

CHAPTER 1

INTRODUCTION

1.1 Background

Ants are social insects that live and work together in highly societies called colonies. They live in forests, fields, deserts, cities, in the soil, in or around houses and all over the earth. However, ants are nuisance pests around the home because they feed on and contaminate human foods, underneath kitchen sinks and other places. Ants and humans have interacted in several ways since ancient times. Ants can play many important roles in nature and environment, some of which are beneficial and helpful to humans. They eat other insects, pollinate plants, disperse seeds, move soil, and circulate nutrients. Ants perform all these functions because they are a key component of many ecosystems. However, some ants cause economic loss. Their sting to humans causes medical problems (Clark and Holbrook, 2009).

Among many species of ants, fire ants are closely related to human existence. Fire ants belong to family *Formicidae* and other Hymenoptera. Fire ants build dirt nests that form mounds in open grass areas (deShazo and Williams, 2014). Fire ants live in nests in the soil, ground mound of soil that build up after rain and below the ground portion of the colony. They build mound in almost any type of soil, sunny areas, such as playground, park, golf courses, agricultural courses and wilderness areas. Fire ants colonies can occur in or under buildings. When the temperature is high (36 ° C or 96 ° F) they cannot create mounds. Therefore, various effective management programs are

implemented to suppress fire ants populations and to control the spread of new mounds and new colonies (Extension, 2014).

Fire ants are aggressive and venomous insects that can cause serious problems in many areas around the world. They are red-colored insects that sting and contain a harmful substance which is called venom. They cause disadvantages to humans in several ways. Fire ants venom is produced in the poison gland. It contains a chemical called piperidine (Clark and Holbrook, 2009). However, people who are sensitive to these venom, a sting can lead to major allergic reaction called anaphylaxis. Fire ants stings can cause a painful burning sensation. Therefore, they can cause serious medical problems such as secondary bacterial infections, hypersensitivity reactions and neurologic complications. Therefore, fire ants must be eradicated or repelled by using a proper method (Extension, 2014).

Many insecticides and repellents have been developed to control fire ants. As ant colonies possess adaptive nature, eradicating them is nearly impossible and using chemical and non-chemical repellents become a highly desirable method. However, using chemicals have a considerable high risk to cause negative effects on humans. Repellents which are effective, safe, affordable and environmentally friendly are preferred. Nowadays people tend to choose natural products that are safe, effective, cheap, comfortable and easy to use. Therefore, using natural repellent from plants and herbs as insect repellents has become an alternative way to control pests, insects and ants. One of the plant that is potential to be used as a repellent is bay leaf, *Laurus nobilis*.

Bay leaf (*Laurus nobilis*) is a pyramid shaped tree or large shrub with aromatic, evergreen leaves and shiny gray bark. Bay leaf is a medium sized tree which aromatic leaves are used as a culinary herb which belongs to the family Lauraceae, is native to the southern Mediterranean region. Not only they are used in food but also they are used in medicine and repellents. Bay leaves are essential ingredients of the herb. It has eugenol, cineol and geraniol and some other active substances (Mahr, 2009). It has been proved in several studies that bay leaf (*Laurus nobilis*) has a repellent properties towards cockroaches, flies and other insects (Maranga *et al*, 2014). Therefore, based on the insect repellent effects of bay leaf (*Laurus nobilis*), a research must be done to test whether bay leaf (*Laurus nobilis*), also provides repellent effect towards fire ants.

1.2 Statement of the Problems

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

- (a) Does extract bay leaf has a repellent effect towards fire ants (*Solenopsis sp.*)
- (b) What is the effective concentration of extract bay leaf that can be used as a repellent?
- (c) What is the optimum duration of repellent effect bay leaf towards fire ants (*Solenopsis sp.*)?

1.3 Objectives of Research

1.3.1 General Objectives

To determine the repellent effect of extract bay leaf (*Laurus nobilis*) towards fire ants (*Solenopsis sp.*).

1.3.2 Specific Objectives

- To determine the effective concentration of extract bay leaf for its repellent effect towards fire ants (*Solenopsis sp.*)
- To identify the duration of repellent effect of extract bay leaf towards fire ants (*Solenopsis sp.*)

1.4 Significance of Research

To Gain more knowledge about alternative methods to control *Solenopsis sp.* using least harmful natural repellent agent. To solve *Solenopsis sp.* problem at home by using home-remedy repellent agent. To Contribute to the medical world about the potential repellent effect of bay leaf towards *Solenopsis sp.*