Health,2002) .

Although most fire ant stings are not severe enough to cause the victim to seek medical attention, they are a social menace because of their sting.

Encounters with fire ants usually involve dozens of ants moving quickly and undetected. By the time they sting, a large number of ants could be on human body, all stinging at once. Stings from fire ants can cause a painful, burning itching sensation, which can last for up to an hour. Multiple stings give the sensation that the body is on fire. (Queensland Government , 2012). Estimating the frequency of sting is difficult as most of the cases are ignored by people. However, annually, more than one half of the population in endemic area is stung, and the incidence appear to be increasing. (National Institute of Health,2002) . Thus, it is important to control pests, including ants.

Nowadays, many different pest control methods can be chosen based on strategy desired, such as by eliminating or repelling them. For many pests, total elimination is almost impossible, but it is possible to control them. (United States Environmental Protection Agency,2005). Using insect repellent is one of the most well known and effective pest controlling method. Insect repellents are agents that are used to protect the body from the bites of insects that can cause local or systemic effects. Whilst some bites cause only local skin irritation, some can cause serious illnesses and possibly death as the insects act as carriers or vectors of diseases. (Ngan,2014) So, many chemical and non-chemical repellents have been widely used by the public to prevent from insect stings, but most of the repellent used today are developed from chemical method. Sometimes a non-chemical method of control is as effective and convenient as a chemical alternative. (United States Environmental Protection Agency,2005). So, people are trying to do research on natural products which have repellent properties, like using of citrus fruits like lemon, orange, etc.

Cucumbers are not only the nutritious fruit for us, but they also have strong repellency towards insects. Cucumbers contain volatile compounds known as (E/Z)-2,6-nonadienal and trans-2-nonenal which repel ants as well as cockroaches. (Zhou and McFeetwers,1998) Trans-2-nonenal is responsible for the odour of cucumber. Although repellent effect of cucumber is well known among people, the research on the repellent effect on fire ants has not yet been conducted widely.

A research was conducted in Kansas State University to examine the natural repellent effect of the cucumber towards the American cockroach. They tested 5 compounds for repellency including (E/Z)-2,6-Nonadienal and (E)-2-nonenal. It was found that well crushed cucumber repelled 90% of cockroaches under the test conditions. The results showed that the 2 compounds, (E/Z)-2,6-Nonadienal and (E)-2-nonenal, are the excellent repellents even at quite low concentrations. (Scriven and Meloan,1984)

The reason why cucumber is chosen is cucumber is one of the most common fruits that can be used and available easily and affordable. Ants are one of the main nuisance that can be found very commonly in households, and so repellents should be developed from the substances like the vegetables that we can get from our gardens that everyone from any social class can get them easily. This will be of benefit to society.

1.2 Statement of the Problem

Based on the explanation on the background study, the following problem formulations are generated:

1. Does cucumber (*Cucumis sativus*) have repellent effect on *Solenopsis* sp?
2. What is the effective concentration of cucumber extract on fire ants for its repellent effect?
3. Is there any relation between the duration of usage and the effectiveness of the repellent?

1.3 Objectives of the research

1.3.1 General Objective

To prove the repellent effect of cucumber on *Solenopsis* sp.

1.3.2 Specific Objective

- To count the number of fire ants which is found in sugar food source
- To determine the effective concentration of cucumber extract on fire ants for the repellent effect.
- To evaluate the relation between the duration of usage and the effectiveness of the repellent.

1.4 Advantage of the Research

1. To gain more knowledge about controlling *Solenopsis* sp by using non chemical substances.
2. To contribute to the medical world about the repellent effect of cucumber towards *Solenopsis* sp.
3. To estimate the duration of repellent effect of cucumber on *Solenopsis* sp.
4. To help the society reduce the risk of being stung by *Solenopsis* sp by using easily available and the least harmful repellent agents.

