
Larvicide Activity Test of Ethanol Extract of Bintaro Plant Leaves (*Cerbera odollam Gaertn.*) Against *Aedes aegypti* Larvae

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Abstract

Bintaro Leaf (*Cerbera odollam Gaertn*) contains alkaloids, flavonoids, saponins and tannins that have the potential as larvicides. The study aimed to determine the mortality rate of *Aedes aegypti* mosquito larvae after administration of Bintaro leaf extract as indicated by the LC50 value. The extract was obtained by maceration method. The yield of Bintaro Leaf (*Cerbera odollam Gaertn*) extract was 6.03%. This study used 180 mosquito larvae (*Aedes aegypti*) instar III, divided into test solutions made with 4 concentrations (10,000 ppm, 1000 ppm, 100 ppm and 50 ppm), positive control using Abate and negative control using Aquadest. Observations were made after 24 hours of treatment. The results of the larvicide test showed that the Bintaro leaf extract was effective as a larvicide as indicated by the LC50 value of 21.170 g/mL 1000 g/mL.

Keywords: Bintaro Leaf (*Cerbera odollam Gaertn*); larvicide; *Aedes aegypti*.

Introduction

Dengue hemorrhagic fever (DHF) is an infectious disease caused by dengue and transmitted through the bite of the *Aedes aegypti* mosquito, this disease can attack everyone and can cause death, especially in children, and often causes an outbreak [3].

The use of insecticides is one of the efforts to overcome the spread of *Aedes*. Currently, many people have used insecticides, but they can have a negative impact on humans and the surrounding environment caused by chemical compounds with dangerous active ingredients contained in them [1].

Plants that can be used as natural insecticides are Bintaro Leaf (*Cerbera odollam Gaertn*). One of the plants that has the potential as bioinsecticide is the leaves of Bintaro plants (*Cerbera odollam Gaertn.*). Based on research from Utami (2010, h.99) leaves of Bintaro plants (*Cerbera odollam Gaertn.*) contains secondary metabolites including saponins. This secondary metabolite compound serves as a protector for plants from disturbing pests. And some previous studies said that saponins are one of the compounds that act as insecticides.

Based on this background, a study of the leaves of bintaro plants (*Cerbera odollam Gaertn.*) Will be conducted to determine whether bintaro plant leaf extract

(*Cerbera odollam Gaertn.*) has larvicidal activity against the *Aedes aegypti* mosquito.

Material and Methods

Plant collection and extraction

Bintaro Leaf (*Cerbera odollam Gaertn*) samples were taken in Makassar City. Sample extraction was carried out at the Pharmacognosy-Phytochemical Laboratory, Faculty of Pharmacy, Universitas Muslim Indonesia. The samples were then cleaned out of the dirt, cut into small pieces, then aired at room temperature. After drying, the Betel leaves were powdered and ready for extraction. The preparation of Bintaro Leaf uses the maceration method using methanol 96%, by weighing 300 grams of Bintaro Leaf (*Cerbera odollam Gaertn*) powder and putting it into a maceration vessel, then adding methanol 96% as solvent. After that, it was filtered and the resulting filtrate was evaporated to remove the solvent using a rotary vacuum evaporator.

Larvicidal Activity Test

The third instar larvae of *Aedes aegypti* were obtained from the Entomology Laboratory, Faculty of Medicine, Hasanuddin University, which had previously been identified by entomologists. Ten third-instar larvae of *Aedes aegypti* were put into a test solution containing Bintaro Leaf (*Cerbera odollam* Gaertn) extract with different concentrations (50, 100, 1000, and 10000 ppm), temephos was used as positive control while the negative control consisted of distilled water. The treatment and control media were repeated three times. Mortality was recorded after 24 hours of exposure and calculated using the larval mortality formula.

Data analysis

Statistical analysis was carried out using one-way ANOVA to analyze the effect of different concentrations of Bintaro Leaf (*Cerbera odollam* Gaertn) extract on the mortality of *Aedes aegypti* larvae. If the data is typically distributed and homogeneous; then the LSD test was used. The statistically significant difference was indicated by $p < 0.05$.

To determine the killing power of Bintaro leaf extract against *Aedes aegypti* larvae, which is expressed by LC (Lethal concentration) which is LC50.

Results and Discussion

Based on the data collected and analyzed, the antilarvicidal power of Bintaro Leaf (*Cerbera odollam*

Gaertn) extract on the development of the *Aedes aegypti* mosquito was tested by mixing the larvae in a container containing Bintaro Leaf (*Cerbera odollam* Gaertn) extract at concentrations of 50, 100, 1000, 10000 ppm. And obtained the cessation of larval development of *Aedes aegypti* in the picture and table below;



Figure 1. death of *Aedes Aegypti* larvae in containers containing the bintaro extract (*Cerbera odollam* Gaertn.) with some concentration, positive and negative control .

The extraction method used is the maceration method. This method was chosen because it is easy and simple, besides that, extraction with the maceration method has the advantage that more macerate is produced [8]. the extraction results obtained extract weight that is 18.1 grams with a percentage yield of 6.03%. The calculation of the percent yield aims to determine the levels of secondary metabolites carried by what compounds are carried [9].

Table 1. The percentage Results of total larvae that die in 3 replications up to 24 hours in a concentrations of 50, 100, 1000 and 10000 ppm.

Sample	Replication	Death larvae concentration µg/mL (10 larvas)			
		50	100	1000	10000
<i>Cerbera odollam</i> Linn. Leaves extract	1	9	9	10	10
	2	7	6	9	10
	3	5	8	10	10
Death total		21	23	29	30
Death percentage (%)		70	76	96	100

Larvicide testing of each Bintaro leaf extract (*Cerbera odollam* Gaertn) in concentrations of 50, 100, 1000, and 10000 ppm with positive control abate, and negative control aquadest, which was tested against *Aedes aegypti*. Observations were made 24 hours after the treatment with the mortality parameter of *Aedes aegypti*. The greater the concentration of Bintaro leaf extract (*Cerbera odollam* Gaertn.), the higher the number of dead larvae. Judging from the 10000 ppm concentration of Bintaro leaf extract (*Cerbera odollam* Gaertn.) the percent mortality of each larva was 100%. This indicates that there is an effect of Bintaro leaf extract on the mortality of *Aedes aegypti*.

Based on the results of the phytochemical screening test on Bintaro leaf extract (*Cerbera odollam* Gaertn.) the active compound components were flavonoids, alkaloids, saponins, and tannins. Alkaloids are a group of organic compounds with basic nitrogen atoms and are widely distributed in the plant world. As larvicides, alkaloids work by inhibiting larval feeding and as a stomach poison.

Flavonoids function as respiratory inhibitors so that they inhibit the mosquito's respiratory system which can cause the *Aedes aegypti* mosquito to die. Flavonoids have a way of working by entering the larval body through the respiratory system which will then cause withering of the nerves and damage to the respiratory system and cause the larvae to be unable to breathe and eventually die [2].

Tannin compounds can also inhibit the work of enzymes and remove substrates (proteins). With the binding of the enzyme by tannins, the work of the enzyme is inhibited, so that the cell metabolism process can be disrupted and the larvae will be malnourished. As a result, larval growth is inhibited and if this process continues, it will have an impact on larval death [4].

Then, a probit analysis was performed to determine the LC50 value. LC50 (Lethal Concentration 50) is the level or concentration of a substance expressed in milligrams of chemicals per cubic meter of test media (parts per million or ppm), which can cause 50% of deaths in experimental animals from a group of species after the experimental animals are tested. displayed at a certain time. Where obtained LC50 (Lethal Concentration 50) Bintaro Leaf (*Cerbera odollam* Gaertn) extract is 21.170 g/mL $\pm$ 0.52. the level of toxicity of an extract is if the LC50 is 1000 g/mL then the sample is toxic, whereas if the LC50 is 1000 g/mL then the sample is non-toxic. This indicates that Bintaro Leaf (*Cerbera odollam* Gaertn) extract Bintaro Leaf (*Cerbera odollam* Gaertn) is toxic to *Aedes aegypti* larvae.

Conclusion

Based on the research that has been done and the results obtained, it can be concluded that Bintaro leaf extract (*Cerbera odollam* Gaertn.) has activity against *Aedes aegypti* with an LC value of 50 on Bintaro Leaf (*Cerbera odollam* Gaertn) extract. Bintaro Leaf (*Cerbera odollam* Gaertn) which is 21.170 g/mL. If the LC50 is $\leq$ 1000 g/mL the sample has the potential as a larvicide.

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