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# EFFECTIVENESS OF *CARICA PAPAYA LINNAEUS* AS A LARVICIDE OF AEDES SP INSTAR III

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**Abstract**

The increase of dengue fever cases year to year make it necessary to control. One way to control dengue is to kill mosquito larvae by using abatization method. The use of abate has affect abate users and the occurrence of resistance in Aedes sp. Carica Papaya Linnaeus are appropriate to be used as mosquito larvae repellent Aedes sp because it has toxins contained in papaya seeds are saponins. The aim of the study was to determine the effectiveness of carica papaya linnaeus as a larvicide of Aedes sp. This research was an experiment with posttest only control group design, using 4 treatments (10 ml, 20 ml, 30 ml, and 40 ml) and 1 control. The objects used are 300 Aedes sp larvae that have reached instar III. Carica papaya linnaeus was extracted by maceration method. Each treatment contained 20 larvae and was repeated 3 times. Data were analyzed by univariate and bivariate. Results of univariate analysis of the number of dead larvae at various doses that died at the lowest total percentage of 35% at a dose of 10 ml and the highest percentage of 100% at a dose of 40 ml. The results showed that there was a significant effect on the difference in the dosage of the carica papaya linnaeus solution used on the mortality of Aedes sp, meanwhile Bonferroni's analysis showed a dose of 40 ml was effective as a larvicide of Aedes sp instar III. It is recommended to use a solution of carica papaya linnaeus to control aedes larvae.

**Key Words:** *Carica papaya linnaeus, larvacide, aedes sp, saponin*

## INTRODUCTION

Dengue fever is one of the public health problems in Indonesia which tends to spread widely in line with the increase in transportation flows and population density. This disease mainly affects children, can cause death and often causes outbreaks (Ministry of Health, 2016). Indonesia is a hyperendemic country with 32 of the 33 provinces affected (Achmadi, 2016). Indonesia's health profile records data on dengue fever in 2018, namely 137,469 cases and 1,187 of them died, in 2019 there were 158,912 cases and 1,420 of them died, in 2018 there were 156,085 cases and 1,358 of them died, and in 2016 there were 65,432 cases and in 2012 namely 595 of them died. Based on the information above, there was a 99.7% decrease in the number of cases between the number of dengue cases in Indonesia and the number of cases in Bengkulu Province. (Ministry of Health of Indonesia, 2012-2018).

Cases of dengue fever sufferers in Bengkulu Province in 2018 also recorded as many as 409 cases infected and spreading in 67 Kelurahan Bengkulu Province and 2 people died. This case increased from 2017 which was only 300 cases (Bengkulu Provincial Health Office, 2017). The Bengkulu City Health Office noted the number of dengue fever sufferers. From year to year, the number of dengue fever sufferers in 2012 reached 470 people, much more than the previous period. Bengkulu city residents who contracted dengue hemorrhagic fever until the end of February 2018 recorded 102 people and 2 of them died (Bengkulu City Health Office, 2018).

Looking at chemical control methods targeting mosquitoes or larvae, there may be a negative impact, namely Aedes sp resistance resulting from the use of chemical control methods. Other forms of control can be done mechanically, biologically, chemically, or by changing genetic traits. Insecticides are used because they work more effectively and the results are visible quickly. However, this has negative impacts, including environmental pollution, death of predators, resistance of target insects, can kill pets, and even interfere with human health. So far the steps that have been taken by the community are abatization. Abatization is carried out to control mosquito larvae and the dose used tends to be lower on the grounds that the water sprinkled with abate smells bad, because this is one of the weaknesses of the temefos SG formulation.

The higher frequency of this abatization can encourage resistance in the population of Aedes sp. In addition, the use of abate for 30 years does allow the development of resistance (Mulla, 2014). Seeing these various reasons, it is necessary to make an effort to obtain alternative insecticides, namely using natural insecticides, namely insecticides produced by plants that are toxic to insects but do not have side effects on the environment and are not harmful to humans.

The most effective method for controlling dengue vector mosquitoes is by killing the larvae (Nurhasanah, 2018). Larvicide which is one of the insecticides can be an alternative to control dengue fever. Natural larvicides can be found in plants which contain compounds that function as larvicides, including the cyanide group, saponins, tannins, flavonoids, alkaloids, steroids and essential oils (Kardinan, 2018). One of the plants that can be used as larvicides is papaya. Papaya seeds are part of the chemical compound that contains alkaloids, saponins, and flavonoids.

## METHOD

### Research Design and Subject

This research was an experiment with posttest only control group design, using 4 treatments (10 ml, 20 ml, 30 ml, and 40 ml) and 1 control. The objects used are 300 Aedes sp larvae that have reached instar III. Carica papaya linnaeus was extracted by maceration method. Each treatment contained 20 larvae and was repeated 3 times.

### Instruments and Data Analysis Techniques

The tools needed: mortal and pastel, ovitrap, gauze, aqua glass, basin, tray, measuring flask, water bath, counter. Meanwhile Ingredient carica papaya linnaues, Aedes sp instar III larvae, 96% alcohol.

### Procedure

The larval colonization process is carried out in two ways, namely by using ovitrap which is placed near mosquito breeding places and also by removing larvae from mosquito breeding places. After the eggs turn into larvae, the larvae are fed with crushed fish pellets as food for the larvae to keep the larvae alive. The larvae used in the study were third instar larvae. The process of making papaya seed extract gets good extraction results, then the papaya seeds are air-dried for 5 days at a temperature of 25°C/room temperature so that the water content in the papaya seeds is reduced.

After the drying process is complete, then the papaya seed plant is mashed which aims to expand the cell surface of the bitter melon to the liquid alcohol so that the active substances contained in the bitter melon will be easier to extract. The smooth papaya seeds were then weighed as much as 100 grams for a concentration of 1%, using 4 doses (10 ml. 20 ml, 30 ml. 40 ml) on an analytical balance using a watch glass then put into a 100 ml volumetric flask and then soaked in alcohol solvent for 3 days. and every day homogenization is carried out. Then the results of the immersion are filtered, after that the filtering results are heated using a water bath until it reaches the boiling point of alcohol at a temperature of 80°C, so that the alcohol can evaporate and a thick papaya seed extract is obtained. After heating the volume of papaya seed extract will decrease, then add aquadest to the mark.

Prepare 5 trays, each tray filled with 1 liter of water. Then put papaya seed extract with a dose of 10 ml into the first basin, a dose of 20 ml in the second basin, a dose of 30 ml in the third basin, a dose of 40 ml in the fourth basin, and tray 5 did not add any substance as a control. Then put 20 larvae into each tray. Wait and observe the development of the larvae for the first 1 hour, the second 2 hours, the third 3 hours and 24 hours then count the dead larvae using a counter. The repetition in the research process was carried out

3 times. The results that have been obtained are entered into the observation table and analyzed using the one way anova test, Then, data were analyzed by univariate and bivariate

## RESULTS

The study, which was conducted from April 24 to May 24, 2014 at the Integrated Laboratory of Poltekkes, Ministry of Health, Bengkulu, resulted in data on the number of larvae that died on the addition of papaya seed extract with various dosage variations, which were presented descriptively and analytically.

**Table 1. The number of dead larvae with various dosages of papaya seed extract 24 hours exposure**

| Repetition | Control | 10% | 15% | 20% | 25% |
|---|---|---|---|---|---|
| | Σ dead larva | Σ dead larva | Σ dead larva | Σ dead larva | Σ dead larva |
| 1 | 0 | 6 | 10 | 16 | 20 |
| 2 | 0 | 7 | 11 | 17 | 20 |
| 3 | 0 | 8 | 12 | 17 | 20 |
| Total | 0 | 21 | 33 | 50 | 60 |
| Average | 0 | 7 | 11 | 16,66 | 20 |
| Percentage % | 0% | 35% | 55% | 83,3% | 100% |

Table 1 showed that from 3 repetitions with a total number of 60 Aedes sp larvae after contact for 24 hours the highest larval death (100%) occurred in the 40ml dose of papaya seed extract treatment.

Bivariate Analysis

The One Way Anova test is used to test a design of more than one variable, this test is used to determine whether there is a difference in the number of dead larvae in the addition of bitter melon extract with various concentrations.

**Table 2 Number of Dead Larvae In Addition of Papaya Seed Extract With Various Dose Variations**

| Variabel | Mean | SD | 95% CI | ρ value |
|---|---|---|---|---|
| Kontrol | .0000 | .00000 | .0000 | 0,000 |
| 10 ml | 7.0000 | 1.00000 | 4.52-9.48 | |
| 20 ml | 11.0000 | 1.00000 | 8.52-13.48 | |
| 30 ml | 16.6667 | .57777 | 15.23-18.10 | |
| 40 ml | 20.0000 | .00000 | 20.00-20.00 | |

Table 2 showed that a value of = 0.000 < 0.05, which means that statistically Ho is rejected and Ha is accepted, it is concluded that there is a difference in the number of Aedes sp mosquito larvae that die when adding papaya seed extract at a dose of 10 ml, 20 ml, 30ml, 40ml). Furthermore, to determine the average difference in the number of dead Aedes sp mosquito larvae with the addition of bitter melon extract with various concentrations and controls, the bonferroni test was carried out. The results of the bonferroni test can be seen in Table 3:

**Table 3 Bonferroni Test Results Number of Dead Aedes sp Mosquito Larvae on Addition of Papaya Seed Extract With Various Doses**

| Intervension | | Different Average | ρ value |
|---|---|---|---|
| Control | 10 ml | 7.000 | 0.000 |
| | 20 ml | 11.000 | 0.000 |
| | 30 ml | 16.667 | 0.000 |
| | 40 ml | 20.000 | 0.000 |
| 10 ml | 20 ml | 4.000 | 0.005 |
| | 30 ml | 9.667 | 0.000 |
| | 40 ml | 13.000 | 0.000 |
| 20 ml | 30 ml | 5.667 | 0.008 |
| | 40 ml | 9.000 | 0.000 |
| 30 ml | 40 ml | 3.3333 | 0.01 |

## DISCUSSION

The difference in the average number of dead Aedes sp mosquito larvae between the control and the 10 ml extract treatment was 7,000 individuals. Meanwhile, the average difference between the control and the extract treatment at a dose of 20 ml was 11,000 individuals. The average difference between control and extract with a dose of 30 ml was 16,667 individuals. The average difference between control and extract at a dose of 40 ml was 20,000 individuals. It is line to Kardinan (2018) that there is an average difference between the control and the extract treatment.

The average difference between the 10 ml extract and the 20 ml extract was 4,000 individuals. The average difference between the extract treatment with a dose of 10 ml and the extract with a dose of 30 ml was 9.667 individuals. The average difference between the extract treatment at a dose of 10 ml and the extract at a dose of 40 ml was 13,000 individuals. The average difference between the extract treatment at a dose of 20 ml and the extract at a dose of 30 ml was 5,667 individuals. The average difference between the extract treatment at a dose of 20 ml and the extract at a dose of 40 ml was 9,000 individuals. The average difference between the extract treatment at a dose of 30 ml and the extract at a dose of 40 ml was 3.333.

The results of the Bonferroni test showed that the mean difference was significant with p value = 0.000 to the number of dead Aedes sp mosquito larvae by adding papaya seed extract at various doses (10 ml, 20 ml, 30 ml, 40 ml) and control, and between The fourth most influential treatment was the treatment with the addition of seed powder extract at a dose of 40 ml.

## CONCLUSIONS AND SUGGESTIONS

The results showed that there was a significant effect on the difference in the dosage of the carica papaya linnaeus solution used on the mortality of Aedes sp, meanwhile Bonferroni's analysis showed a dose of 40 ml was effective as a larvicide of Aedes sp instar III. It is recommended to use a solution of carica papaya linnaeus to control aedes larvae.

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