



Ability of Papaya Leaf Extract (*Carica papaya*) in Controlling *Aedes Aegypti* Mosquito (Experimental Study)

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Abstract

Dengue Hemorrhagic Fever DHF is caused by dengue virus is transmitted through the bite of the *Aedes aegypti* mosquito, which often occurs in various regions. Due to the mosquito-borne virus that causes the disease from live around us. Various prevention efforts have been done by using an electric mosquito repellent with papaya extract active ingredients as vegetable insecticide. The aim of research to determine the ability of papaya extract in controlling the *Aedes aegypti* mosquito. This type of research is an experiment, with the active ingredient papaya extract concentrate of 50%, 60%, and 70% in light weather conditions. The results showed that papaya leaf extract, the first 15 minutes pulled all the mosquitoes in a cage and there is no death. At a concentration of 50% LC50 is reached after 45 minutes on average *Aedes aegypti* dead reached 11 tails. LC50 at 60% concentration is reached after 30 minutes on average *Aedes aegypti* dead reached 16 tails. LC50 at 70% concentration is reached after 30 minutes on average observation *Aedes aegypti* dead reached 17 tails. This mosquito smell the papaya extract containing bitter substances karpain an insecticide plant alkaloid that is not favored by mosquitoes. Alkoloid karpain that has the characteristics of safe neurotoxin when inhaled by humans. As an insect neurotoxin exposure to toxins is generally experiencing spasms and paralysis before death. Conclusions research papaya extract is able to control the mosquito *Aedes aegypti* with standard LC50. Concentration of 60% papaya extract more effective than a concentration of 50% and 70%. It is recommended to people to take advantage of papaya leaf extract as an alternative vegetable insecticide.

Keywords: *Aedes aegypti*; Papaya Leaf Extract.

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1. Introduction

Dengue hemorrhagic fever is a disease that is still common in many regions, this is because the mosquito-borne virus that causes this disease and live around us. Noted that Indonesia is still endemic Dengue With a death toll of about 1,317 people in 2010, Indonesia ranks highest cases of dengue in the ASEAN, the number of dengue cases in Indonesia in 2010 there were 150,000 kasus. Potensi spread of dengue among the member countries of ASEAN enough higher than other regions, the Southeast Asian countries most seriously affected by dengue [1].

Various control measures have been made in controlling the dengue vector, one of which is the use of chemical insecticides which are considered more effective in tackling vector. However, the use of chemical insecticides are continuous in the long term will lead to insect resistance targets. It is associated as vectors in the ability to develop immune system against insecticides commonly used in mosquito control [2]. The use of chemical insecticides is effective to break the chain of transmission of the Vector Borne Disease, especially mosquitoes, but it also has impact on human toxicology. Therefore, to reduce the impact of the use of chemical insecticides and synthetic materials containing toxins. Needed another way safer, more effective and efficient and environmentally friendly, which is an insecticide derived from vegetable plants. The various means of prevention, but has a negative impact on health. For example the use of anti-mosquito of breathlessness due to fumes sucked by people. The use anti-mosquito spray contains toxins that can be directly sucked by humans, so its use is repetitive and time will damage the health. So came the idea to conduct research using the electric mosquito repellent evaporation method with herbal active ingredients. It means that the electric mosquito repellent to be used in this research is the electric mosquito repellent liquid bottle models with papaya extract material which contains bitter alkaloids that can be used as a natural pesticide [3].

2. Materials and Methods

This Research conducted at the Applied Laboratory and Environmental Health Engineering, Environmental Health Campus, Department of the Ministry of Health Polytechnic Makassar while the extracting of papaya leaf was prepared in the Department of Environmental Health Laboratory of the Ministry of Health Polytechnic Makassar. In this study includes two variables are independent variables and the dependent variable, but that is a staple in this experiment that the ability of papaya leaf extract in the deadly mosquitoes.

Papaya extract otherwise be able to turn off the mosquito when the tested with 20 *Aedes aegypti* mosquitoes that were in captivity, the dead mosquitoes reach 50% or LC50 achieved. Papaya extract is expressed not being able to turn off when the mosquito when tested with 20 *Aedes aegypti* mosquitoes which were kept in a cage, dead mosquitoes do not reach 50% was not achieved or LC50.

Data were obtained based on preliminary test results that have been done. This was done to ascertain whether the papaya leaf extract are made to turn off the mosquito *Aedes aegypti*. Whereas, secondary data obtained from a variety of references of articles, books or other literature that are considered to support the theory that there was, and is considered to have relevance to this study.

The study design is a whole plan for answering the research and to anticipate the difficulties that may arise

during the research process by [4,5]. Based on the research objectives, namely to determine the ability of papaya extract (*Carica papaya*) in controlling the *Aedes aegypti* mosquito. So in this study the *Aedes aegypti* analyzed using mosquito repellent containing leaf papaya extract with 70%, 60%, and 50% with a bright conditions to be observed every 15 minutes for 4 hours.

Implementation of Experiments Mosquito samples used in this study obtained from its own breeding of mosquito larvae to be grown, bred in containers that have been engineered or modified until close to the original environmental conditions where mosquito larvae habitat is taken. The next four mosquito cage, made in such a way that the condition is almost the same as the rooms we live everyday with ventilation 10% of the floor area, enter the *Aedes aegypti* mosquito cage into each 20 head. Then three cages filled each 20 *aedes aegypti* mosquitoes with light conditions. The third confinement is exposed to mosquito anti-mosquito appliance with papaya extract for 4 hours at different time intervals are: 15-30 minutes, 30-45 minutes, 45-60 minutes and 120-240 minutes in this test there are 3 concentrations want used is a concentration of 70%, 60%, and 50% with a bright conditions. This study used three different variations of concentration, so in this study refers to the LC50. LC50 is the lethal concentration for inhalation of chemicals in the form of gases or aerosols can also be tested. In the gas concentration to kill half of the animals included 50% lethal animal model [6].

To determine the acute LC50, duration of exposure of 1 to 4 hours, short-term research. usually 30 or 90 days, and the long-term studies of one year or more. Re-exposure is conducted continuously or intermittently. LC50 was tested used because of exposure by inhalation to determine the median lethal at certain concentrations during a certain exposure. LC50 is the concentration that causes the death of 50% of the animals at the exposure for a certain time [7].

3. Observation Results

In observation every 15 minutes during 240 minutes were repeated three times, there are no dead mosquito *Aedes aegypti*. Controls are not exposed to concentrations of papaya extract given treatment but bright conditions with the same cage.

Tabel 1 shows the *Aedes aegypti* that dead every 15 minutes observation during 240 minutes with concentration of 50% in light condition.

4. Discussion

1. On the concentration of 50% papaya leaf extract, in the first 15 minutes of all mosquito pull over on the cage and no deaths, Lethal concentration 50 (LC50) is reached after 45 minutes in which the *Aedes aegypti* mosquito that died reached 11 individuals (55%)
2. At the concentration of 60% papaya extract in the first 15 minutes of all the mosquitoes are active fly cage pulled to the side and there is no death, Lethal concentration 50 (LC50) is reached after 30 minutes of observation to fulfill where *Aedes aegypti* dead reached 17 tails (80%).

3. At 70% concentration of papaya leaf extract in the first 15 minutes of all the mosquitoes are active fly cage pulled to the side and there is no death, Lethal concentration 50 (LC50) is reached after 30 minutes of observation to fulfill where *Aedes aegypti* dead reached 18 tails (90%). In the first 15 minutes all the mosquitoes were pulled, the mosquitoes because the smell of papaya extract containing bitter substances alkaloid karpain an active ingredient that is not favored by mosquitoes so beneficial as a natural pesticide.

Table 1: The observation of *Aedes aegypti* mosquitoes that die after exposure to a concentration of 50% papaya extract every 15 minutes of observation for 240 minutes

Observation period	<i>Aedes aegypti</i> that dead every 15 minutes observation during 240 minutes with concentration of 50% in light condition						Average	
	Ulangan							
	I		II		III			
	Not dead yet	Dead	Not dead yet	Dead	Not dead yet	Dead	Not dead yet	Dead
15 minutes	20	-	20	-	20	-	20	-
30 minutes	15	5	14	6	15	5	15	5
45 minutes	10	10	9	11	9	11	9	11
60 minutes	8	12	6	14	7	13	7	13
120 minutes	-	20	-	20	-	20	-	20
240 minutes	-	20	-	20	-	20	-	20

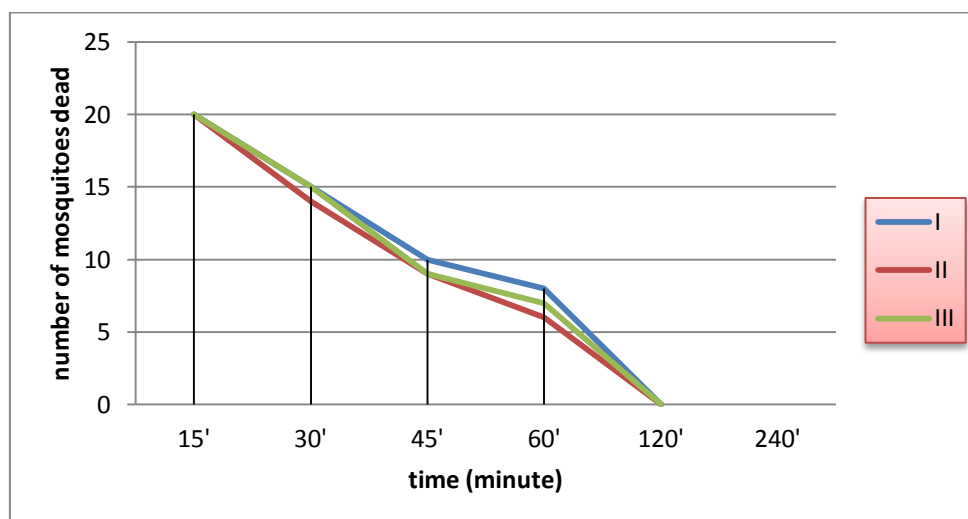
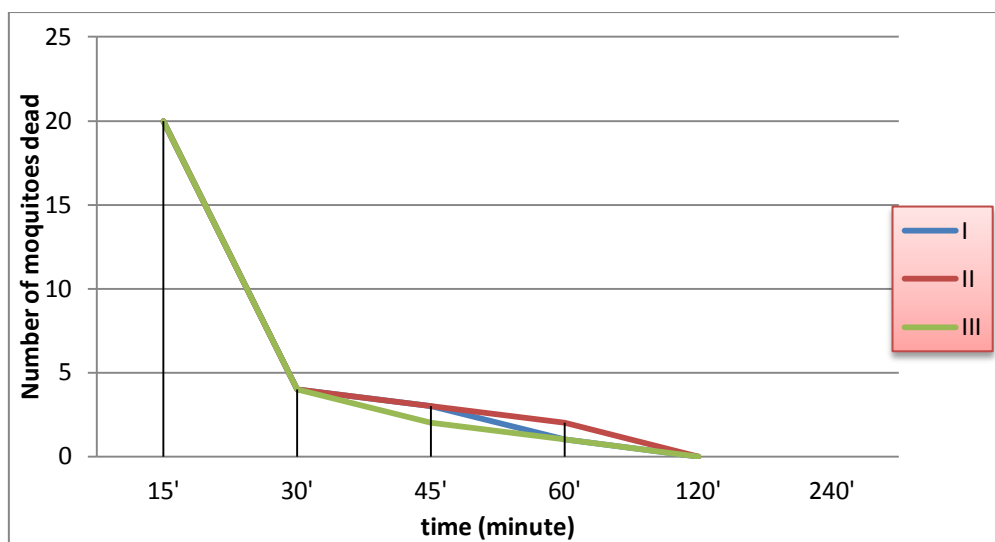


Figure 1: The observation to the dead of mosquitoes *Aedes aegypti* after exposure with 50% of papaya leaf extract every 15 minutes during 240 minutes

Table 2: The observation to the dead of mosquitoes *Aedes aegypti* after exposure with 60% of papaya leaf extract every 15 minutes during 240 minutes

Number of dead <i>Aedes aegypti</i> mosquitoes								
Period of observation	Repetition						Average	
	I		II		III			
	Not dead yet	Dead	Not dead yet	Dead	Not dead yet	Dead	Not dead yet	Dead
	15 Minutes	20	-	20	-	20	-	-
30 Minutes	4	16	2	16	4	16	4	16
45 Minutes	3	17	3	17	2	18	3	17
60 Minutes	1	19	2	18	1	19	1	19
120 Minutes	-	20	-	20	-	20	-	20
240 Minutes	-	20	-	20	-	20	-	20

**Figure 2:** The observation to the dead of mosquitoes *Aedes aegypti* after exposure with 60% of papaya leaf extract every 15 minutes during 240 minutes

Alkaloid karpain have safe nerve toxicity when inhaled by humans. As a neurotoxin, insects were exposed to these toxins are generally experiencing spasms and paralysis before death. Based on the research results of [8], the alkaloid in papaya leaves a bitter taste in the tongue, alkaloids form salts that can degrade the cell membrane

and into the cell damage. [9, 10] also mentions that the alkaloid compounds that inhibit the action of the enzyme acetylcholinesterase function in continuing stimulation to the nervous system, so that the transmission of stimuli does not happen [11].

Table 3: The observation to the dead of mosquitoes *Aedes aegypti* after exposure with 70% of papaya leaf extract every 15 minutes during 240 minutes

Period of observation	Number of dead <i>Aedes aegypti</i> mosquitoes						Average	
	Repetition							
	I		II		III			
	Not dead yet	Dead	Not dead yet	Dead	Not dead yet	Dead	Not dead yet	Dead
15 minutes	20	-	20	-	20	-	20	-
30 minutes	2	18	4	16	2	18	3	17
45 minutes	1	19	3	17	1	19	2	18
60 minutes	-	20	-	20	-	20	-	20
120 minutes	-	20	-	20	-	20	-	20
240 minutes	-	20	-	20	-	20	-	20

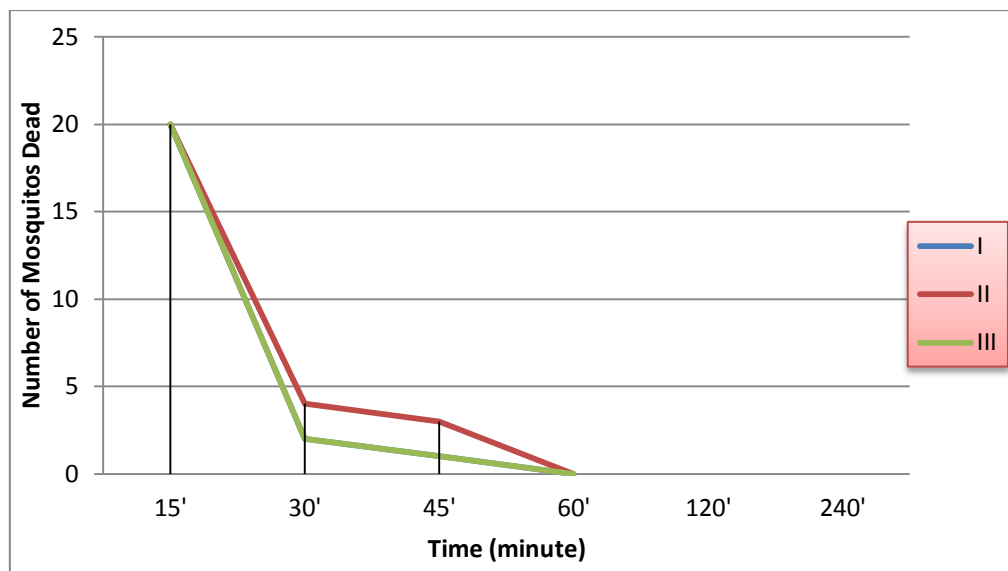


Figure 3: The observation to the dead of mosquitoes *Aedes aegypti* after exposure with 70% of papaya leaf extract every 15 minutes during 240 minutes

Results showed that the concentration of 50%, 60%, and 70% of papaya leaf extract has been quite effective because it meets the standards LC50. Lethal concentration where 50 is a certain concentration of a substance that could kill as many as 50% of experimental animals. So it can be stated that papaya leaf extract concentration of 60% for 30 minutes *Aedes aegypti* dead reached 17 individuals (80%) declared effective in controlling the mosquito *Aedes aegypti* compared to a concentration of 50% and 70%. It is effectively applied, as environmentally friendly as well as papaya are easily found at low altitude. Papaya extract is a plant-based insecticide that is more environmentally friendly and there are no toxic effects in humans in comparison with the use of chemical insecticides that can damage the health of society. At the controls was not found dead mosquitoes, so that the results obtained may reflect the truth and there is a difference between treatments with *Aedes aegypti* number of deaths on each - each concentration. At a concentration of 50% and 60% of papaya leaf extract, 100% mortality occurred after 120 minutes of observation. At a concentration of 70% while the papaya leaf extract, 100% mortality occurred after 60 minutes of observation. The higher the concentration, the more the number of *Aedes aegypti* dead. This is because the herbal ingredients in papaya extract alkaloid karpain ie substances that contain insecticides have a high toxicity basis. Meanwhile, when considered from the length of exposure, the more, the number of *Aedes aegypti* mosquitoes was dead.

A wide variety of plants that can be used as an insecticide plant including papaya because they contain substances that are not alkaloid karpain like mosquitoes because of the smell. Besides vegetable insecticides not only little leaves a residue on the components of the environment and food ingredients that are considered safer than chemical insecticides can be produced in a simple way. Materials make vegetable insecticides can be available around the house. Economically reduce the cost of purchasing insecticides. The room temperature measured during the study was about 30°C to 31°C, the air temperature does not affect the study because the temperature is too high or too low can affect the survival of mosquitoes where mosquito growth will stop completely when the temperature is less than 10°C or more than 40°C [11]. Measurement of indoor air humidity is measured during the study that 68% to 70%. The moisture does not interfere with the smooth running of research because of the air that ranged from 71.5 % to 89.5% is optimal moisture for process embriyasi and mosquitoes embryo survival [12, 13].

5. Conclusion

Based on these results, that the leaf extract of papaya (*Carica papaya*) is able to control to die the *Aedes aegypti* mosquito with standards Lethal concentration 50 (LC50). Concentration of 60% more effective in the lethal mosquito *Aedes aegypti* compared to a concentration of 50% and 70%

6. Suggestions

6.1. This study is expected to be an alternative vector control, especially against the mosquito *Aedes aegypti*, papaya leaf extract can be used as an insecticide plant as safe for the environment and humans.

6.2. Researchers can then try other herbal ingredients that can be used as an active ingredient which is specific that are toxic to mosquito *Aedes aegypti*.

6.3. For government or health personnel to provide training to the public how to make papaya leaf extract because it is environmentally friendly.

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