*Dama International Journal of Researchers (DIJR), ISSN: 2343-6743, ISI Impact Factor: 1.018*
*Vol 2, Issue 7, July, 2017, Pages 28 - 31, Available @ www.damaacademia.com*

# Exploration of Plant Extracts that have Potential as Repellent to Aedes Aegypti

**Denok Indraswati[1], Djoko Windu P. Irawan[2]**
[1&2]*Health Polytechnic of Ministry of Health in Surabaya, Indonesia*

***Abstract***
*Today, the use of pesticides from chemicals is the most applied way to control Aedes aegypti mosquitoes. The negative impacts of this method include environmental pollution, vector resistance and the death of other organisms that are not targeted by insecticides. Until now it has been known several plants that contain various active compounds that serve as insecticides. This study aims to analyze the differences in the ability to resist mosquitoes of several plant extracts: Canangium odoratum, Citrus aurantifolia, Eucalyptus aloballus, Melaleuca leucadendron, Cinamomum verum, Eugenia aromatica, Foenicum vulgare, Rosa sp., Cymbopogan nardus. This research was conducted in laboratories in four phases: (1) Collection of plants (2) extraction of plant material (3) Colonization of Aedes aegypti (4) biological test. The measure of the ability to resist was the number of mosquitoes that land on the feed. The data that have been collected was analyzed by Analysis of Variance test. The results of the data analysis showed that different concentrations (25%, 50%, 75%, 100%) resulted in differences in the ability to resist mosquitoes. Melaleuca leucadenron, Foeniculum vulgare, Rosa sp. And Cymbopogan nardus at concentrations of 75% and 100% had the same ability to resist mosquitoes, while Eugenia aromatica at concentrations of 50%, 75%, and 100% had the same ability. The order of ability to resist mosquitoes were: Eugenia aromatica, Foeniculum vulgare, Citrus aurantifolia, Rosa sp, Canangium odoratum, Cymbopogan nardus, Cinamomum verum, Eucalyptus aloballus and Melaleuca leucadendron. Eugenia aromatica had the greatest potential to be used as a repellent.*

***Keywords****: Aedes aegypti, Plant extracts, Repellent*

## I. INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is a disease caused by dengue virus and is transmitted by one species of mosquito that is Aedes aegypti. Efforts to treat DHF have been widely studied such as prompt and precise diagnosis, specific therapy, and vaccine development; but until now has not obtained satisfactory results. The most promising alternative effort is the control of vector density (Soegijanto, et al., 2006).

The way that has been routinely implemented since the 1950s until now is chemically controlling with various synthetic chemical insecticides. This has been shown to have many negative impacts, such as the occurrence of targeted insect resistance, the killing of non targeted insects, and the deterioration of environmental quality (WHO, 1972).

One way to prevent the spread of DHF is to protect humans from mosquito bites by using mosquito nets and mosquito repellent. Repellent are ingredients that have the ability to keep insects away from humans. Repellent is used by rubbing it on the body or spraying it on clothing (Soedarto, 2002). The repellent compounds derived from plants include essential oils. Essential oils are produced by special glands of the plant and have a distinctive and sharp odor. The essential oil used as the repellent compound is the citron oil.

Based on the above explanation, it is necessary to do research to explore the types of plants that contain essential oils, because in Indonesia grow various types of plants (Tjokronegoro, 2007). In this study selected 9 species of plants that have potential as repellent, namely: *Canangium odoratum, Citrus aurantifolia, Eucalyptus Olobulas, Melaleuca Leuca dendron, Cinnamomun verum, Eugenia aromatica, Foeniculum vulgare, Rosa sp.* and *Cymbopogan nardus*.

## II. METHODS

This experimental study used a Completely Randomized Design consisting of 1 control and 4 treatments, each of which consisted of 3 replications. Samples were selected by purposive sampling technique. In this case, Aedes aegypti 5-day-old female is made to be hungry for 1 day. The sample size in each treatment was 30 mosquitoes. Plant extracts were prepared in 5 replications: 1 control (0%) and 4 treatments (100%, 75%, 50% and 25%), with the following details:

1. Control: plant extract is diluted using ethanol 96%
2. 100% concentration: plant extract without diluent
3. 75% concentration: comparison of plant extract and diluent is 3: 1

4. 50% concentration: comparison of plant extract and diluent is 1: 1
5. 25% concentration: comparison of plant extract and diluent is 1: 3Uji Repellent.

Aedes aegypti females are kept for 2 days in a 30 x 30 x 120 cm cage and are fasted for 1 day. Furthermore, these mosquitoes are grouped randomly into a cage. Each cage is filled with 30 mosquitoes. The baits used in this test are the hands of researchers and students of the Department of Environmental Health at Magetan, Health Polytechnic of the Ministry of Health in Surabaya. These hands have previously been smeared with extract in various types and concentrations of 3 ml evenly, then put in a mosquito cage. For each concentration, counted the number of mosquitoes that settled every 20 minutes for 40 minutes. The study was conducted from 07.00 to 13.00 for 12 days. The scale of the data collected is the ratio, so that it is descriptively presented in the mean form (Nugroho, 2014). Furthermore, to test the difference of ability to reject Aedes aegypti from each plant extract used Analysis of Variance (Anova) test (Sudjana, 2002).

## III. RESULTS AND DISCUSSION

Table 1. Number of Aedes aegypti Perched on Feed Ethanol as Repellent

| Replication | Concentration | | | | |
|---|---|---|---|---|---|
| | 0 % | 25% | 50% | 75 % | 100 % |
| 1 | 29 | 30 | 28 | 28 | 27 |
| 2 | 28 | 29 | 29 | 29 | 29 |
| 3 | 30 | 25 | 26 | 26 | 25 |
| Mean | 29 | 28 | 27 | 27 | 27 |

Table 2. Number of Aedes aegypti Perched on *Canangium odoratum* as Repellent

| Replication | Concentration | | | | |
|---|---|---|---|---|---|
| | Control | 25% | 50% | 75 % | 100 % |
| 1 | 23 | 13 | 11 | 5 | 2 |
| 2 | 25 | 15 | 12 | 6 | 2 |
| 3 | 20 | 17 | 13 | 7 | 3 |
| Mean | 23 | 15 | 12 | 6 | 2 |

Table 3. Number of Aedes aegypti Perched on *Citrus aurantifolia* as Repellent

| Replication | Concentration | | | | |
|---|---|---|---|---|---|
| | Control | 25% | 50% | 75 % | 100 % |
| 1 | 23 | 19 | 10 | 6 | 0 |
| 2 | 25 | 20 | 17 | 7 | 3 |
| 3 | 21 | 20 | 18 | 8 | 2 |
| Mean | 23 | 20 | 15 | 7 | 2 |

Table 4. Number of Aedes aegypti Perched on *Eucalyptus loballus* as Repellent

| Replication | Concentration | | | | |
|---|---|---|---|---|---|
| | Control | 25% | 50% | 75 % | 100 % |
| 1 | 21 | 18 | 13 | 6 | 5 |
| 2 | 22 | 19 | 16 | 7 | 4 |
| 3 | 24 | 17 | 18 | 10 | 4 |
| Mean | 22 | 18 | 16 | 8 | 4 |

Table 5. Number of Aedes aegypti Perched on *Melaleuca leucadendron* as Repellent

| Replication | Concentration | | | | |
|---|---|---|---|---|---|
| | Control | 25% | 50% | 75 % | 100 % |
| 1 | 20 | 21 | 11 | 9 | 0 |
| 2 | 23 | 22 | 14 | 10 | 2 |
| 3 | 25 | 23 | 16 | 11 | 2 |
| Mean | 22 | 22 | 14 | 9 | 2 |

Table 6. Number of Aedes aegypti Perched on *Cinnamum verum* as Repellent

| Replication | Concentration | | | | |
|---|---|---|---|---|---|
| | Control | 25% | 50% | 75 % | 100 % |
| 1 | 21 | 14 | 12 | 6 | 3 |

| Replication | Concentration | | | | |
|---|---|---|---|---|---|
| | Control | 25% | 50% | 75 % | 100 % |
| 2 | 24 | 17 | 13 | 8 | 5 |
| 3 | 20 | 17 | 14 | 9 | 3 |
| Mean | 22 | 16 | 13 | 8 | 4 |

Table 7. Number of Aedes aegypti Perched on *Eugenia aromatica* as Repellent

| Replication | Concentration | | | | |
|---|---|---|---|---|---|
| | Control | 25% | 50% | 75 % | 100 % |
| 1 | 25 | 2 | 0 | 0 | 0 |
| 2 | 20 | 4 | 4 | 2 | 0 |
| 3 | 21 | 5 | 3 | 2 | 1 |
| Mean | 22 | 4 | 2 | 1 | 0 |

Table 8. Number of Aedes aegypti Perched on *Foeniculum vulgare* as Repellent

| Replication | Concentration | | | | |
|---|---|---|---|---|---|
| | Control | 25% | 50% | 75 % | 100 % |
| 1 | 21 | 11 | 7 | 3 | 1 |
| 2 | 20 | 12 | 9 | 4 | 2 |
| 3 | 24 | 14 | 8 | 3 | 2 |
| Mean | 22 | 12 | 8 | 3 | 2 |

Table 9. Number of Aedes aegypti Perched on *Foeniculum vulgare* as Repellent

| Replication | Concentration | | | | |
|---|---|---|---|---|---|
| | Control | 25% | 50% | 75 % | 100 % |
| 1 | 25 | 17 | 10 | 4 | 2 |
| 2 | 23 | 20 | 9 | 5 | 3 |
| 3 | 21 | 15 | 12 | 7 | 2 |
| Mean | 23 | 17 | 10 | 5 | 2 |

Table 10. Number of Aedes aegypti Perched on *Cymbopogan nardus* as Repellent

| Replication | Concentration | | | | |
|---|---|---|---|---|---|
| | Control | 25% | 50% | 75 % | 100 % |
| 1 | 24 | 17 | 10 | 4 | 3 |
| 2 | 20 | 15 | 12 | 6 | 2 |
| 3 | 25 | 16 | 11 | 6 | 4 |
| Mean | 23 | 15 | 11 | 5 | 3 |

The following is the result of the difference test of each plant extract in various concentrations:

***A.*** ***Canangium odoratum:*** P value of Anova is 0.000 (<0.05) so it is concluded that the concentration difference of this plant extract (25%, 50%, 75%, 100%) will result in different ability to reject Aedes aegypti. The higher the concentration of the plant extract is getting a bit of Aedes aegypti that perch on the bait.

***B.*** ***Citrus aurantifoli:*** P value of Anova is 0.000 (<0.05) so it is concluded that the concentration difference of this plant extract (25%, 50%, 75%, 100%) will result in different ability to reject Aedes aegypti. The higher the concentration of the plant extract is getting a bit of Aedes aegypti that perch on the bait.

***C.*** ***Eucalyptus aloballus:*** P value of Anova is 0.000 (<0.05) so it is concluded that the concentration difference of this plant extract (25%, 50%, 75%, 100%) will result in different ability to reject Aedes aegypti. The higher the concentration of the plant extract is getting a bit of Aedes aegypti that perch on the bait.

***D.*** ***Melaleuca leucadendron:*** P value of Anova is 0.000 (<0.05) so it is concluded that the concentration difference of this plant extract (25%, 50%, 75%, 100%) will result in different ability to reject Aedes

aegypti. The higher the concentration of the plant extract is getting a bit of Aedes aegypti that perch on the bait.

***E.*** ***Cinnamomum verum:*** P value of Anova is 0.000 (<0.05) so it is concluded that the concentration difference of this plant extract (25%, 50%, 75%, 100%) will result in different ability to reject Aedes aegypti. The higher the concentration of the plant extract is getting a bit of Aedes aegypti that perch on the bait.

***F.*** ***Eugenia aromatic:*** P value of Anova is 0.000 (<0.05) so it is concluded that the concentration difference of this plant extract (25%, 50%, 75%, 100%) will result in different ability to reject Aedes aegypti. The higher the concentration of the plant extract is getting a bit of Aedes aegypti that perch on the bait.

***G.*** ***Foeniculum vulgare:*** P value of Anova is 0.000 (<0.05) so it is concluded that the concentration difference of this plant extract (25%, 50%, 75%, 100%) will result in different ability to reject Aedes aegypti. The higher the concentration of the plant extract is getting a bit of Aedes aegypti that perch on the bait.

***H.*** ***Rosa sp:*** P value of Anova is 0.000 (<0.05) so it is concluded that the concentration difference of this plant extract (25%, 50%, 75%, 100%) will result in different ability to reject Aedes aegypti. The higher the concentration of the plant extract is getting a bit of Aedes aegypti that perch on the bait.

***I.*** ***Cymbopogon nardus:*** P value of Anova is 0.000 (<0.05) so it is concluded that the concentration difference of this plant extract (25%, 50%, 75%, 100%) will result in different ability to reject Aedes aegypti. The higher the concentration of the plant extract is getting a bit of Aedes aegypti that perch on the bait.

The effective plant extract as repellent for Aedes aegypti at concentration 50% was Eugenia aromatica, at concentration 75% was Foeniculum vulgare (adas), Rosa sp. (Roses), Cymbopogan nardus (lemongrass) and Melaleuca leucadendron (eucalyptus), while the rest is effective at 100% concentration.

## IV. CONCLUSION

The order of ability to resist mosquitoes were: *Eugenia aromatica*, *Foeniculum vulgare*, *Citrus aurantifolia*, *Rosa sp*, *Canangium odoratum*, *Cymbopogan nardus*, *Cinamomum verum*, *Eucalyptus aloballus* and *Melaleuca leucadendron*. *Eugenia aromatica* had the greatest potential to be used as a repellent.

## REFERENCES

1. Nugroho, H. S. W. 2014. Analisis Data Secara Deskriptif untuk Data Numerik. Ponorogo: Forum Ilmiah Kesehatan (Forikes).
2. Soedarto. 2002. Entomologi Kedokteran. Jakarta: Penerbit Buku Kedokteran EGC.
3. Soegijanto S., Sustini F., Wirahjanto A. 2006. Epidemiologi Demam Berdarah dengue. Edisi 2. Surabaya: Airlangga University Press.
4. Sudjana. 2002. Metode Statistika, Bandung: Tarsito.
5. Tjokronegoro, K. R. 2007. Penelusuran Senyawa Kandungan Tumbuhan Indonesia, Bioaktif terhadap Serangga, Disertasi Universitas Padjajaran.
6. WHO, 1972. Vector Control In International Health, World Health Oranization, Geneva