

CHAPTER 1

INTRODUCTION

1.1 Background

Ants are one of the most important organisms which play keystone roles in our ecosystems. Their importance is due to their way of living; they have high social organization and ability to modify habitats, tap resources, and defend themselves. They live in colonies ranging in size from a few dozen individuals living in natural cavities to several hundred millions of ants which occupy large territories. Ants and human societies have interacted in several ways since ancient times. Some ants and their venom are of medical importance. Some are consumed as food in different parts of the world. Some helps humans in cultivation of plants and harvesting. Ants are helpful and beneficial to humans and natural environment in so many ways, however, some ants are also considered as pests as they invade houses and buildings, cause economic loss and their sting to humans causes medical problems (eXtension, 2012).

Certain species of ants like fire ants are a nuisance to humans. Fire ants belong to the family *Formicidae* and genus *Solenopsis*. The species like *Solenopsis invicta* and *Solenopsis geminata* are invasive pests in many areas of the world. They cause agricultural damage and serious medical problems. Fire ant venom consists of alkaloid components such as piperidine which cause allergic reactions to humans. Multiple stings can lead to severe medical reactions, even in people with normal immune systems. Infants, neurologically compromised people, the elderly, and otherwise immobile or unaware individuals are at a higher risk of multiple stinging incidents. Some people who are allergic to

the venom, may experience anaphylaxis, which requires emergency treatment (eXtension Foundation, 2012). Therefore, it is important to control fire ants in a proper way.

Fire ants are resourceful, resilient and adapt well to adverse conditions. Fire ants usually produce hills or mounds in open areas where the colonies reside. These fire ants build mounds in almost any type of soil, but prefer open, sunny areas such as meadows, parks, playgrounds, lawns, and golf courses, as well as agricultural land. Their choice of habitat increases their encounter with humans and thus, they cause disadvantages to humans in several ways. Therefore, many effective management programs are used to suppress existing populations of fire ants and the spread of new mounds and colonies (eXtension Foundation, 2012).

Many insecticides and repellents have been developed to control fire ants. Nowadays, people are aware of the danger of chemical agents contained in insecticides so they become selective in choosing the insecticide to be used. Insecticides which are effective, safe, elective, affordable and environmentally friendly are preferred. Therefore, using natural agents extracted from plants and herbs as insecticides has become an alternative way to control pests and insects and ants. One of the plants that is used as both insecticide and repellent is red pepper, *Capsicum annuum*.

Red pepper, *Capsicum annuum*, which belongs to the genus *Capsicum*, is native to southern North America and northern South America. The species is a source of numerous varieties of peppers cultivated all around the world. Not only are they used in food but they are also used in medicine, insecticides and repellents. Capsaicin is the active component of red pepper which is a hydrophobic, odorless, crystalline to waxy compound. *Capsicum* produces a

sensation of burning in any tissue with which it comes into contact (Dray A, 1992). It is also used in riot control and personal defense pepper spray chemical agents. Although red pepper extract is commonly used as a component of household and garden insect and fire ant repellent formulas, little research has been carried out to provide strong evidence that it has insecticidal effects on fire ants (Tewksbury and Nabhan, 2001). Therefore, a research must be done to test the insecticidal effect of red pepper, *Capsicum annum* towards fire ants so that its usage can be expanded to benefit the public.

1.2 Statement of the problems

Based on the explanations in the background study, problem formulations are generated below:

- Does red pepper have an insecticide effect towards fire ants, *Solenopsis species*?
- What is the amount of the red pepper extract concentration that is effective to use as an insecticide towards fire ants?
- What is the best duration of insecticidal effect of red pepper towards Fire ants (*Solenopsis sp.*)?

1.3 Objectives of the research

1.2.1 General Objective

- To know the effect of red pepper (*Capsicum*) as an insecticide towards fire ants, *Solenopsis sp.*

1.2.2 Specific Objective

- To know the amount of the concentration of red pepper that is effective as an insecticide towards fire ants.

- To know the best duration of insecticidal effect of red pepper towards Fire ants (*Solenopsis sp.*)

1.3 Significance of the Research

The outcomes of the present research are expected to:

1. Gain more knowledge about alternative methods of controlling fire ants, *Solenopsis sp.* using natural agents that have an insecticide effect.
2. Contribute to the medical world about the insecticidal effect of red pepper towards fire ants, *Solenopsis sp.*
3. Help the public to protect themselves from the stings of *Solenopsis sp.* so that fatalities and diseases caused by *Solenopsis sp.* can be reduced.

