

CHAPTER 6

DISCUSSION

6.1 Discussion

Because of the increasing public awareness about chemical side effects of repellents and drugs, nowadays people choose the kind of repellents that is safe, inexpensive and environmentally friendly. Therefore, using the active substances obtained from natural materials as insect repellents has become an alternative to be considered. One of the alternative solutions for such repellent is using bay leaf (*Laurus nobilis*).

This research was carried out to observe the effect of ethanol extract bay leaf (*Laurus nobilis*) as a repellent towards flies (*Musca domestica*). Bay leaf (*Laurus nobilis*) extract contains 1, 8-cineol and other essential oils like eugenol and chavicol that give smell, which is disliked by flies (*Musca domestica*). In this research, three concentrations of bay leaf extract (*Laurus nobilis*) were used and the experiment was observed the repellency towards flies (*Musca domestica*). The three concentrations were 20%, 30% and 40% and naphthalene as positive control and aquades as negative control was also used in the experiment. 10 adult flies were used in each set of the box for each repetition of the experiment. Each experiment was observed for 5 minutes on the clock to 0,1,2,4, and 6 and the experiments were repeated four times.

Since the dependent variable (repellency) is numeric type, and there are 2 independent variables (time and concentrations), One-way Anova Test was used as the appropriate statistical test. This test showed that different Bay leaf extract gives significant difference effect on repellency in each group treatment

($p < 0.05$) but there was no significant difference on repellency effect of Bay leaf extract in each time of exposure ($p > 0.05$).

Post hoc Tukey test from this research showed that there was significant difference of repellency among all concentrations compared to negative control and positive control as well ($p < 0.05$), also all time of incubation gave significant difference on repellency. Meanwhile all time of exposure gave no significant difference on repellency among the groups ($p > 0.05$). Pearson correlation test also proves that repellent potential increase with higher of concentration of Bay leaf extract.

As a matter of fact, the material used in this research, bay leaf, is not only used in food and medicine but also they are used as repellents. Bay leaves are an essential ingredient of the herb and 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, fire ants and other insects (Maranga *et al*, 2014).

In one of the studies made by Jouda Mediouni-Ben Jemâa *et al*, 2011, it was demonstrated that composition and repellent efficacy of essential oil from *Laurus nobilis* against adults of the Cigarette Beetle *Lasioderma serricorne* (Coleoptera: Anobiidae). This study reports the chemical composition and the repellent activity of *Laurus nobilis* (Lauraceae) essential oil against 7-10 days old adults of the cigarette beetle *Lasioderma serricorne*. Essential oil chemical composition was assessed via GC (Gas chromatography) and GC/MS (Gas chromatography/mass spectrometry) analysis. 1,8-cineole (24.55%), linalool (17.67%), eugenylmethyl-ether (12.40%), isovaleraldehyde (9.65%) and camphene (7.21%) were the major compounds. Significant pest repellent activity

was demonstrated. Repellent action was highly dependent upon oil concentration and exposure time. The best repellent efficacy was observed for high doses and short exposure period. At the dose 0.12 $\mu\text{l}/\text{cm}^2$, repellency reached 92.5% after 1 h of exposure. Moreover, the median repellent dose value (RD50) was 37.84 $\mu\text{l}/\text{cm}^2$. Chi-square analysis indicated that *L. nobilis* essential oil showed significant pest repellent activity to *L. serricornis* adults. The results suggested that *L. nobilis* essential oil may have potential as a control agent against cigarette beetle (Jemaa et al, 2011).

Another research made by Liliane R.E. & Toshie Kawano on 1987 also proved that the effect of *Laurus nobilis* (Lauraceae) on *Biomphalaria glabrata* (intermediate host of *Schistosoma mansoni*). This research made experiments that were carried out using aqueous extracts from leaves and flowers of *Laurus nobilis* on *Biomphalaria glabrata*. Treatments were performed on blastula stage (+ or - 15 hr after first cleavage) and on adults snails (11- 18mm). In both instances they were exposed for 24h to different concentrations of the extracts on snails (200 to 2400 ppm) and embryos (20 to 300 ppm) at 25 + or - 1 °C. The embryos were observed of 20 days after treatment and snails for 10days. The tests were performed according to the methodology recommended by the World Health Organization (WHO, 1965, 1983). Results obtained with leaf aqueous extracts are shown a degree of toxicity on embryos starting at a concentration of 125 ppm, the flowers extract being effective at 35ppm. The malformation obtained with the different concentrations and some cephalic and shell malformations were found in embryos treated with concentrations over 50ppm (leaves) and 25ppm (flowers). The Ld90 on adult snails obtained by treatments with flower and leaf

extract was observed at concentrations of 340 ppm and 1900 ppm respectively (Liliane R.E& Toshie Kawano, 1987).

And also another research made by Lwin K. K., Baskoro A.D., and Widodo E. on 2015 also proved that the effect of bay leaf (*Laurus nobilis*) ethanol extract as a repellent towards fire ants (*Solenopsis sp.*). This research was an experimental laboratory research using three different concentrations of bay leaf (30%,40%,50%) to repel the fire ants for a period of 6 hours. Based on the analysis with one-way Anova test for this research, it showed that Bay leaf gives significant difference effect on repellency in every hour at each treatment group and concentration and it can be concluded that the optimum dose of bay leaf as a repellent is 50% and the best time is the first three hours during the six hours and 24 hours of the experiment (Lwin K. K., Aswin D. B., and Edwin W., 2015).

In this research, extract bay leaf (*Laurus nobilis*) contains 1, 8-cineol and other essential oils like eugenol and chavicol that give smell. The smell of extract bay leaf will be captured by the antenna fly that containing Odorant Receptor Neurons (ORNs), which is located at the tip of the dendrite in the lymph fluid. Then Odorant Receptor Neurons (ORNs) delivers smell of bay leaf to the antenna lobe. Passing through the lymph fluid, smell of bay leaf binds to OBPs, OBPs work dissolving the odor molecules and act in the selection of olfactory information. When complex smell OBPs reached the dendrite membrane, the smell associated with transmembrane receptors, namely Olfactory receptors (Ors). Olfactory receptors (Ors) transfers chemical messages that trigger the activation of nerves. And then, electrical impulses delivered to the center of the brain. This impulse results in behaviour reponses of the flies to move away from

the source of the odour of extract bay leaf and hence flies (*Musca domestica*) are repelled.

Therefore, based on the research data and proved references above, it can be concluded that bay leaf extract (*Laurus nobilis*) which is readily used not only cooking and as an antiseptic but also can be used as a home remedy insects including flies repellent. However, if it is compared to the repellent potency of the widely used repellent, naphthalene, the effect of the bay leaf extract is still weak.

6.2 Benefits of the research

The benefits of this research are that it can help people to protect themselves from flies (*Musca domestica*) so that fatalities and diseases caused by flies (*Musca domestica*) can be reduced. And also, this research can give more knowledge about alternative methods of controlling flies (*Musca domestica*) using natural repellent agents like bay leaf and contribute to the medical world about the repellent effect of bay leaf extract towards flies (*Musca domestica*). Moreover, it can give people to solve *Musca domestica* problem at home by using home-made natural bay leaf extract repellent.

6.3 Limitations of the study

This research still has some limitations. Environmental factors like temperature, humidity, light intensity can influence the result of the research. In this research, the repetition was four time and it can't be done in one day. So, at least two or three day was needed and temperature and humidity in those day is not the same. And also this research was the repellency effect towards flies by using the smell of extract bay leaf, but we cannot control the smell of bay leaf extract and movement of fly inside the box. So, there may be having smell of

ethanol extract bay leaves in and out and also other influence smell. Moreover, in this research, milk fish is used as an attractant. But there are other kinds of attractant that were more attract *Musca domestica* like rotten meat and ripe fruit. So, if we change the attractant, the number of fly landed can also be changed or not and we still need more experiments with other attractants.

