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Effect of Dosage of Clover Leaf Extract (Syzygium Aromaticum) on Death of Mosquito Larva Culex Sp

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A B S T R A C T

The clove plant (Syzygium Aromaticum) is a medicinal plant that has various uses. One of its uses is as a biopesticide (larvicide). Clove leaves contain toxic substances for insects such as several chemical compounds eugenol, saponins, flavonoids and tannins. This research is an experiment, in terms of the aim of this research it is classified as verification research with the aim of determining the effect of clover leaf extract (Syzygium Aromaticum) dosage on the death of Culex Sp mosquito larvae. In this study, 5 containers were used, each container contained 10 larvae out of 150 larvae, 4 containers were given clover leaf extract at a dose of 5ml, 10ml, 15ml and 20ml in 1 container as a control (without treatment). The data obtained was tested using the Anova test. Data from statistical analysis research between 0 milli control (without treatment) with a calculated F value of 7.867 and this significant value is smaller than α=0.05, so the research hypothesis is accepted, meaning that with 3 repetitions with doses of 5ml, 10ml, 15ml and 20ml there is a significant effect in killing Culex Sp larvae. Clover Leaf Extract (Syzygum Aromaticum) can inhibit the growth of Culex Sp mosquito larvae.

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INTRODUCTION

Filariasis in Indonesia is a serious public health problem in Indonesia. Almost all areas of Indonesia are endemic areas for filariasis, especially Eastern Indonesia which has a higher prevalence. Filariasis (elephantiasis) is transmitted by mosquitoes. The main vector of filariasis is caused by filarial worms and transmitted by the Culex Sp mosquito. Three species of filarial worms that cause lymphatic filariasis are Wuchereria bancrofti, Brugia malayi, and Brugia timori (MOH RI, 2010).

In 2012, it was estimated that filarial worm larvae had infected more than 700 million people worldwide, of which 60 million people (64%) were in the Southeast Asia region. In Southeast Asia, there are 11 countries where filariasis is endemic and one of them is Indonesia. Indonesia, with the largest population and large area, has a complex filariasis problem. In Indonesia, three types of filarial worms (Wucheraria bancrofti, Brugia malayi, and Brugia timori) can be found (WHO in the Indonesian Ministry of Health, 2010).

1.4 billion people in 73 countries are at risk of being infected with filarial worms. Approximately 65% of those infected are in Southeast Asia, 30% in Africa, and the rest are in tropical areas. Lymphatic filariasis causes more than 25 million men with genital disorders and more than 15 million men with lymphoedema (WHO, 2013).

LITERATURE REVIEW

Filariasis in Indonesia is a serious public health problem in Indonesia. Almost all areas of Indonesia are endemic areas for filariasis, especially Eastern Indonesia which has a higher prevalence. Filariasis (elephantiasis) is transmitted by mosquitoes. The main vector of filariasis is caused by filarial worms and transmitted by the Culex Sp mosquito. Three species of filarial worms that cause lymphatic filariasis are Wuchereria bancrofti, Brugia malayi, and Brugia timori (MOH RI, 2010).

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Filariasis POMP coverage in 11 cities/districts in West Java Province in 2012, namely Bogor City (94.02%), Kab. Bogor (90.73%), Depok City (86.34%), Bekasi City (87.05%), Kab. Karawang (99.64%), Kab. Subang (79.84%), Kab. Bandung (78%), Tasikmalaya District (96.79%), two districts

have not been reported, namely Bekasi District and Kuningan District (West Java Provincial Health Service, 2012).

In 2009 in the Sagaranten sub-district area there were 36 people affected by filariasis (elephantiasis) while in the Curug Kembar area, there were 13 people affected by filariasis (Sukabumi District Health Service, 2009).

Transmission occurs because mosquitoes suck the blood of someone who is infected and spread to healthy people. The blood that mosquitoes suck contains worm larvae and will develop, after which the mosquito will bite until the larvae are left in healthy people. The mosquitoes that transmit filariasis larvae include the genus Culexs sp.

Culex Sp mosquitoes usually become active after sunset until before sunrise. These mosquitoes lay eggs and breed in ditches containing clean water, ditches containing domestic waste, and places where water pools above the ground. In general, control of mosquitoes as disease vectors is carried out using synthetic insecticides. However, continuous use of synthetic insecticides will cause environmental pollution, the death of various other living creatures, cause pests or larvae to become resistant, and can even cause gene mutations. Seeing the losses caused by synthetic insecticides, efforts are needed to find alternatives that are more effective in controlling mosquito populations. One alternative is biological control.

Cloves (Syzygium aromaticum) can be used for many things, including resistance to various pest attacks and diseases which are influenced by the content of secondary metabolite compounds. The essential oil content in clove leaves (Syzygium aromaticum) is 3.20% and the aromatic compound content called eugenol is 90.53%. Clove plants (Syzygium aromaticum) have the potential to kill Culex Sp mosquito larvae.

Efforts to control disease vectors naturally are in the form of biopesticides, namely by utilizing clove plants (Syzygium aromaticum) using the physical method of clove leaves (Syzygium aromaticum) by extracting vegetable simplicia as an environmentally friendly alternative for Culex sp mosquito larvicide.

Although there has been a lot of research on the use of Clove Leaf Extract (Syzygium aromaticum) as an insect killer. (16) researched clover leaf extract (Syzygium aromaticum) on Culex Sp mosquito larvae. Thus, this research was conducted to determine the toxicity effect of clover leaf extract (Syzygium aromatic) on Culex Sp larvae.

METHODOLOGY

This research is a type of explanatory research, namely explaining the relationship between variables through hypothesis testing. In terms of the aim of this research, it is classified as verification research which aims to check the correctness of the results of previous research, to find out the effect of clover leaf infusion extract (Syzygium aromaticum) as Mosquito Larvicide Culex sp.

According to (6) The population is the entire research subject. If someone wants to research all the elements in the research area, then the research is population research population study, or census. The research subject is where the variable is attached. Research variables are research objects. The research population was 150 Culex sp larvae filled into each container with 10 larvae.

According to (6) The sample is a portion or representative of the population studied. Even though what is being studied is a sample, the research results or research conclusions apply to the population, or the research conclusions are generalized to the population. The following are the research samples, among others:

1. The research sample consists of 5 containers
2. Then 4 containers are given clover leaf extract
3. Each container with doses of 5ml, 10ml, 15ml and 20ml
4. One container was not given clover leaf extract (as a control without treatment)
5. Each container is filled with 10 Culex sp larvae
6. Then observations were made with 3 times the number of repetitions.

The data collected was by counting the number of dead Culex sp larvae in each container. Observations were carried out for 30-90 minutes for a concentration of 5ml, 120-150 minutes for a concentration of 10ml, 180-240 minutes for a concentration of 15ml, 270-330 minutes for a concentration of 20ml, the number of dead larvae was counted in each dose determined. Dead larvae are larvae that float in containers and no longer show signs of life. The data obtained will be analyzed using the SPSS computer program (software) ANOVA TEST.

RESEARCH RESULT

The results of the research "Effect of Clove Leaf Extract Dosage (Syzygium aromaticum) on the Death of Culex sp Mosquito Larvae" are presented in table form as follows:

Univariate Analysis Results

Table 1. Number of Deaths of Culex Sp. Mosquito Larvae

Time	Repetition	Dose	∑ Death of Larvae	pH	Temperature
30 Minutes-330 Minutes	1 2 3	0ml (Control) 0ml (Control) 0ml (Control)	0 0 0	7	23℃
30 minutes 60 Minutes	1 2 3	5ml 5ml 5ml	4 3 6 $X_1 = 13$	7	23℃
90 Minutes	1	10ml	6		

	2 3	10ml 10ml	9 10 $X_2 = 25$	7	23℃
120 Minutes 130 Minutes	1 2 3	15ml 15ml 15ml	7 10 10 $X_3 = 27$	7	23℃
150 Minutes	1 2 3	20ml 20ml 20ml	9 10 10 $X_4 = 29$	7	23℃
			Jumlah (X) X = 94		

Based on the research results in the table above, treatments using clove leaf extract and those not using clove leaf extract have differences, namely the number of deaths of Culex Sp mosquito larvae within 330 minutes. By repeating 3 times with a concentration of 5 ml, 13 larvae can be killed. Meanwhile, a concentration of 10 ml can kill as many as 25, a concentration of 15 ml can kill as many as 27 larvae and a concentration of 20 ml can kill as many as 29 larvae. For the control without treatment (not using clove leaf extract) there was no death in Culex Sp mosquito larvae.

Bivariate Analysis Results

Table 2. Results of Anova Test Analysis of Treatment Doses of Clove Leaf Extract on Death of Culex Sp Larvae

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	62.933	4	15.733	7.867	.004
Within Groups	20.000	10	2.000		
Total	82.933	14			

Information Data obtained from SPSS 16.

From the table above, the calculated F value is 7.867 with this significant value being smaller than α=0.05, so the research hypothesis is accepted, meaning that with 3 repetitions with doses of 5ml, 10ml, 15ml, and 20ml there is a significant effect in killing Culex Sp larvae.

Based on the analysis of the ANOVA calculation results because it shows that H0 is rejected, and Ha is accepted, there is a difference, this test is continued with a Post Hoc test. The test compares the average numbers between treatment groups at the real level α=0.05 which can be seen in the following table:

Table 3. Comparative Analysis of Differences in Clove Leaf Extract Doses by Various Treatments

No	Treatment	Treatment	Average Difference	P-Value
1.	Control	5ml	5.667*	0.006
		10ml	1.667	1.000
		15ml	1.000	1.000
		20ml	0.333	1.000
2.	5ml	Control	-5.667*	1.000
		10ml	-4.000	0.061
		15ml	-4.667*	0.024
		20ml	-5.333*	0.010
3.	10ml	Control	-1.667	1.000
		15ml	4.000	0.061
		10ml	-.667	1.000
		20ml	-1.333	1.000
4.	15ml	Control	-1.000	1.000
		5ml	4.667*	0.024
		10ml	0.667	1.000
		20ml	-0.667	1.000
5.	20ml	Control	-0.333	1.000
		5ml	5.333*	0.010
		10ml	1.333	1.000
		15ml	0.667	1.000

- Based on the table above in the Post Host Analysis ANOVA test, in the 5 ml treatment with a p-value coefficient of 0.061 where the p-value <0.05, there is an effect of the 5 ml dose on larval death.
- In the 10ml treatment with a p-value coefficient of 0.061, there was an effect of the 10ml dose on larval death.
- In the 15ml treatment with a p-value coefficient of 0.024, there was an effect of the 15ml dose on larval death.
- In the 20ml treatment with a p-value coefficient of 0.010, there was an effect of the 20ml dose on larval death.

DISCUSSION

In this study, it can be seen from Table 5.1 above that based on the number of deaths of Culex Sp larvae, it proves that there is an influence of the dose of clove leaf extract (Syzygium aromaticum) on the death of Culex sp mosquito larvae in each treatment given clove leaf extract because clove leaf extract contains toxic substances for insects such as the chemical compounds eugenol and tannin, the bio-active compound eugenol which can inhibit the growth of Culex Sp mosquito larvae.

From research conducted by the author, clove leaf extract (Syzygium aromaticum) has been proven effective as a Culex Sp mosquito larvicide which can inhibit the growth and kill Culex Sp mosquito larvae. The

concentration of clove leaf extract (Syzygium aromaticum) given to each treatment by repeating it 3 times with a dose of 5 ml can kill 13 Culex Sp larvae. Meanwhile, a 10ml dose can kill 25 Culex sp larvae, a 15ml dose can kill 27 larvae and a 20ml dose can kill 29 larvae. For the control (not using clove leaf extract) there was no death in Culex Sp mosquito larvae.

Judging from the four concentrations above, it is very clear that there is a difference between the control without treatment and using the treatment which is shown in the results of the analysis using the SPSS computer program (software) The Anova test in Table 5.2, the doses of 5ml, 10ml, 15ml and 20ml give a calculated F value of 7.867 with a significance value 0.004 because the significance value is smaller than α=0.05, the research hypothesis is accepted.

From the results of the author's research entitled "The Effect of Clove Leaf Extract Doses (Syzygium Aromaticum) on the Death of Culex Sp Mosquito Larvae", the LD (Lethal Dose) required for the effective dose of clove leaves is use a 5ml dose of clove leaf extract, a dose of clove leaf extract 10ml, dose of clove leaf extract 15ml and dose of clove leaf extract 20ml.

CONCLUSIONS AND RECOMMENDATIONS

The results obtained from clove leaf extract with a treatment dose of 5ml using the Post Hoc Test, Anova Test obtained a P-Value of 0.024 where the P-Value < α = 0.05, so the research hypothesis was accepted.

The results obtained from clove leaf extract with a treatment dose of 10 ml using the Post Hoc Test, Anova Test obtained a P-Value of 0.061 where P-Value > α = 0.05 so the research hypothesis was rejected.

The results obtained from clove leaf extract with a treatment dose of 15 ml using the Post Hoc Test, Anova Test obtained a P-Value of 0.024 where the P-Value < α = 0.05 so the research hypothesis was accepted.

The results obtained from clove leaf extract with a treatment dose of 15 ml using the Post Hoc Test, Anova Test obtained a P-Value of 0.010 where the P-Value < α = 0.05, so the research hypothesis was accepted.

ADVANCED RESEARCH

For Educational Institutions, with the results of this research, it is hoped that it will add reading or reference materials to the library at the YAPKESBI Sukabumi POLTEKES.

For future researchers, with this research, it is hoped that it can explore other factors and phenomena that are thought to influence the reduction in the number of mosquito larvae through quantitative and qualitative studies.

For the community, for information to the public in efforts to improve sanitation to control mosquitoes by using Clove Leaf Extract (Syzygium aromaticum) as a biological insecticide because traditional control does not harm health, the material is easy to obtain and is environmentally friendly.

For information to the public in knowing that Clove Leaf Extract (Syzygium aromaticum) can be used as a botanical larvicide, as an alternative measure in effectively controlling the Culex Sp mosquito population

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