CHAPTER 6

DISCUSSION

6.1 Discussion

This research was conducted in order to test the potential insecticidal activity of ethanol extract of garlic (*Allium sativum Linn*.) towards flies (*Chrysomya sp.*) by using spraying method. Garlic, as a natural material, was used in this study because it can be found easily in most parts of the world and it is affordable.

In this experiment, 10 flies were placed in each of five containers and one of the three different concentrations (10%, 20%, 30%) of garlic extract, Malathion 0.28% (positive control) or water (negative control) were sprayed into each container. Each experiment was observed for every 1st hour, 2nd hour, 3rd hour, 4th hour, 5th hour, 6th hour and and subsequently after 24th hour. The experiments were repeated four times.

In this experiment, potential insecticidal effect was calculated by Abbott formula. After observing for 24 hours, the result showed that ethanol extract of garlic at 30% concentration achieved the optimal potential and it had the same 100% insecticidal potential as positive control malathion while 10% and 20% concentration only gave the effect <100%. It can be concluded that decreasing the concentration of ethanol extract of garlic will decrease the insecticidal potential and vice versa. This is because a higher concentration of ethanol extract of garlic has greater amount of active chemical substances to kill flies (*Chrysomya sp.*). From the result, it can be concluded that extract with higher chemical active components or higher concentration of ethanol extract of garlic increase killed flies and also the longer the duration of insecticide application, the

greater the potential insecticidal effect. So, ethanol extract of garlic gives the potential insecticidal effect against flies in 24 hours (Figure 5.1). As the higher concentration of garlic being used, the insecticidal potential against flies become stronger and the longer duration of insecticide application also gives the greater potential insecticidal effect (Figure 5.2).

Data analysis was done by using a number of tests. Based on the Saphiro WIlk Normality Test, the data distribution of this research showed an insignificant value ($p<0.05$). Levene's Test of Homogeneity of Variances showed an insignificant value ($p<0.05$).

Kruskal Wallis Test is a non parametric statistical test to determine the differences of,significance between independence and dependence variables. The result showed all p value <0.05, so there is a significant difference of insecticidal potentials among all treatments in every hour of observation time.

Mann Whitney test is a multiple comparison test which was done to know the differences between the groups was carried out. Based on the results, the insecticidal potentials in all concentrations of garlic extract were significantly different compared to negative control ($p<0.05$) in the 24 hour observation time data set, meanwhile there was no significant difference in insecticidal potential between 30% of garlic extract and positive control ($p=1.000$; $p>0.05$). This indicate that 30% concentrations of garlic extract has the same strength of positive control (0.28% malathion).

Spearman's Rho Correlation test is a non parametric statistical test performed to determine the correlation between dependent variable (insecticidal potentials) and independent variables (time and concentrations). Significant correlation is achieved at p value less than 0.05. The results of Correlations test

showed that: there is a significant correlation between the concentration of garlic extract and insecticidal potentials (p=0.000).

Based on the results of all of the tests mentioned above, garlic extract has an insecticidal effect towards flies. *Allium sativum* possess allicin and other sulphur compounds which have the insecticidal potential effect. These compounds are responsible for the strong pungency of the garlic. Allicin's toxicity towards insects is by disturbing the protein synthesis which is needed in cell growth and damaging cell membrane. Flavonoids also act as respiratory inhibitor and causing respiratory failure. Garlic's toxicity towards insects is through metabolic disruption, membrane Garlic has also been shown to repel insects as well as kill them. As the concentration of sprayed ethanol extract increases, the number of dead flies increases. And the longer the time of exposure, the stronger insecticidal effect of garlic.

These are some examples of journal, thesis or research which prove the potential insecticidal effect of extract garlic. Lavicidal activities of ethanol extract of *Allium sativum* (garlic bulb) against the filarial vector, Culex *quinquefasciatus* (Kalu *et al*, 2010).The toxicity of garlic bulb extracts to the second, third and fourth instar larvae of *C.quinqueasciatus* mosquito was noted and the statistical data LC_{50} values are presented. Douiri et al (2013) also researched that chemical composition and biological activity of *Allium sativum* essential oils against *Callosobruchus maculatus* have toxicity LC_{50} ranging between 0.02 and 0.25mg/l. Concentration of garlic extract was proved that by using different methods also gives different effectiveness and the process of garlic extraction was made.Yang et al (2012) had researched about insecticidal activities of garlic substances

against adults of grain moth, Sitotroga cerealella had significant fumigant activity with 50% lethal concentration values respectively.

Although the external factors such as sunlight, temperature and humidity were already controlled by doing 10%, 20%, 30%, positive control and negative control at the same time, same place and same method. This study, however, has some weaknesses, e.g, restricted storage time of extract during the experiment, selection of the technique used, financial issues, limited equipment, and time.