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RESEARCH ARTICLE

INFLUENCE OF EXTRACTS OF LEAVES OF YAM BEAN *(Pachyrrhizus erosus)* AGAINST THE DEATH OF THE LARVAE OF AEDES *AEGYPTI* sp.

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ABSTRACT

The mosquito Aedesaegypti is the vector of the disease dengue fever Dengue (DBD) which until recently was a public health problem in Indonesia. One of the efforts made in the eradication of the vector control was via DBD naymuk larvae of Aedesaegypti by using larvasida. Larvasida biodiversity derived from plants has the potential to control mosquito larvae, besides its use is secure against man. One of the biological larvasida that can be used is from the leaves of Yam bean (Pachyrrhizuserosus). From previous research that the leaf extract Yam bean (Pachyrrhizuserosus) could be mosquitos Anopheles aconitus larval lethal with a concentration 2.8771% at LC_{50}. This research aims to know the sejauhmana leaf extract Yam bean (Pachyrrhizuserosus) can be deadly mosquito larvae Aedesaegypti in various levels of concentration. As a variable in this study was the death of the larvae of the mosquito Aedesaegypti with free variables is a variation of the concentration of extract of leaves of Yam bean (Pachyrrhizuserosus). Sample research is the larvae of the mosquito Aedesaegypti in the instar III/IV relatip stable of outside influence as much as 30 larvae for each treatment. The treatments in this study by using aqueous leaf extract jicama with the respective concentrations of 2.0%, 4.0%, 6%, 8% and 10%, with 4 repetitions and a control without treatment. Analysis of the statistics used in this research is analisaregresi through the program SPSS 17 probit for windows. From observations of the larva, the number of known dead after emblazoned Yam bean leaf extract at concentrations of 2%, the highest 4 tails (16%) and the lowest was 2 tails (8%); the highest at 4% is the 7 tail (28%) and the lowest 4 tails (16%); the highest concentrations of 6% is the 12 tails (48%), the lowest 7 tail (28%); the highest concentrations of 8% is 21 tail (84%), the lowest 17 tail (68%); the highest at concentrations of 10% are 25 tails (100%) 21, the lowest tail (84%), at konrol there is no death. Analysis of examination results of probitmenunjukkan effective concentration on $LC_{50,}$ LC_{90} and LC_{95} with confidence interval (SK) acceptable i.e. 95%, respectively was 6.314%, and 10.104 11.179% with upper and lower limits. From this analysis biased note, the higher the concentration of extract of leaves of Yam bean, then the higher death rate larva Aedesaegyptisampai finally reached the maximum limit of the larva mortality rate.

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INTRODUCTION

The disease dengue fever Dengue (DBD) which is transmitted through the Aedesaegypti mosquito which is caused by dengue virus, entered into the blood circulation through the bite of mosquitoes of the genus Aedes. Savingakit of dengue fever is found in tropical and Subtropical climates in different parts of the world, especially in the humid rainy season. Who estimates every year there are 50 – 100 million cases of dengue virus infection du throughout the world. And in Indonesia, it is still a public health problem, can be seen the data sourced from Ditjen disease control and environmental health the Ministry of health in 2009 in West Java province case as much as 35,453 cases, while in 2010 it has been reported the deaths of as many as 35 people with a CFR of 1.35 in 12 Provinces in Indonesia. Up to now, there has been no vaccine or antiviral drugs for this disease. The most effective action to suppress epidemic dengue fever is to control the existence and wherever possible avoid dengue virus vectors. Control can be done by holding the population of Larval mosquito larva/Aedesaegypti in place of breeding. This effort can be done using larvasidalarvasida as an alternative vegetable started because are selective (not kill organisms not targeted, high power, eco-friendly and low-toxicity so that a higher level of security). One of the plants used are leaves of the Yam bean (Pachyrrhizuserosus) containing the active ingredient rotenon, saponins and flavonoida. Work as power has Rotenon barrier to metabolism and nervous system working slowly and depressant. Symptoms of poisoning is rotenon pepsinogen (not being able to eat), and

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especially of the death. The leaves of the Yam bean (Pachyrrhizuserosus) which isused in making the old leaves should extract, because based on the results of earlier researchby HantiWahyuningsih against larvae of the mosquito *Anopheles aconitus*old Yam bean leaves that give death a larger mosquito larvae when compared with the young leaves. The results of this study are expected to provide the choice of vector control efforts in disease dengue fever dengue through the use of vegetable larvasida from the leaves of Yam bean (Pachyrrhizuserosus).

RESEARCH METHODOLOGY

These studies arelaboratory-scale experiments, i.e. with a sample of larvae/plant in aedesaegypti larva/culture developed in a container in the laboratory, after the age of instar III/IV done retrieval with the amount as needed for research. Preparation of the research needed to support research activities, in this case that is prepare location research in the laboratory of a local Patient P2B2 PangandaranCiamis, jicama, leaf extract larvae of the mosquito aedesaegypti larva/spp, as well as supporting tools/material research. The population in this research is the seluspirit of the larvae of aedesaegypti spp. which instar larvae up to dibiakan III/IV. Minimum Sample required on this researchis sebanyak 25 larvae aedesaegypti spp. on each repetition in the instar III/IV. Based on the standards of the WORLD HEALTH ORGANIZATION for the study of Entomology in Malaria Entomology 3, Module of health RI Ditjen PPM & PLP2B2 Directorate in 2003.As for the repetition is done 5 times repetition based on the formula:

r (r-1) ≥ 3, where:t = treatment
r =repetition
then : 5(r-1) ≥ 15
5r – 4≥ 3
5r ≥ 20
r ≥ 4

This research was conducted In five treatment namely wrapping with extracts from the leaves of jicama with a concentration of 2%, 4%, 6%, 8% and 10% to water that has been grown larvae/larva from mosquitoes aedesaegypti spp. and one control without putting Yam bean leaf extract. While repetition is performed as many as four (4) times based on the formula above. Data collection performed is the primary data through measurements with 5treatment and 4 repetitions. Data collected processed through the editing process, entry and cleaning of data for rechecking the truth as well as the completeness of the data that has been signed in a computer program. The overall data processing is done by the program SPSS version 17for windows. Analisis data is performed by using statistical testsprobit regression analysis using program SPSS 17 for windows. To know the difference in meaning between the different concentration of leaf extract against larvae of death Yam bean/larva aegeypti Aedes spp. Then performed a test with probit regression analysis hypothesis testing (H_o) is: "there is no meaningful difference between the various Yam bean leaf extract concentration against the death of the larvae of Aedesaegypti larva/spp". Probit Regression is a regression analysis which is used to describe the relationship between the dependent variable and independent variable. The dependent variable (the variable response) commonly symbolized measurement scale Y dikotomus (binary) and independent variables (predictor variable) commonly symbolized measurement scale X that are dikotomus, polikotomus or continuous.

If : $\phi(x) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{1}{2}x^2\right)$

And if known :

	X
Y = 1	P (y = 1 | x)
Y = 0	P (y = 0 | x)

Then :

$$P(y = 1/x) = \int^{\beta_0+\beta_1 x} \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{1}{2}t^2\right)dt$$

=

$\Phi[\beta_0 + \beta_1 x]$

WithΦ[.] is a function of the standard normal distribution is komulatif.

$$\Phi^{-1}[P(y = 1|x)] = \Phi^{-1}[\Phi[\beta_0 + \beta_1 x]]$$

$$\Phi^{-1}[P(y = 1|x)] = \beta_0 + \beta_1 x$$

or $Z = \beta_0 + \beta_1 x_1$ with $Z = \Phi^{-1}P(y = 1 \mid x)$

In the same way if more than one free variable,

Then:$Z = X\beta + e$

With a Z is a variable that is not observed and our observations are:

Y = 1 if Z > 0
If y = 0 Z ≤ 0 with ε is the residual that is assumed to be Gaussian with mean zero and variance one (1).

The probability that Y_i = 1 from equation (2.1) are:

$$P(y_i = 1 \mid x) = \Phi(X_i\beta)$$

$$P(y_i = 0 \mid x) = 1 - \Phi(X_i\beta)$$

The RESULTS of the

The temperature of thespaceduring the study was6.7^{0}C, while the water temperature in the range of 24.8^{0}C up to 25.5 ^{0}C, the pH of the water in the rangeup to 7.09 7.90 with humidity 80.7% (Table 1).

From observations of the larva, the number of known dead after emblazoned leaf extractYam beanat concentrations2%, the highest4tail (16 %) and the lowest was 2tails (8 %); the highest at 4 % is the 7tail (28%) and the lowest 4tails (16%); the highest concentrations of 6 % is the 12tails (48%), the lowest 7 tail (28%); the highest concentrations of 8 % is 21tail (84 %), the lowest 17 tails (68%); the highest concentrations 10% is25tail (100%), the lowest 9tail (84%) on konrol no death so it does not need to be corrected (Table 2).

Table 1. The results of the measurement of the room temperature, water temperature, pH dan air humidity

Repetition	The concentration of	Room temperature (^{0}C)	Water temperature (^{0}C)	Ph	Humidity (%)
I	2%	26.7	25.4	7.3	80.7
	4%		25.3	7.14	
	6%		25.3	7.09	
	8%		25.1	7.14	
	10%		25.5	7.15	
	Control		25.2	7.9	
II	2%		25.1	7.3	
	4%		24.9	7.14	
	6%		25.1	7.09	
	8%		25.1	7.14	
	10%		25.2	7.15	
	Control		25.2	7.9	
III	2%		24.9	7.3	
	4%		24.9	7.14	
	6%		24.8	7.09	
	8%		24.8	7.14	
	10%		24.9	7.15	
	Control		25.1	7.9	
IV	2%		24.8	7.3	
	4%		24.8	7.14	
	6%		24.8	7.09	
	8%		24.8	7.14	
	10%		24.8	7.15	
	Control		25.1	7.9	

Table 2. The death of the Larva of mosquito *Aedes aegypti* before and after exposure to leaf extract jicama on treatment and control

Repetition	The initial number of larva	Death on the control	The death of the Larva After treatment of Yam bean leaf extract									
			2.00%		4.00%		6.00%		8.00%		10.00%	
			The total number of	%	The total number of	%	The total number of	%	The total number of	%	The total number of	%
1	25	0	3	12	7	28	12	48	17	68	21	84
2	25	0	4	16	6	24	10	40	19	76	25	100
3	25	0	2	8	4	16	7	28	21	84	24	96
4	25	0	2	8	4	16	7	28	17	68	22	88
Mean	25	0	2.75	11	5.25	21	9	36	18.5	74	23	92

To find out the relationship between the shape of the wrapping with various concentrations of extract of leaves of *Jicama* with a percentage of the death of j.emosquito ntik *Aedesaegypti* the dead, carried out an analysis of the *probit analysis*. This analysis is also used to calculate the concentration of extract of leaves of *Jicama* which are effective in killing the larva of mosquito *Aedesaegypti*. It is used in the analysis of concentration of *Yam bean* leaf extract that is 2%, 4%, 0.6%, 8% and 10% of the berinterval is equal to K = 2. Based onprobit analysiswith reference to the shape of the relationship, then the LC_{50} (concentration of extracts of leaves of *Jicama* which turn off turn off 50% larva), LC_{90}(turn off 90% larva) and LC_{95} (95% lethal larva), respectively 6th, 314%, 10.104%and 11179%. (annex 1).

DISCUSSION

The disease dengue fever Dengue (DBD) which is transmitted through the Aedesaegypti mosquito which is caused by dengue virus, entered into the blood circulation through the bite of mosquitoes of the genus Aedes. Savingakit of dengue fever is found in tropical and Subtropical climates in different parts of the world, especially in the humid rainy season. Who estimates every year there are 50 – 100 million cases of dengue virus infection du throughout the world. And in Indonesia it is still a public health problem. Control can be done by holding the population of Larval mosquito larva/Aedesaegypti in place of perindukan. This effort can be done using larvasidalarvasida as an alternative vegetable started because are selective (not kill organisms not targeted, high power, eco-friendly and low-toxicity so that a higher level of security). In principle the eradication of mosquitoes *Aedes aegypti* intended for disconnection of transmission chain of *DBD*, i.e. with the management of the environment (*environmental management*), the eradication in biology (*biological control*) and the eradication of chemically (*chemical control*). The method of eradication is chemically known is to use pesticides (insecticides), how it should be used in the home or outside the home, the application on the walls of the House or directly aimed at mosquitoes, spraying or fogging. One of the conditions to avoid terjangkitnya DBD, then for it is need for prevention. One way is by doing the cleaning puddles which allows the onset of *Aedesaegypti* larva which vector disease DBD. For it it is necessary efforts for the eradication of *Aedesaegypti*larva, which one with larvasida leaf extract *Jicama*. Where active substances in the leaves and seeds contain saponins and jicama flavonoida, besides the seeds also contain asiri oilsby means of work as a contact and stomach poison. From the analysis of the test results*probit*demonstrate effective concentration on $LC_{50,}$ LC_{90} and LC_{95} with confidence interval (SK) acceptable i.e. 95%, respectively were 6,314%10.104,% and 11179% with upper limits and lower. From this analysis can be known, the higher the concentration of extract of leaves of *Yam bean*, then the higher mortality rate of *Aedesaegypti* larva until it reaches the maximum limit of the larva mortality rate.

Conclusion

a. It was concluded, that the *Yam bean* leaf extract can kill larva *Aedes aegypti*. The higher the concentration of extract of leaves of *Yam bean*, then the higher mortality

rate of *Aedesaegypti* larva until it reaches the maximum limit of the larva mortality rate.

b. To be able to effectively kill 50% of the test, the larva then must use extract *Yam bean* leaves at concentrations 6,314%, on the concentration of 10.104% larva can kill 90%, as for effectively killing 95% test larva then must use the *Yam bean* leaf extract at concentrations 11,179%.

Advice

a. Further research needs to be done about the application of the use of Yam bean leaf extract so that can be used practically by the community.
b. Further research needs to be done from a type of vegetable material that can be used as a larvasida.

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