

## Effect of Boiled Carica Papaya Leaf on Death of *Aedes Aegypti* Larvae

Rustam Aji

Study Program in Nursing, Curup School of Health Polytechnics, Bengkulu

### ABSTRACT

**Background:** In its life cycle *Aedes aegypti* larvae develop to become mosquito. Then the mosquito develops to become vector of dengue haemorrhagic fever transmission. The life cycle of *Aedes aegypti* vector can be interrupted by killing *Aedes aegypti* larvae. The killing of *Aedes aegypti* larvae has been undertaken by fogging or abate powder administration. However, these methods can cause environmental pollution. Carica papaya leaf has long been recognized to have the potential to become an effective and safe larvacide since it contains papain enzyme. The effect of papain protease can kill *Aedes aegypti* larvae. This study aimed to determine the effect of boiled Carica papaya leaf on death of *Aedes aegypti* larvae.

**Subjects and Method:** This was an analytic experimental study using randomized control trial design. The study was conducted in Curup Tengah village, Bengkulu Province. Study sample included 36 water containers containing *Aedes aegypti* larvae. These containers were divided into 2 groups: papain enzyme group and no papain enzyme (control) group. The data on the percentage of killed *Aedes aegypti* larvae were then compared and tested by Chi Square test. The effect of Carica papaya leaf was indicated by Odds Ratio.

**Results:** Boiled Carica papaya leaf had an effect on the death of *Aedes aegypti* larvae. Carica papaya leaf that was administered on the larvae increased the risk of death among *Aedes aegypti* larvae four times as many (OR= 4.10; p= 0.043).

**Conclusion:** Carica papaya leaf is effective to increase the risk of death among *Aedes aegypti* larvae.

**Keyword :** Carica papaya leaf, *Aedes aegypti* larvae.

### Correspondence:

Rustam Aji. Study Program in Nursing, Curup School of Health Polytechnics, Bengkulu. Email: adjie-roestamadjie@gmail.com.

---

### BACKGROUND

---

When *Aedes aegypti* larvae are not observed, they will continue to develop into adult mosquitoes. Mosquitoes containing *Aedes aegypti*, can cause dengue hemorrhagic fever (DHF) in humans who are sucked in by the mosquitoes.

DHF is a health problem. DHF transmission is determined by the presence of *Aedes aegypti* larvae. An effective way to cope with this disease is to break the life cycle of dengue disease vectors by killing the existence of *Aedes aegypti* larvae. The killing of *Aedes aegypti* larvae has been undertaken by fogging, abate powder administration and so on that have side effects on the environment.

The author looked for a safe and effective natural larvicidal solution, because authors saw the number of papaya plants planted by residents in the yard. Papaya plants contain many substances called papain. The effect of papain protease can kill *Aedes aegypti* larvae. Papaya tree (*Carica papaya*, Linn.) Familia (*Caricaceae*). Papaw (English), Pepaya (Indonesia), Gedang (Sunda); Betik, Kates, Telogantung (Java) (Luhung et al., 2017).

Papaya (*Carica papaya*) is an upright and wet trunked plant. Papaya resembles palm. Its flowers are white and the ripe fruit is reddish yellow, tastes like a melon. The height of the papaya tree can reach 8 to 10 meters with strong roots. This plant is also cultivated in extensive gardens because

the fruit is fresh and nutritious. Papaya plants contain many substances called the enzyme papain. The effect of papain protease can kill *Aedes aegypti* larvae (Yoke, 2016).

This study aimed to determine the effect of boiled *Carica papaya* leaf on death of *Aedes aegypti* larvae in a water container. The location of the study was in Curup Tengah Village. Study sample included 36 water containers in the houses surveyed. This was an observational study with cross-sectional study design. The survey carried out by using single larvae method.

The survey was conducted around the yard of the residents of Batu Galing Village, Curup Tengah Sub District. There were many papaya plants. When the authors observed the water containers, some of them were not closed. That was feared to be the site of development of *Aedes aegypti* larvae. The existence of *Aedes aegypti* larvae is crucial for controlling the development of Dengue Hemorrhagic Fever mosquitoes. *Aedes aegypti* larvae can be used as an indicator to determine larva free numbers in an area. The use of boiled *Carica papaya* leaf should be socialized to reduce the existence of *Aedes aegypti* larvae. Based on the data, the authors did a study on "The Effect of Boiled *Carica Papaya* Leaf on Death of *Aedes Aegypti* Larvae".

This study aimed to determine the effect of boiled *Carica papaya* leaf on death of *Aedes aegypti* larvae in a water container.

---

## SUBJECTS AND METHOD

---

### 1. Study Design

This quasi-experimental study was to determine whether the concentration of boiled *Carica papaya* leaf was effective as a repellent of *Aedes aegypti* larvae. This study used randomized control trial design.

### 2. Population and Sampling

The experiment was carried out with three repetitions using the concentration of boiling water from 3 papaya leaves mixed with 50 ml of water. The location of the study was conducted in the observation room in October 2017. The study object was *Aedes aegypti* larvae.

The materials and tools in this study were stoves, gas, matches, pots, water, measuring cups, papaya leaves, larva filters, pipettes, flashlights, white plates and stopwatch.

### 3. Data Analysis

Based on observations, the results of experimental trials used 50 ml of boiled water of papaya leaves that had been cooled. 36 mosquito larvae were put into the concentration of boiled papaya leaves. Then it was observed for 5 minutes.

---

## RESULTS

---

Based on the data in Table 1, it was found that almost all, 34 (94.4%) of 36, *Aedes aegypti* larvae (Ae) died in decoction of 50 ml of papaya leaf water in under 2 minutes.

Based on Chi-square analysis values obtained  $p = 0.004$ . This means that there was a significant correlation between the death of *Aedes aegypti* larvae with boiled papaya leaves. OR value = 4.103 means the effect of *Carica papaya* leaf that was administered on the larvae increased the risk of death among *Aedes aegypti* larvae (Ae) 4.10 times as many.

Based on the observations, the trial results of boiled *Carica papaya* leaves with the same formulation, caused a number of different larvae deaths with the same time span.

**Table 1. Effect of boiled Carica papaya leaf on the death of Aedes aegypti larvae**

Administration of boiled carica papaya leaves	The death of <i>Aedes aegypti</i> larvae						OR	p
	Dead		Live		Total			
	n	%	n	%	n	%		
Yes	34	94.4	2	5.5	36	100	4.10	0.043
No	0	0	36	100	36	100		

## DISCUSSION

### Effect of boiled water Carica papaya leaf on the death of *Aedes aegypti* larvae

Almost all *Aedes aegypti* larvae, 34 out of 36, died in a 50 ml boiled water of Carica papaya leaves in under 2 minutes.

This result was in accordance with the result of a study conducted by Delli (2016) that there was an effect of the administration of papaya leaf extract (*Carica Papaya*, Linn) on the mortality of *Aedes aegypti* Instra III larvae.

The study was also supported by a study conducted by Anggia (2014) that papaya leaf extract (*Carica papaya* L) had potential as larvacide. The higher the concentration of extract given, the higher the mortality of *Aedes aegypti* larvae instars III.

In line with the results of the study of Eko et al. (2015), the seed and peel extracts had a larvicidal activity against *Aedes aegypti*. The seed extracts had a higher larvicidal activity than peel extracts. This might be due the effect of phytochemical constituent in extract such as flavonoid, alkaloid and tannin. From this study indicate that the aqueous extracts of seed and peel of Carica papaya showed potential larvicidal activity for *Aedes aegypti*. Further studies might be needed for the use of this extracts for eco-friendly vector control programs especially for *Aedes aegypti*.

These results also agree with Adhityas (2009) who wrote that natural ingredients from the solution of papaya leaves (*Carica papaya*) have an effect on killing the *Aedes aegypti* larvae Instar II.

In line with the results of Rochmat's study (2017), there was a significant influence between lemongrass fragrant plants in the presence of *Aedes aegypti* larvae in the water container environment, with OR = 4.375.

In line with the results of Rasman's study (2015), 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 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. Papaya extract is able to control the mosquito *Aedes aegypti* with standard LC50. Concentrations 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.

The authors agrees with the study results of Enis (2000) that papaya leaf extract was effective as larvacide against *Anopheles Aconitus Donits* mosquito, in *Upaya Pencegahan Penyakit Malaria di Daerah Persawahan Desa Lalonggombu Kecamatan*

*tan Andolo Kabupaten Konawe Selatan* (Prevention of Malaria in the Rice Fields of the Lalongombu Village, Andolo Sub District, South Konawe Regency).

The result of Luhung et al. study (2017) stated that papaya leaf extract lotion effectively repelled *Aedes Aegypti* mosquitoes at a concentration of 30% because the resistance was more than 90%. Patryisia (2013) stated that papaya leaf extract has the effect of being a larvicidal *Culex* sp mosquito.

The author agreed with the study of Wahyuning (2014) that papaya leaf extract (*Carica papaya L*) was more effectively used as larvicides, based on the size of LC 50 from papaya leaf extract (*Carica papaya L*) for a period of 12 hours, 24 hours, 36 hours and 48 hours, lower compared to the boiled water of papaya leaves (*Carica papaya L*).

In line with the results of Malathi's (2015), Phytochemical screening of the selected parts' crude aqueous and ethanol extracts indicated the presence of alkaloids, carbohydrates, saponin, phenol, tannin, flavones, coumarins, anthocyanin and flavanoids which are known to possess medicinal and insect larvicidal properties. Larvicidal effect of 2nd 4th instar larvae of mosquito species *Aedes aegypti* have been investigated for 24hrs with 1mg/ml concentration of extracts of selected parts of *Carica papaya*. The results clearly indicated that there is a significant variation among the aqueous and ethanol extracts of the selected parts of the plant. The seed extracts are observed as effective larvicide than other selected parts of *Carica papaya*.

The author agrees with Rofirma (2012) that the higher the concentration of fragrant lemongrass juice, the better it was used as a repellent. Deby (2015) showed that papaya leaf extract (*Carica Papaya Linn*) affects the mortality of *Aedes aegypti* larvae.

The results of this study can be concluded that papaya plants contain many papain enzyme. The effect of papain enzyme can kill *Aedes aegypti* larvae. It was found that almost all 34 (94.4%) of 36 *Aedes aegypti* larvae (Ae) died in decoction of 50 ml of papaya leaf water in under 2 minutes. There is a significant correlation between the death of *Aedes aegypti* larvae with boiled papaya leaves.

It is expected that the community play an active role in combating *Aedes aegypti* larvae, by getting used to boiling papaya leaves and pour it into water containers as needed.

---

#### REFERENCE

---

- Rochmat AR (2017) Pengaruh Serai Wangi terhadap Keberadaan larva Jentik *Aedes aegypti* pada Tempat Penampungan Air. JVK. 3(1): 1-4. <http://ejournalpoltekkes-pontianak.ac.id/index.php/JVK>.
- Sumi ANK (2016) Efektifitas Ekstrak Etanol Serai Wangi (*Cymbopogon Nardus L*) sebagai Larvasida *Aedes aegypti*.
- Yoke A (2016) Potensi Tanaman di Indonesia sebagai Larvasida Alami untuk *Aedes aegypti*. SPIRAKEL, 8(2): 37-46.
- Adhityas AA (2009) Uji Efektifitas Larutan Daun Pepaya (*Carica papaya*) Sebagai Larvasida terhadap Kematian Larva Nyamuk *Aedes aegypti* Di Laboratorium B2P2VRP. Fakultas Kesehatan Universitas Dian Nuswanto. Semarang.
- Luhung FNA, et al. (2017) Uji Daya Ekstrak Daun Pepaya (*Carica Papaya L*) dalam Sediaan Lotion dengan Basis PEG400 sebagai Repellent terhadap *Aedes Aegypti*. Jurnal Ilmu Kesehatan Masyarakat. FIK Universitas Negeri Semarang. 5(3).

- Rasman JLH (2015) Ability of Papaya Leaf Extract (*Carica papaya*) in Controlling *Aedes aegypti* Mosquito (Experimental Study) International Journal of Science: Basic and Applied Research (IJSBAR). 24(3): 164-172. Lecturer of Health Polytechnic, Ministry of Health Makassar, Indonesia.
- Delli L (2016) Pengaruh ekstrak daun pepaya (*Carica Papaya*, Linn) terhadap mortalitas larva nyamuk *Aedes aegypti* Instra III Batu Raja Kabupaten OKU. Program Study: Ilmu Kesehatan Masyarakat. Sekolah Tinggi Ilmu Kesehatan Al-Ma'arif Baturaja.
- Rofirma M, Chahaya I, Dharma S (2012). Pengaruh daya tolak perasan serai wangi (*Cymbopogon Nardus*) terhadap gigitan nyamuk *Aedes aegypti*. Departemen Kesehatan Lingkungan. Fakultas Kesehatan Masyarakat. Universitas Sumatera Utara. Medan.
- Enis NW, Yuniar N, Fachlevy AF (2000). Efektifitas uji daya bunuh ekstrak daun pepaya (*Carica Papaya L.*) terhadap larva nyamuk *Anopheles acinutus* dalam upaya pencegahan penyakit malaria di daerah persawahan Desa Lalonggombu Kecamatan Andolo Kabupaten Konawe Selatan. Fakultas Kesehatan Masyarakat Universitas Halu Oleo.
- Dwi NA (2011). Kematian larva *Aedes aegypti* setelah Pemberian Abate di bandingkan dengan pemberian serbuk serai. KESMAS. 7(1): 91-96. <http://Journal.unnes.ac.id/index.php/kemas>.
- Amelia P (2014) Studi Diskriptif Penerimaan Masyarakat terhadap Larvasida Alami. UJPH. 3(2): 1-10. <http://journal.unnes.ac.id/sju/index.php/ujph>.
- Anggia SP, et al. (2014) Uji potensi ekstrak daun pepaya (*Carica papaya L*) sebagai larvasida terhadap larva *Aedes aegypti* instars III. Jurusan Biologi FMIPA Universitas Lampung.
- Eko S (2015) Aqueous Extracts of Seed and Peel of Carica Papaya Against *Aedes aegypti*. Journal of Medical and Bioengineering, 4(5). Departement of Medical Pharmacology Faculty of Medicine Lambung Mangkurat University. Banjarmasin. Indonesia.
- Patrysia SA (2013) Efek ekstrak daun pepaya (*Carica Papaya L.*) sebagai larvasida nyamuk *Culex sp.* Bagian parasitologi Fakultas Kedokteran Universitas Maranatha Bandung.
- Deby S (2015) Pengaruh ekstrak daun pepaya (*Carica Papaya Linn*) terhadap kematian larva nyamuk *Aedes aegypti*. Sekolah Tinggi Ilmu Farmasi. Jurnal Publikasi Kesehatan Masyarakat Indonesia, 2(2): 84-87, Agustus 2015.
- Wahyuning TD, Wahyuni D, Hariyadi S (2014). Perbedaan toksisitas ekstrak, rebusan dan rendaman daun pepaya (*Carica papaya L*) terhadap mortalitas larva nyamuk *Aedes aegypti L.* Program Studi Biologi FKIP Universitas Jember.
- Malathi V (2015) Evaluation of mosquito larvicidal effect of carica papaya against *Aedes aegypti*. International Journal of Mosquito Research, 2(3): 21-24. Departement of Zoology Periyar. E.V.R College (Autonomous) Thiruchirappalli-23. Tamil Nadu. India. PT and Research.