

Extract Clove Leaves Were Used to Test the Effectiveness of Hand Washing Soap. *Aedes Aegypti* Mosquito Larvae *Syzygium Aromaticum* L Exterminator

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ABSTRACT

The best method for getting rid of mosquito larvae is to employ biological pesticides derived from plants, such as *Syzygium aromaticum* L.'s clove leaf extract. *Aedes aegypti* larvae can be killed by a clove leaf extract containing eugenol, saponins, flavonoids, and tannins. Insect repellent hand soap prepared from *Syzygium aromaticum* L clove leaf extract is being tested to see how well it works against *Aedes aegypti* mosquito larvae. This study uses an experimental design with a post-test and a control group, including three treatment and three control groups. A sample of 20 larvae was taken from each group and the control three times. So that there were 280 *Aedes aegypti* larvae in the sample, 60, 80, and 100 mL of hand soap prepared from *Syzygium aromaticum* L. clove leaf extract were used, respectively. Within 24 hours, observations were taken, and the number of larvae perished each hour was recorded. The outcomes demonstrated that the amount of *Aedes aegypti* larvae mortality in the treatment of 60 mL, 80 mL, and 100 mL was extremely effective, being able to kill 100 percent with three repetitions in one hour, non-treatment (negative control) 0 percent larvae mortality in time of 24 hours, and the control treatment of hand washing soap without clove leaf extract was less effective, it could only kill 50 percent within 24 am, while the control treatment with clove was more effective. The mortality of mosquito larvae is significantly influenced by the concentration of hand soap made from clove leaf extract *Syzygium aromaticum* L, which occurs extremely quickly. To promote public awareness and comprehension of natural larvae exterminators, there is a need to educate people about the risks of DHF and how to prevent it with natural components. The findings of this study are anticipated to be used in the future to improve health conditions.

Keywords – Liquid Hand Soap; Clove Leaf Extract (*Syzygium Aromaticum*.L); *Aedes Aegypti* Mosquito Larvae; DBD

INTRODUCTION

The World Health Organization (WHO) states that the number of reported cases of dengue fever has increased more than eight times over the past four years, from 505,000 cases to 4.2 million in 2019. The reported deaths have also increased from 960 to 4032

during 2015. Cases of dengue hemorrhagic fever (DHF) in Indonesia have occurred in 16,099 cases from January to early March 2020. According to data from the Ministry of Health, dengue has killed at least 100 people during the two months and forced several regions to declare the status an Extraordinary Event. (KLB). There were 16,099 cases with 100 deaths (persons) in the nation. Since 2020, dengue hemorrhagic fever has been endemic in several areas in Indonesia. In the first two months, 285 regencies/cities reported that their areas were infected with dengue fever. At least five regencies/cities have announced the status of an extraordinary occurrence of dengue fever (DHF) in their area. These include Belitung Regency in Bangka Belitung Province, six villages in Temanggung Regency, Central Java, and three regencies in East Nusa Tenggara (NTT) Province, namely Alor, Lembata, and Sikka. When compared, throughout 2016, the number of cases of dengue outbreaks reached 620 cases, with the death toll reaching 13 people. While this year has only been running for three months but the cases have far exceeded previous events (1).

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Since 2020, dengue hemorrhagic fever has been endemic in several areas in Indonesia. In the first two months, 285 regencies/cities reported that their areas were infected with dengue fever. At least five districts/cities have announced the status of an Extraordinary Dengue Fever Event (DHF) in their area. These include Belitung Regency in Bangka Belitung Province, six villages in Temanggung Regency, Central Java, and three regencies in East Nusa Tenggara (NTT) Province, namely Alor, Lembata, and Sikka. When compared, throughout 2016, the number of cases of dengue outbreaks reached 620 cases, with the death toll reaching 13 people. While this year has only been running for three months, the cases have far exceeded previous events (1).

DHF cases in Palu City were based on the results of reports from 13 puskesmas entered at the Palu City Health Office that the highest cases of Dengue Hemorrhagic Fever were found in 5 puskesmas with the first order being at Kamonji Health Center, with a total of 89 dengue cases, the second order being Sangurara Health Center with 70 results. Cases and one person died, third in Mabelopura Health Center with 45 DHF cases, fourth in Birobuli Health Center with 41 DHF cases and one person died, and fifth in Bulili Health Center with 40 cases of DHF in 2019. The high number of dengue cases is due to the large number of mosquito larvae found in Palu City, the larva-free rate in 2015 was 85.7%, while the achievement of free rate to be achieved was 95% (2).

Dengue virus is transmitted from person to person through the bite of the mosquito. *Aedes aegypti* is the main vector of the epidemic, but other species such as *Ae. albopictus*, *Ae. polynesiensis* and *Ae. niveus* are also considered secondary vectors. Other *Aedes* mosquitoes are excellent hosts for the dengue virus, but they are generally less efficient

epidemic vectors than *Ae. aegypti*. This dengue-transmitting mosquito is found in almost all corners of Indonesia, except in places with an altitude of more than 1000 meters above sea level (3).

One effective way to eradicate mosquito larvae is to use natural larvicides from clove leaf plants. The content of natural larvicide ingredients toxic to mosquito larvae is easily decomposed in running water, so they are environmentally friendly.

Clove flower extract containing eugenol, saponins, flavonoids, and tannins can kill *Aedes aegypti* larvae. Chemical compounds contained in these plants are larvicidal. Saponins are glycosides in plants with soap-like properties and are soluble in water. Saponins can reduce the activity of digestive enzymes and food absorption (4).

Similar research using clove leaf extract *Syzygium aromaticum* L is about the effectiveness of clove leaf extract as an anti-mosquito repellent *Aedes aegypti*. Repellents generally do not kill insects immediately but rather serve to repel the presence of insects, mainly due to the strong smell. The eugenol substance gives a distinctive odor and aroma, has a spicy taste, and is easy to evaporate if left in the open air, allowing the compound to be used as a repellent against the *Aedes aegypti* mosquito. The use of clove leaves as an anti-mosquito repellent is needed to avoid mosquito bites. This study uses dry clove leaves so that clove leaf extract can be made as a repellent (5).

This study aims to determine the effectiveness of handwashing soap made from clove leaf extract *Syzygium aromaticum* L as a mosquito larvae repellent for *Aedes aegypti*.

METHOD

This type of research method is experimental, which aims to determine the death caused by the treatment by the researcher. This study was used to determine the effectiveness of hand soap made from clove leaf extract *Syzygium aromaticum*, L. as a mosquito larvae repellent for *Aedes aegypti*. The objects in this study were *Aedes aegypti* mosquito larvae and liquid hand soap (handwash) made from clove leaf extract as an *Aedes aegypti* mosquito larvae repellent. This study's samples were 280 *Aedes aegypti* mosquito larvae and 240 ml of hand soap with clove leaf extract.

RESULTS

This research was carried out from 19 May 2022 to 08 June 2022 at the Poltekkes Laboratory of the Ministry of Health Palu. This study aims to determine the effectiveness of hand soap made from clove leaf extract as an *Aedes aegypti* mosquito larvae repellent. The liquid hand soap (handwash) in question is liquid hand soap with clove leaf extract, which can later be used to wash hands, and from wastewater, the hand washing soap can be used as an *Aedes aegypti* mosquito larvae repellent.

This study used three treatments and three controls, namely I for control of hand soap that did not use clove leaf extract containing 100 mL, II for control of clove leaf extract containing 100 mL, III for water control containing 60 mL, 80 mL, 100 mL. mL of water, and I, II, and III for the treatment of hand washing soap made from clove leaf extract containing

60 mL, 80 mL, and 100 mL as an *Aedes aegypti* mosquito larva repellent which was carried out three times.

Table 1. Effectiveness of hand soap made from clove leaf extract *Syzygium aromaticum* L with doses of 60 mL, 80 mL, 100 mL

	Treatment / Repeat	Amount flick	Observation time															
			1	2	3	4	5	6	7	8	9	10	11	12	24	Σ	±	
60 mL	I	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	20	20
	II	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	20	20
	III	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	20	20
80 mL	I	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	20	20
	II	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	20	20
	III	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	20	20
100 mL	I	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	20	20
	II	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	20	20
	III	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	20	20

Source: Primary data, 2022

Based observations in table 1 show that water and hand soap made from clove leaf extract *Syzygium aromaticum* L is very effective in eradicating *Aedes aegypti* mosquito larvae at doses of 60 mL, 80 mL, and 100 mL within 1 hour with the number of dead larvae respectively. Twenty individuals in treatment I, II, and III against *Aedes aegypti* mosquito larvae.

Table 2. Effectiveness of the number of dead *Aedes aegypti* larvae in each control treatment I, II, and III

Dose	Treatment / Repeat	Amount flick	Observation time													
			1	2	3	4	5	6	7	8	9	10	11	12	24	Σ

60 mL	I	20	0	20														
80 mL	I	20	0	20														
100 mL	I	20	0	20														

Source: Primary Data, 2022

Based on the observations in Table 2 shows that there was no number of *Aedes aegypti* larvae mortality in each control of 60 mL, 80 mL, and 100 mL of water within 24 hours of observation.

Table 3. Effectiveness of the number of dead *Aedes aegypti* larvae in each control treatment I and II

Dose	Treatment / Repeat	Amount flick	Observation time														Σ	±	
			1	2	3	4	5	6	7	8	9	10	11	12	24				
100 mL	I	20	10	0	0	0	0	0	0	10	10								
100 mL	I	20	18	0	0	0	0	0	0	18	2								

Source: Primary Data, 2022

Based on the observations in Table 3, it shows that the control using water and hand soap that does not use clove leaf extract with a dose of 100 mL is less effective in eradicating mosquito larvae, while water and clove leaf extract with a dose of 100 mL is effective in eradicating *Aedes aegypti* mosquito larvae during the observation period. For 24 hours.

DISCUSSION

This study was conducted to determine the effectiveness of hand soap made from clove leaf extract *Syzygium aromaticum* L as a mosquito larvae repellent for *Aedes aegypti*. The *Aedes aegypti* mosquito is a vector that causes dengue fever which is still a problem worldwide, and no medicine can cure it. Moreover, the current *Aedes aegypti* mosquito is very dangerous, especially for pregnant women and toddlers. Therefore, it is necessary to

prevent the disease before it occurs. One of them is by eradicating *Aedes aegypti* larvae, and clove plants are one of the plants that can become natural pesticides for larvae.

In this study, the effect of hand soap and clove leaf extract can be seen as an *Aedes aegypti* mosquito larvae repellent based on treatment (concentration).

In the first treatment with a dose of 60 mL using water and hand washing soap made from clove leaf extract within 1 hour, it was able to kill 20 larvae, the second repetition was 20 larvae, and the third repetition was 20 *Aedes aegypti* mosquito larvae.

In the second treatment with a dose of 80 mL using water and hand washing soap made from clove leaf extract within 1 hour, it was able to kill 20 larvae, the second repetition was 20 larvae, and the third repetition was 20 *Aedes aegypti* mosquito larvae.

In treatment III, with a dose of 100 mL using water and hand washing soap made from clove leaf extract within 1 hour, it was able to kill 20 larvae, the second repetition was 20 larvae, and the third repetition was 20 *Aedes aegypti* mosquito larvae.

The control containing 60 mL, 80 mL, and 100 mL of water within 24 hours showed that there was no number of *Aedes aegypti* larvae mortality.

The control of water and hand washing soap that did not use clove leaf extract with a dose of 100 mL was less effective in eradicating mosquito larvae, while water control and clove leaf extract with a dose of 100 mL were effective in eradicating *Aedes aegypti* mosquito larvae.

So it can be concluded that hand washing soap made from clove leaf extract *Syzygium aromaticum* L, which is given, greatly affects larva mortality. The clove leaf extract containing eugenol, saponins, flavonoids, and tannins can kill *Aedes aegypti* larvae. The chemical compounds in these plants are larvicidal or stomach poisoning, which can cause disturbances in the digestive system of *Aedes aegypti* larvae so that the larvae fail to grow and eventually die.

A study (Nindatu & Noya, 2018) that used clove leaf extract *Syzygium aromaticum* L was about the effectiveness of clove leaf extract as an anti-mosquito repellent for *Aedes aegypti*. Repellents generally do not kill insects immediately but rather serve to repel the presence of insects, mainly due to the strong smell. The eugenol substance gives a distinctive odor and aroma, has a spicy taste, and is easy to evaporate if left in the open air, allowing the compound to be used as a repellent against the *Aedes aegypti* mosquito. The use of clove leaves as an anti-mosquito repellent is needed to avoid mosquito bites. This study uses dry clove leaves so that clove leaf extract can be made as a repellent (5).

In this study, the effectiveness of the control of each treatment was tested. In control (negative), there were no dead *Aedes aegypti* mosquito larvae consisting of 60 mL, 80 mL, and 100 mL of water, the control of hand washing soap water without clove leaf extract and control water and clove leaf extract *Syzygium aromaticum* L. From the control effectiveness test results, clove leaf extract has a mortality rate of 90% to kill mosquito larvae, while the control of hand washing soap water without clove leaf extract can kill only 50%. This proves that the presence of *Syzygium aromaticum* L clove leaf extract affects the effectiveness of hand washing soap made from *Syzygium aromaticum* L clove leaf extract as a mosquito larvae repellent *Aedes aegypti*.

CONCLUSION

This study concluded that the rapid death of mosquito larvae with concentrations of hand soap made from clove leaf extract *Syzygium aromaticum* L increasingly has a major influence on the mortality of *Aedes aegypti* mosquito larvae. *Aedes aegypti* Very Effective or can kill *Aedes aegypti* mosquito larvae and be used as natural larvicides.

SUGGESTION

There is a need for socialization about the dangers and ways to prevent DHF with natural ingredients to increase public knowledge and understanding about natural larvae exterminators. The results of this study are expected to be applied in the future to improve health status.

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