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Effectiveness of Soursop (Annona muricata) and Tobacco Leaf Extract Nicotiannna Tabacum) in Killing Aedes Aegypti Mosquito at the Salatiga Vector and Reservoir Desease Research and Development Center

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ABSTRACT

Hemorrhagic Fever (Dengue) is an acute fever and deadly caused by a virus transmitted by Aedes aegypti mosquito For this reason, it is necessary to develop the use of plant-based insecticides, which in addition to being inexpensive and have high toxicity. The purpose of this Research is to determine and compare the effectiveness of soursop leaf extract (Annona muricata) and tobacco leaf extract (Nicotianna tabacum) in killing Aedes aegypti mosquitoes.

This research design study uses a True Experiment design. The population in this study was the Aedes Aegypti mosquitoes that had been bred using simple random sampling techniques which obtained a sample of 625 mosquitoes with 4 repetitions. Statistical analysis used was the Annova multivariate statistical test and Linear Dummy Regression.

Based on the results of this study it is known that the average Aedes Aegypti mosquito mortality is greatest at 60 minutes. From the results of statistical tests show there are an effect of the effectiveness of various extra doses of Soursop soursop leaf (Annona Muricata) with tobacco leaf extract (Nicotianna tabacum) in controlling Aedes Aegypti mosquitoes (p-value = 0,000), while the variables that most influence on the death of Aedes Aegypti mosquitoes are extra soursop leaves Soursop (Annona Muricata) at a dose of 100 ppm (p-value = 0.006) and tobacco leaf extract (Nicotianna tabacum) at a dose of 150 ppm (p-value = 0.025)

Soursop leaf extract (Annona Muricata) at a dose of 100 and tobacco leaf extract (Nicotianna tabacum) at a dose of 150 ppm is the most effective dose used in controlling Aedes Aegypti mosquitoes if sprayed within 60 minutes or 1 hour. So that it can be developed as a vegetable insecticide in controlling Aedes Aegypti mosquitoes.

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INTRODUCTION

Indonesia is a tropical region and is one of the places for the development of several types of mosquitoes that endanger human and animal health. In humans, Anopheles mosquitoes act as vectors of malaria, while Culex as vectors of Japanese enchepalitis, Aedes aegypti as vectors of dengue, and several genera of mosquitoes namely Culex, Aedes, and Anopheles can also be vectors of filariasis. Mosquitoes also transmit several diseases in animals. Culex mosquito as a vector of Dirofilaria immitis (heart worms in dogs).

Dengue Hemorrhagic Fever is an acute fever and causes death and is caused by a virus that can be transmitted by mosquitoes. The mosquito originates from the Aedes mosquito which is widespread in tropical and subtropical regions throughout the world.

In Indonesia the number of Dengue Fever sufferers caused by the Aedes Aegypthy Mosquito is still high. According to data from the World Health Organization (WHO), Indonesia is the second country with the largest DHF cases among 30 endemic regions. In East Java cases of Dengue Fever sufferers increased in 2018 by 4758 cases while in 2019 to June as many as 16,063 cases. Likewise, the City of Kediri also experienced an increase in cases in 2018 by 157 cases while in 2019 up to June it was 209.

The Aedes aegypti mosquito has a fairly complex life phase with changes in form, function, and habitat. The life phase of a mosquito consists of four phases including: the egg, larvae, pupa and adult phases. The life phase of the mosquito is divided into two, namely the aquatic phase or in water which is the larval egg and pupa egg phase and the terrestial phase or on land that is when the adult phase.

Mosquito control can be done in many ways, including chemically and non-chemically. Mosquito control using insecticide chemicals is still the main choice by the community, because the results can be seen directly. The use of chemical insecticides on the one hand has many advantages, but the use of inappropriate dosages and methods of application, can have a negative impact on health and the environment. This is very likely the occurrence of environmental pollution due to the accumulation of active ingredients of chemical insecticides.

For this reason, it is necessary to develop the use of plant-based insecticides, which in addition to being cheap, generally have a strong toxicity to target insects and are less harmful to humans and are more environmentally friendly. Insecticides from plants (vegetable) include soursop leaves (Annona muricata) which contain active ingredients Annonain and Resin which function to kill pests and tobacco leaf extracts (Nicotianna tabacum) which contain Nicotin active ingredients that are insect repellent (repellent), which works by contact poison, stomach and respiratory poisons.

Based on the description above, the researcher wants to know the effect of plant-based insecticides in the form of soursop leaf extract which contains Annonain and Resin active ingredients and tobacco leaf extract (Nicotianna tabacum) which contains nicotin active ingredients to kill Aedes Agypthy mosquitoes as one of the vectors that cause disease.

METHODS

The study in this study used a True Experiment design research design. The population in this study was the Aedes Aegypti mosquitoes that had been bred using simple random sampling technique, as many as 625 Aedes Aegypti mosquitoes were sampled. The Aedes Aegypti mosquito was put into 10 observation boxes as many as 25 head for each box with 4 repetitions.

In this study, the variables studied were independent and dependent variables. The independent variables studied were soursop leaf extract (Annona muricata), tobacco leaf extract dose (Nicotianna tabacum), and spraying time (30, 40, 50, 60 minutes), while the dependent variable was the number of dead Aedes Aegypti mosquitoes.

Data processing is done by editing, by checking the data obtained. Coding is done by giving a code on each characteristic. The next process is data analysis. The statistical analysis used was Anova multivariate statistical test and Linear Dummy Regression.

RESULTS

The sample used was aedes aegypti mosquito. The mosquitoes are put into a breeding box with a size (50cm x 50 cm x 50 cm) which contains 3 bowls of water placed in 3 bowls. After 3 days the mosquito

is removed from the box. If there is larvae, wait for 2 weeks so that the mosquitoes are ready to be made research and transferred to the treatment box. Mosquitoes used in the study were 7-day-old adult female mosquitoes. The number of mosquitoes that die after being sprayed by soursop leaf extract (Annona Muricata) and Tobacco leaf extract (Nicotianna Tabacum) can be seen in the table below:

Table 1. Number of Aegypti aedes mosquitoes that die after being sprayed with soursop leaf extract (Annona Muricata)

Dose	Time (minute)			
	30	40	50	60
50	23	28	31	35
100	4	7	12	18
150	4	7	10	13

Based on table 1 it is known that the number of Aedes Aegypti mosquitoes that die after being sprayed with Soursop (Annona Muricata) leaf extracts most dies at 60 minutes of spraying observations

Tabel 2. Jumlah Nyamuk aedes Aegypti Yang Mati Setelah Disemprot Ekstrak Daun Tembakau (*Nicotianna Tabacum*)

Dose	Time (minute)			
	30	40	50	60
50	15	19	27	36
100	19	26	28	30
150	7	15	19	25

Based on table 2, it is known that the number of Aedes Aegypti mosquitoes that die after being sprayed with tobacco extracts of Nicotianna Tabacum most died at 60 minutes of spraying.

Table 3. Effectiveness Analysis Results of various doses of Soursop (Annona Muricata) leaf extract with tobacco leaf extract (Nicotianna tabacum) in controlling Aedes Aegypti mosquitoes

Variable	Sig Value	Unstandardized Coefficients (B)	Sig
60 minutes	0,000	2.944	0,013
Tobacco Extract 150 ppm		-3.734	0,005
Soursop Extract 100 ppm		-3.672	0,006

Based on the results of data analysis using a Linnier Dummy regression statistical test with a degree of error of 0.05, a p-value of 0,000 <0.05 is obtained, then an alternative hypothesis is accepted, which means that there is an effect of the effectiveness of various doses of soursop leaf extract (Annona Muricata) with tobacco leaf extract (Nicotianna tabacum) in controlling Aedes Aegypti mosquitoes.
From the dosage of soursop leaf extract (Annona Muricata) with tobacco leaf extract (Nicotianna tabacum) obtained 2 significant variables namely soursop leaf extract (Annona Muricata) with a dose of 100 ppm with a significance of 0.006 and tobacco leaf extract (Nicotianna tabacum) with a dose of 150 ppm ith significance of 0.005. However, the variable that gives the strongest or most effective influence in killing Aedes Aegypti mosquitoes is soursop leaf extract (Annona Muricata) at a dose of 100 ppm because it has the greatest B value among other variables (-3,672). Which means soursop leaf extract (Annona Muricata) with a dose of 100 ppm is the most effective dose used in killing Aedes Aegypti mosquitoes If sprayed within 60 minutes or 1 hour

DISCUSSION

The results of the Linear Dummy Regression statistical test obtained a p-value of 0,000 <0.05, which means that there is an effect of the effectiveness of soursop leaf extract (Annona Muricata) extract with tobacco leaf extract (Nicotianna tabacum) in killing Aedes Aegypti mosquitoes. This is because the

content that is found in soursop leaves is annonain, flavonoids, saponins and tannins as active ingredients that can kill mosquito larvae (Kardinan, 2004). The saponin content in soursop leaves can inhibit the growth hormone Aedes aegypti, causing an abnormal development time. Annonain is an alkaloid compound which has physiological activity that is toxic to the stomach and can work as an inhibitor of the enzyme acetylcholinesterase so that it interferes with the central nervous system. Flavonoids are strong natural insecticides that have antifertility effects. Tannin is a secondary metabolite compound found in plants that has the function to disrupt larvae in food digestion, suppress appetite, growth rates and the ability of larvae to survive. So that the presence of these substances soursop leaf extract has a toxic effect when eaten by insects and can inhibit growth, affect the nervous system, reproductive development of insects, inhibit breathing which can cause death.

In this study, it was found that almost all Aedes Agypti mosquitoes died during spraying for 60 minutes or 1 hour from various doses of soursop leaf extract (Annona Muricata). Soursop leaf extract (Annona Muricata) cannot kill mosquitoes instantly like chemical insecticides in general. Because in the Soursop leaf extract (Annona Muricata) contains Annonain and Tannin compounds which have physiological activities that are toxic to the stomach, disrupt the central nervous system, can disrupt mosquitoes in digesting food, suppress appetite, and growth rates which can slowly cause death in mosquitoes. Therefore, mosquitoes affected by soursop leaf extract (Annona Muricata) cannot die immediately but it takes approximately 1 hour.

Tobacco leaf extract (Nicotianna Tabacum) contains toxic substances consisting of pyridine, formadelhid and nicotine. Pyridine is a colorless liquid with a sharp odor. This substance can be used to change the nature of alcohol as a solvent and a pest killer. Formaldehyde is a kind of gas with a sharp odor. This gas is classified as a preservative and pest control. This gas is also very poisonous to all living organisms. Nicotine is a nerve poison that reacts quickly (potent nerve poison) and is used in insect poisons that cause stimulation of the hormone kathelokamin (adrenaline) which is stimulating the heart and blood pressure. The highest concentration of nicotine is found in twigs and leaf bones. Tobacco leaf extract (Nicotianna Tabacum) is repellent (insect repellent) that works by poisoning stomach and respiratory contact, and is systemic. Tobacco leaf extract (Nicotianna Tabacum) that is sprayed on direct contact with mosquitoes will cause death for mosquitoes.

From the dosage of soursop leaf extract (Annona Muricata) with tobacco leaf extract (Nicotianna tabacum) obtained 2 significant variables namely soursop leaf extract (Annona Muricata) with a dose of 100 ppm (d2) with a significance of 0.006 and tobacco leaf extract (Nicotianna tabacum) with a dose 150 ppm (d6) with a significance of 0.005. However, the variable that gives the strongest or most effective influence in killing Aedes Aegypti mosquitoes is soursop leaf extract (Annona Muricata) at a dose of 100 ppm because it has the greatest B value among other variables (-3,672). Which means soursop leaf extract (Annona Muricata) with a dose of 100 ppm is the most effective dose used in killing Aedes Aegypti mosquitoes if sprayed within 60 minutes or 1 hour. Soursop leaf extract (Annona Muricata) is more effective because it only requires a dose of 100 ppm which can effectively kill mosquitoes compared to tobacco leaf extract (Nicotianna tabacum) which requires a dose of 150 ppm in killing mosquitoes and has volatile properties. The higher the dose of the tobacco solution used, the more mosquitoes die, this is because the higher the dosage, the more insecticides contained in the tobacco leaf, so that it requires more doses to have fast and strong killing power.

CONCLUSION

1. There is an effect of soursop leaf extract (Annona Muricata) with tobacco leaf extract (Nicotianna tabacum) in killing Aedes Aegypti mosquitoes.
2. The most effective dose used in controlling Aedes Aegypti mosquitoes is soursop leaf extract (Annona Muricata) with a dose of 100 ppm and extract if sprayed within 60 minutes or 1 hour

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