CHAPTER 6

DISCUSSION

6.1   Discussion

Using of repellent and insecticide has been popular choice among the society to control the fire ants attack at home or at industrial. However, there is always chemical and non- chemical repellents that circulate among the society to prevent from insect stings and most of the chemical repellents that consist of a lot of different side effects on human body. Therefore, alternative natural materials are being researched to eradicate these pests.

This research was done to identify the ethanol extract of bay leaf (*Laurus nobilis*) as a repellent towards fire ants (*Solenopsis sp).* Bay leaf extract contains essential oil of aromatic and spicy odour which is disliked by insects. The dried bay leaf and essential oils are used in all kinds of food products, soups, fishes and sometimes used in perfume and soap making. A natural material, bay leaf was used in this study because it can be found easily and it is affordable.

In this research, there were five treatment groups: aquadest as a negative control, Naphthalene powder as a positive control, Bay leaf extract 30%, Bay leaf extract 40% and Bay leaf extract 50%. Fifteen of the fire ants were used in each set of the container for the experiment and the number of total fire ants which cannot cross the bay leaf extract treated tube at the time interval of 1st hour, 2nd hour, 3rd

hour, 4th hour, 5th hour and 6th hour were noted. The total duration of each experiment was 6 hours and the experiment were repeated in four times.

Since the dependent variable (repellency) is numeric type, and there are two independent variables (time and concentrations), Anova Test was used as the appropriate statistical test. Based on One Way Anova test, it showed that bay leaf extract gives significant effect on repellency in every hour since all p value was 0.00 (all p value = 0.000; $p < 0.05$).

The Pearson correlation test was showed to determine the correlation between dependent variable (repellency) and independent variable (time and concentration). The result of Pearson correlation test in this research showed p value = 0.000 for time against repellency and p value = 0.409 for concentration against repellency. It means that repellency has significant correlation with time but not concentration. The repellency is affected by time of exposure rather than concentration of Bay leaf extract. The correlation coefficient for time is -0.944. This value show us that there was a negative correlation between repellency and time of exposure and the strength of correlation is very strong. It means that the repellency effect decreased with greater time of exposure.

The Linier Regression test was also performed to investigate the magnificence of time of exposure affecting the repellency. Based on the R square value, 89.1% of dependent variable is influenced by independent variable, while 10.9% of dependent variable is affected by external factor. The linier regression test also produce the predictive equation that could predict the repellency in any time not

observed. The formula of regression is : $y = 15.313 - 0.308x$ (y = repellency and x = time of exposure).

Based on the results of all of the tests mentioned above, it can be concluded that bay leaf extract has a excellent repellent effect towards the fire ants. But this repellency showed the best effect on the fire ants at every first hour and it can be determined that the optimum dose of bay leaf extract is 50% for repellent.

In this research, 1,8-cineol oil is an active substances of bay leaf extract. Moreover, it contains essential oil especially 1,8-cineol, dihydrocarvone, α-terpinenyl acetate, sabinene, spathulenol, α-pinen, eugenol and geraniol which produce a specific ordour. This odour will stimulate the primary olfactory sensors located in the fire ant's antennae. This odour will bind with a specific Odorant- Binding Proteins (OBP) to form OBP complexes. It will trigger an impulse to interference of peripheral sensory nervous system and olfactory system of fire ant's brain and ant will respond to it by avoiding the odour.

The advantages of using bay leaf extract is used for acne, aging skin, dry skin, wrinkles, wound, common cold and influenza (Wholesome, 2013). However, bay leaf is also used to cure multitude of illnesses. Nowadays, Modern scientific research has discovered numerous health effects of bay leaves, especially for diabetes and heart diseases. The leaves are used to flavor good and soups as a cooking ingredient (Danica, 2011). Not only they are used in food but also they are used in medicine and repellents. 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, bay leaf extract has an effective natural repellent effect on not only cockroaches, files and other insects but also fire ants based on the two experiments.

Using natural repellent from plants and herbs as insect repellents has become an alternative way to control pests, insects ant ants. Although natural pesticides are only effective, safe to use, comfortable and environment friendly. Therefore, the experiment can also be done using natural substance like bay leaf extract which are inexpensive, easy to use and high repellency effects.