

THE EFFECTIVENESS OF DUKU KUMPEH SKIN EXTRACT AROMATHERAPY CANDLES TO REPEL DENGUE HEMORRHAGIC FEVER MOSQUITOES

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ABSTRACT

Dengue Hemorrhagic Fever is a health problem that has become a significant topic internationally. In Indonesia, DHF is still a disease with a high incidence rate. Quoted from the Sehat Negeriku website, in 2020, there were 95,893 cases of dengue fever, with the number of deaths from dengue reaching 661 people. To ensure a healthy life and encourage prosperity for all people of all ages to achieve goal number 3 of the Sustainable Development Goals, it is necessary to take preventive measures against this disease. The specific purpose is to know the number of dead mosquitoes with a concentration of 1% duku peel extract in wax. Knowing the number of mosquitoes killed with a duku peel extract concentration of 2% in resin, It is known that the number of dead mosquitoes with a concentration of 3% duku peel extract in wax.

This research is an experimental study with a completely randomized design (Completely Randomize Design) Duku bark extract wax was made by varying the concentration of duku bark extract to 1%, 2%, and 3%. Based on the data in the table, the highest *Aedes aegypti* mosquito mortality rate was obtained at a concentration of 3%, with the highest number of mosquito deaths, namely 49 mosquitoes. Whereas at a concentration of 2%, the number of mosquitoes that died was 25, and at a concentration of 3%, the number of mosquitoes that died was 25. Duku bark extract wax is categorized as good and can be used as a vegetable insecticide.

Keywords: Aromatherapy Candles; Duku Skin Extract; DHF.

BACKGROUND

Dengue Hemorrhagic Fever is a health problem that has become a significant topic internationally. In Indonesia, DHF is still a disease with a high incidence rate. Quoted from the Sehat Negeriku website, in 2020, there were 95,893 cases of dengue fever, with the number of deaths from dengue reaching 661 people. To ensure a healthy life and encourage prosperity for all people of all ages to achieve goal number 3 of the Sustainable Development Goals, it is necessary to take preventive measures against this disease.

The dengue virus of the genus *Flavivirus*, family *Flaviviridae*, causes Dengue Hemorrhagic Fever. Dengue fever is transmitted to humans through the bite of an *Aedes* mosquito infected with the Dengue virus. Dengue virus that causes Dengue Fever (DD), Dengue Hemorrhagic Fever (DHF), and Dengue Shock Syndrome (DSS) belongs to group B Arthropod Virus (Arbovirosis), which is now known as the genus *Flavivirus*, family *Flaviviridae*, and has four types of serotypes, namely: Den-1, Den-2, Den-3, Den-4.

So far, no vaccine has been found to prevent this disease. Thus, efforts can be made to minimize DHF by controlling

vectors by eradicating *Aedes aegypti* larvae and adult mosquitoes. Several methods of vector control have been widely known and used by DHF control programs, namely: environmental management, biological control, chemical control, community participation, individual protection, and legislation.

Chemical control, still often used in DHF vector control, is known as the use of malathion in fogging, which can be beneficial or detrimental. The use of chemical insecticides, if the right target, correct dose, time, and coverage, will be able to control the vector. However, apart from having a reasonably practical control effect, the use of chemicals can also hurt the environment; namely, it can leave residues that can lead to vector resistance and, in amounts that exceed the limit, can be detrimental to other living things, including humans.

For this reason, so that efforts to control the DHF vector, namely the *Aedes aegypti* mosquito, can still be carried out without causing adverse impacts, other alternatives need to be carried out which are certainly more environmentally friendly, namely by using mosquito repellent plants. One of them is duku fruit skin (*Lansium domesticum* Corr).

The duku plant is a seasonal plant that grows in areas with tropical climates, such as the Philippines, Malaysia, Thailand, and Indonesia. In Indonesia, one of the areas that have duku with superior varieties that are famous for their sweet taste namely Duku Kumpeh and Duku Rengas Bandung in Jambi Province.

During the fruiting season, the duku rind will only become waste in the environment. There are several ways that the local community can process or utilize duku rind waste into valuable goods and have a sale value so that they become additional income for the surrounding community. Duku skin waste, which is included in organic waste, if not treated and just left in the environment, will also cause

problems for the environment and impact the phenomenon of climate change.

This relates to goal number 13 of the Sustainable Development Goals, where we must take action to combat climate change and its impacts immediately. For this reason, it is necessary to create innovative products related to the utilization of waste, in this case, duku bark which is known to have compounds or substances that have the potential to kill the *Aedes aegypti* mosquito.

The existence of several studies on the use of duku rind as a vegetable insecticide or bioinsecticide proves this statement.

Lansium domesticum or duku fruit is one of 195 species known to have potential as mosquitocidal agents, substances that duku have can have mortality and anti-benefit effects or anti-eating insects. In a study conducted by Darmadi et al., duku peel was known to contain several secondary metabolites, namely flavonoids, saponins, and triterpenoids., then obtained a 25% which is the most effective concentration in killing *Aedes aegypti* mosquitoes.

According to Oppenheimer in the book *The Candlemaker's Companion*, essential oils/mixtures added in the preparation of aromatic candles are not more than 4%. Therefore, the manufacture of duku bark extracts candles uses 3 concentrations of duku bark extract: 1%, 2%, and 3%. which is designed as a candle to be helpful for the community and can be used as a DHF disease control.

The ability of duku bark extract wax to kill *Aedes aegypti* mosquitoes is known. Therefore, the innovative product, namely the duku bark extract candle, is expected to be an alternative to controlling the DHF disease problem, which the community can easily imitate, so that goal number 3 of the Sustainable Development Goals is to achieve a healthy and prosperous community life. Furthermore, the use of duku peels as organic waste so as not to

pollute the environment and have an impact on climate change is also expected to help achieve goal number 13 of the Sustainable Development Goals, namely action to combat climate change and its consequences.

RESEARCH METHODS

This research is an experimental study with a completely randomized design (Completely Randomize Design). Hypothesis decision-making is concluded by comparing the calculated F value with the F table. The hypothesis is accepted at $\alpha = 0.05$ if the computed F value $>$ F table. Replication of this experiment using three repetitions for all independent variables (duku peel extract (25g/l, 30g/l, 35g/l).), This repetition produces an estimate of the error and a more precise measure of the effect of treatments. to the experimental results.

This research was conducted indoors. In this study, the parameter measured was the number of Aedes Aegypti mosquitoes that died after being given anti-mosquitoes from duku bark extract with different concentrations.

RESULTS AND DISCUSSION

Table 1. Data on the results of duku bark extract wax testing are as follows:

No	Concentration	The number of dead mosquitoes in the fourth iteration			Amount
		1	2	3	
1	Control	0	0	0	0
2	1%	10	11	10	31
3	2%	15	15	16	46
4	3%	20	20	19	59

Percent of mosquitoes fainted/dead at a concentration of 1% = $31/60 \times 100\% = 51.7\%$

Percent of mosquitoes fainted/dead at a concentration of 2% = $46/60 \times 100\% = 76.7\%$

Percent of mosquitoes fainted/dead at a concentration of 3% = $59/60 \times 100\% = 98.3\%$

Duku bark extract wax was made by varying the concentration of duku bark extract to 1%, 2%, and 3%. Based on the data in the table, the highest Aedes aegypti mosquito mortality rate was obtained at a concentration of 3% with the highest number of mosquito deaths, namely 49 mosquitoes. Whereas at a concentration of 2%, the number of mosquitoes that died was 25, and at a concentration of 3%, the number of mosquitoes that died was 25. Duku bark extract wax is categorized as good and can be used as a vegetable insecticide.

The results of observations during the duku bark extract wax test included the candle's burning time. Candle burning time is the length of time that shows the durability of the candle being burned until it runs out. This burning time is obtained from the difference between the start time or when the wick is burned and the time when the candle runs out or goes out. Based on the test results, the average time the candle burns out is 4-5 hours. There was no change in the color of the wax, which was a pale-yellow color and the color of the duku bark extract wax was affected by the duku peel extract. The results of observing the aroma that arises from burning candles are dominated by the aroma of citronella essential oil.

CONCLUSION AND RECOMMENDATION

The test results of the duku bark extract wax product innovation can be said to be effective in killing Aedes aegypti mosquitoes and can be used as an alternative vegetable insecticide that functions to kill Aedes aegypti mosquitoes and can control DHF problems.

The concentration of 3% duku peel extract in wax is 98.3% in killing Aedes aegypti mosquitoes, showing the best attention

compared to duku peel extract concentrations of 2% and 1%^{5.2}.

The duku bark extract wax innovation product will then be developed by conducting several tests as a complement and complement. Finally, products that have been perfected will be marketed and disseminated to the target community through Community Service activities. The community service related to the duku peel extract wax product innovation is targeted at the people of the duku plant-producing area in Jambi, namely Kumpeh Village and Rengas Village, Bandung. This activity aims to educate the public about utilizing duku skin waste when the duku season arrives. The community is expected not only to get more income when the duku season comes but also to get income from the utilization of duku peel waste which is turned into a product, namely duku bark extract wax which can be sold when the duku season ends. This product can also be a reference for community activity units such as PKK or Karang Taruna in carrying out entrepreneurship or economic programs for the people of duku fruit-producing areas, namely Kumpeh Village and Rengas Village, Bandung, Jambi Province.

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