The Comparison Between Extracts of Basil Leaves (Ocimum sanctum) and Papaya Leaves (Carica papaya) in Killing Aedes Aegypti Mosquitoes

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ABSTRACT
Mosquitoes are a medium for transmitting certain diseases which are classified as vector borne diseases. The disease that is spread by the Aedes aegypti mosquito is dengue fever. According to data compiled by the Ministry of Health, dengue cases in Indonesia until July 2020 reached 71,633 cases and in 2019 there were 112,954 cases. The control of Aedes aegypti mosquitoes can use vegetable insecticides, such as the use of basil leaves which have chemical compounds of flavonoids and saponins. Papaya leaves also contain chemical tannins, alkaloids, flavonoids, and saponins. These toxic compounds can cause the death of the Aedes aegypti mosquito. The study aims was to compare the ability of basil leaf extract (Ocimum sanctum) and papaya leaves (Carica papaya) in killing Aedes aegypti mosquitoes. The type of research used was experimental. The samples in this study were 20 Aedes aegypti mosquitoes that were presented using basil leaf extract and papaya leaves with concentrations of 55%, 60% and 65%, with a spray method for 60 minutes. The results showed that there were differences in the results of basil leaf extract trials with papaya leaf extract. Concentrations that reach a mortality percentage of 80% are at a concentration of 65% found in basil leaf extract, while in papaya leaf extract the percentage of death obtained is 70% at a concentration of 65%. Both extracts meet lethal consentration standards.

Keywords: *Particulate Matter, Merchants, Respiratory Disorders*

INTRODUCTION

According to data compiled by Director of Prevention and Control of Vector and Zoonotic Infectious Diseases Ministry of Health that until July 2020, dengue cases in Indonesia reached 71,633 cases. However, the number of cases and deaths this year is still low when compared to 2019 which amounted to 112,954 cases. As with the total deaths, in 2020 there were 459 deaths while in 2019 there were 751 deaths. DHF cases in the last 3 years that occurred in Maros Regency have increased. Data on dengue cases according to the health office of Maros Regency in 2014, amounted to 449 cases and 2 cases died, in 2015 there were 397 cases with 1 person died, and in 2016 the incidence of dengue disease was 628 cases with 1 person dying (Syamsul, 2019). Until now there has not been found a vaccine that can be used to prevent dengue virus infection and no specific drug has been found as a treatment. Thus, the control of dengue hemorrhagic fever can only hope for the control of the Aedes aegypti mosquito. There are various kinds of control efforts carried out in controlling the vector that causes dengue hemorrhagic fever (DHF), one of which is using chemical insecticides which are thought to be very effective in dealing with the vector that causes dengue fever. In addition to the use of chemical insecticides, other preventive measures against mosquito bites are using mosquito rackets, mosquito coils, electric mosquito repellent, mosquito repellent spray, anti-mosquito lotion, mosquito nets and much more.

The use of chemical insecticides is actually very effective in breaking the chain of disease transmission, but it causes negative impacts on humans. Repeated use of chemical insecticides can cause side effects, such as the use of mosquito coils which can cause shortness of breath due to inhaled smoke. Another example is the use of mosquito spray which contains poison so that it can be directly inhaled by humans, so that

long-term use will interfere with health and from an economic point of view, it can be said to be uneconomical because the tools used must be replaced, not to mention if the nature of the mosquitoes used is may be resistant to the use of the substance. Therefore, to reduce these impacts, more effective, efficient, safer, the environmentally friendly way is needed is using vegetable insecticides.

The use of plant-based insecticides can also reduce the use of chemical insecticides that can damage the environment. One of them is the use of plants that produce vegetable insecticides that are widely grown in Indonesia. One type of plant that produces natural insecticides is basil and papaya leaves.

MATERIAL and METHOD

The type of research used in this study was experimental research by observing the comparison the ability of basil and papaya leaf extracts using a sprayer to kill Aedes aegypti mosquitoes with concentrations of 55%, 60% and 65%. The location of the research was carried out in the female dormitory of Ministry of Health Makassar, Department of Environmental Health. The research time was divided into two stages, namely the preparation stage, which includes data collection for the preparation of proposals and the implementation stage, which includes the implementation of research activities.

The population used in this study was the Aedes aegypti mosquito which was bred from larvae to become adult mosquitoes. The sample used in this study was each concentration and treatment used 20 mosquitoes. The tools in this study were knives/scissors, scales, filters, jars, stirrers, measuring cups, mosquito cages measuring 1m x 1m, and sprayer bottles. The materials used in this study were basil leaf extract and papaya leaves.

Prepare all the tools and materials will be used, wash the basil leaves and papaya leaves until clean then drain. Cut the leaves into small pieces then weigh as much as 100 grams, put in a jar and mix with 1000 ml of methanol, let stand for 5 days for the first soaking, after 5 days replace the methanol solution with a new one then let stand again for 5 days. After the second soaking, collect the extract and put it in a sprayer bottle. The mosquito cages used measuring 1 x 1 m are 7 cages. Each cage was given 20 mosquitoes with different concentrations according to the desired concentration. The mosquito used in this study was the Aedes aegypti mosquito, then spray the extract that has been made into each cage, after that do the exposure for 1 hour and count and record the results obtained.

Data processing by manually using calculator and computer and the data obtained will be presented in the form of tables and graphs and analyzed descriptively.

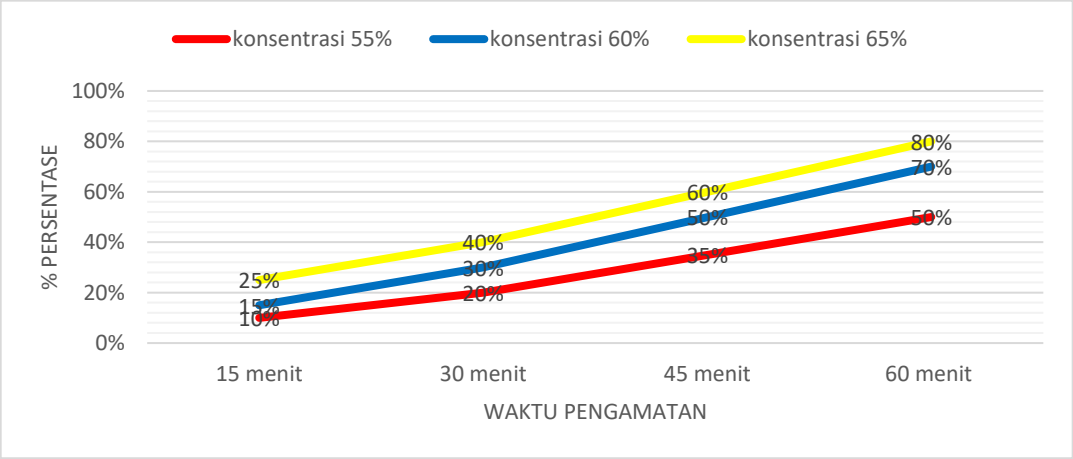
RESULT and DISCUSSION

Tabel 1
Observations of Mosquitoes Dead After Exposure to Basil Leaf Extract

Observation Time	Mosquitoes Dead in 3 replication				Average	Persentase (%)
	Control	I	II	III		
55% Concentration						
15 Second	0	2	2	3	2	10
30 Second	0	4	5	4	4	20
45 Second	0	6	8	7	7	35
60 Second	0	9	11	10	10	50
60% Concentration						
15 Second	0	3	2	3	3	15
30 Second	0	6	6	7	6	30
45 Second	0	11	9	10	10	50
60 Second	0	15	14	13	14	70
65% Concentration						
15 Second	0	4	5	5	5	25
30 Second	0	8	7	8	8	40
45 Second	0	12	11	14	12	60
60 Second	0	15	16	16	16	80

Primary Data, 2021

Graph 1
Observations of Aedes aegypti Mosquitoes After Exposure to Basil Leaf Extract Concentrations of 55%, 60% and 65% For 1 Hour

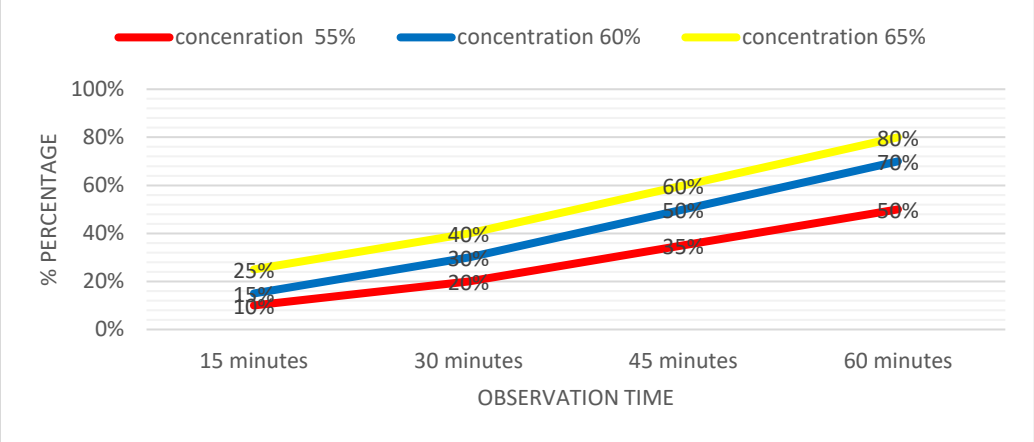


Tabel 2
Observations of Mosquitoes Dead After Exposure to Papaya Leaf Extract

Observation Time	Mosquitoes Dead in 3 replication				Average	Persentase (%)
	Control	I	II	III		
55% Concentration						
15 Second	0	2	3	2	2	10
30 Second	0	4	4	5	4	20
45 Second	0	6	6	8	6	35
60 Second	0	8	11	10	10	50
60% Concentration						
15 Second	0	2	2	2	2	10
30 Second	0	3	5	4	4	20
45 Second	0	7	10	8	8	40
60 Second	0	13	12	13	13	65
65% Concentration						
15 Second	0	3	4	3	3	15
30 Second	0	5	5	6	5	25
45 Second	0	8	9	11	9	45
60 Second	0	13	14	14	14	70

Primary Data, 2021

Graph 2
Observation of Aedes aegypti MosquitoEs After Exposure With Papaya Leaf Extract Concentrations of 55%, 60% and 65% For 1 Hour



1. Ability of basil leaf extract (Ocimum sanctum) with 55%, 60% and 65% concentration in killing Aedes Aegypti mosquitoes

One of the vector control of the Aedes aegypti mosquito is the use of plant-based insecticides that are easily linked to the surrounding environment so that they do not cause pollution and pollute the environment and are safe for humans, such as the use of

basil leaves which can be extracted and applied using a sprayer. Basil leaf extract in this study was made using methanol to obtain flavonoids, alkaloids, saponins, tannins, phenols, anthosinins, terpenoids and steroids which are thought to have insecticidal effects on mosquitoes.

The sample used in the basil leaf extract test was the Aedes aegypti mosquito which was divided into three cages, each containing 20 mosquitoes and repeated 3 times. One of the factors that play a role in this research is the age of the mosquito which affects the resistance of the mosquito to an exposure, so that age selection is important in a study. The age range of mosquitoes used in this study was 2-5 days in accordance with the guidelines for testing biological insecticides. Female mosquitoes live longer than male mosquitoes, male mosquitoes usually only last 6 to 7 days. While female mosquitoes can usually only survive up to 2 weeks.

Measurement of temperature and humidity also affects the survival of mosquitoes. In this study, the room temperature was 32.1 oC with a humidity of 61.6%. Based on data from research conducted using basil leaf extract (Ocimum sanctum) with concentrations of 55%, 60% and 65% in each cage, which was carried out using a sprayer. On exposure to a concentration of 55% basil leaf extract with an observation time of 1 hour, an interval of 15 minutes the percentage of mosquito mortality was 50%, for a concentration of 60% the percentage of mosquito mortality was 70%, at a concentration of 65% the percentage of mortality was 80% and for controls not there was death after 1 hour. Based on the results of research conducted by Armayanti (2019), there are similarities with the results obtained in this study. Where the percentage of mosquito mortality is directly proportional to the concentration, namely the higher the concentration of the extract, the higher the percentage of mortality will also be. It can be concluded that the toxicity of noni leaf extract is almost the same as the toxicity of basil leaf extract.

Based on the results of research on mosquito mortality after being exposed to basil leaf extract at various concentration variants, it was quite effective because it met the LC50 standard. So it can be stated that concentrations of 55%, 60% and 65% of basil leaf extract were effective in killing the Aedes aegypti mosquito. Where LC50 is the concentration that causes the death of 50% of animals on exposure for a certain time. This indicates that the more chemicals in the insecticide in the basil leaf extract, the higher the insecticidal effect.

The results of the correlation test in this study were conducted to assess the strength of the relationship between increasing the concentration of basil leaf extract and mosquito mortality. As for the test results, the correlation value at minute 60 is 0.927. From the results of this correlation test, it can be concluded that the correlation value is 0.927, which means the correlation between the concentration of basil leaf extract and mosquito mortality is very strong with a positive correlation direction, meaning the higher the concentration of basil leaf extract, the greater the mortality of mosquitoes. Lind, Marchal, Wathen, (2008) explained that correlation is a measure of the strength of a linear relationship between two

variables. He explained that the positive correlation was above 0.50 and 1, while the negative correlation was below -0.50 and -1. Correlation also has meaning guidelines such as, 0.00 – 0.199 indicates very low strength and direction of the correlation coefficient, 0.20-0.399 can be said to be low, 0.40-0.599 is said to be moderate, 0.60-0.799 means strong, and 0.80-1,000 can be interpreted as very strong.

2. The ability of papaya leaf extract (Carica papaya) with 55%, 60% and 65% concentration in killing the Aedes Aegypti mosquito.

Papaya leaf extract with concentrations of 55%, 60% and 65% in each cage, which was exposed using a sprayer. On exposure to a concentration of 55% basil leaf extract with an observation time of 1 hour, an interval of 15 minutes, the percentage of mosquito mortality was 50%, for a concentration of 60%, the percentage of mosquito mortality was 65%, at a concentration of 65% the percentage of mortality was 70% and for controls not Death was found after 1 hour.

Measurement of temperature and humidity also affects the survival of mosquitoes. In this study, the room temperature was 32.1 oC with a humidity of 61.6%. These results indicate that the concentration of basil leaf extract has different killing power. This is in line with the results of research conducted by Kandita, R (2015) which showed that the percentage of mosquito mortality was directly proportional to the concentration, namely the higher the concentration of extract, the percentage of mosquito mortality would also increase. Based on this, it can be concluded that the toxicity of basil leaf extract is almost the same as the toxicity of leuca fruit extract.

Based on the results of the study, each concentration of papaya leaf extract was quite effective because it had fulfilled the LC50. Where LC50 is the concentration that causes the death of 50% of animals on exposure for a certain time. So it can be stated that the concentrations of 55%, 60%, and 65% of papaya leaf extract were effective in killing the Aedes aegypti mosquito. As for the control, no dead mosquitoes were found, so it is evident that there is a difference between the treatment and the number of deaths of Aedes aegypti mosquitoes at each concentration. The death of the mosquito was due to the basil leaf extract containing papain enzyme compounds, kapina alcohol, pseudo carpaine, glycosides, carposids and saponins. In addition, the bitter content of karpain alkaloids, carpaside glucosides, and a little resin contained in papaya leaves can be used as natural pesticides.

The results of the correlation test in this study were conducted to assess the strength of the relationship between increasing the concentration of basil leaf extract and mosquito mortality. As for the test results, the correlation value at minute 60 is 0.866. From the results of this correlation test, it can be concluded that the correlation value is 0.866, which means the correlation between the concentration of basil leaf extract and mosquito mortality is very strong with a positive correlation direction, meaning the higher the concentration of basil leaf extract, the greater the mortality of mosquitoes.

3. Comparison of basil leaf extract (Ocimum sanctum L) and papaya leaf extract (Carica papaya)

Based on the observations that have been made, the ability between basil leaf extract and papaya leaf extract in killing Aedes aegypti mosquitoes can be explained by several analyzes that have been obtained from research data. So, in this study, a comparison of the ability of basil and papaya leaf extracts was carried out in killing the Aedes aegypti mosquito. Basil leaf extract is said to be more effective in killing Aedes aegypti mosquitoes because the percentage of mortality obtained is at a concentration of 65%, which is 80% mosquito mortality. While the papaya leaf extract obtained the percentage of mortality obtained at a concentration of 65%, which is 70% mosquito mortality. However, both extracts met the LC50. Based on the results of the probit analysis test in this study, it was found that basil leaf extract had an LC50 value of 54.692% and papaya leaf extract had an estimated lethal concentration value at a concentration of 56.026% which could cause 50% mosquito mortality. Basil leaves and papaya leaves as vegetable insecticides provide solutions for environmental protection, because vegetable insecticides are easily degraded so they are environmentally friendly. In addition, the use of basil and papaya leaves is very beneficial because they are easy to obtain and economical.

In this study, basil leaf extract was said to be more effective as a vegetable insecticide because the mortality percentage of Aedes aegypti mosquitoes obtained was 80% while papaya leaf extract obtained 70% mortality percentage of Aedes aegypti mosquitoes. in this case the two extracts both met the LC50, which means they are able to reduce the vector population which can automatically reduce the incidence of Dengue Hemorrhagic Fever (DHF).

CONCLUSION

The conclusion of this study is that basil leaf extract is more effective in killing Aedes aegypti mosquitoes. Basil and papaya leaf extracts can be served as an alternative in killing the Aedes aegypti mosquito.

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