Larvacidal effect of papaya leaf extracts (*Carica papaya l.*) toward the larvae of *Anopheles aconitus* donits mosquitoes as an effort to prevent malaria disease in Rural Areas of Southern Konawe

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Abstract
The Provincial Health Office of Southeast Sulawesi in 2014 in Southeast Sulawesi stated that in South Konawe the case of malaria is still very high with the number of cases as many as 1,339 cases alkaloids, Flavonoids, Saponins, and Tanins contained in leaves C. Papaya can be used as an An larvicidal. Aconitus causes malaria. The purpose of the study was to investigate the effectiveness of papaya leaf extract (*C. Papaya*) as Larvasida to larvae of mosquito *Anopheles aconitus* with contact time 12 hours, 24 hours, 36 hours and 48 hours. This type of research is purely experimental with post test design only control group design. The sample is an An mosquito larvae *Anopheles aconitus* Instar III / IV of 25 in each of 4 treatment units and 1 control with 4 repetitions.The results showed that concentration of 0ppm (control), 125ppm, 250ppm, 500ppm, and 1000ppm, papaya leaf extract (*Carica Papaya* L) respectively caused larvae deaths of 0%, 8%, 16%, 40%, and 56% for 24 hours treatment, and 0%, 16%, 28%, 68%, and 96%, for 36 hours of treatment. Result of probit test obtained value of LC50 and LC90 at 24 hours equal to 657,278 ppm and 1209,82 ppm. at 36 hours at 424,086 ppm and 837,754 ppm. Kruskall-wallis test results show $p < 0.05$ so that it can be concluded there is a significant difference in the number of dead larvae between groups compared.The conclusion in this research is papaya leaf extract effective as larvasida to larvae of *Anopheles aconitus*.

Key words: *Anopheles aconitus*, Leaf extract of C. Papaya, larvacide.

Introduction

Alfias S. et al (2010) states that malaria is a disease caused by a protozoan parasite called plasmodium that can only be seen with a microscope. Malaria is transmitted from people to healthy people by Anopheles mosquitoes. One of the efforts made by the government to suppress the rate of transmission of malaria is by reducing the vector population density (mosquito larvae). One species of mosquito that plays a role in the spread of malaria is *Anopheles aconitus* mosquito. World Health Organization data in 2012 occurred 207 million cases of malaria and 627 thousand deaths. As many as 80% of cases and 90% of deaths occur in Africa and most deaths as many as 77% occur in children under 5 years.

Malaria is one of the most serious issues of public health problems in Bangladesh. Aravin et al (2013) conducted a study and stated that malaria endemic areas occur in 13 northern and eastern regions bordering India and Myanmar, 90% of morbidity and mortality rates occur in Rangamati, Bandarban and Khagrachari Regencies. The spread of malaria in Bangladesh is very complex and the most malaria-causing vector in this country is the *Anopheles Aconitus* Donits mosquito. Malaria Occurrence is still common, especially in Thailand. Among the many species of Anopheles, An. minimus and An. aconitus is the primary and secondary vector of malarial disease in Thailand. Aconitus (Celia) is one of the most distributed Anophelines in all of Thailand. According to Junkum Research in Jamil et all (2014), *Anopheles aconitus* mosquito besides being a malaria vector in Thailand, this mosquito has also become the biggest vector of malaria disease in Indonesia, Bangladesh and Malaysia.

Data of the health department of Republic of Indonesia (2015) mentioned that Malaria disease in Indonesia is still very high. In the book titled "Indonesia Health Profile 2012" published by the Ministry of Health of the Republic of Indonesia recorded the 2011 API is 1.75%, while the year 2012 is 1.69%. This causes malaria to be an important disease to be overcome.

Malaria is still a public health problem in Indonesia, where the development of malaria is monitored through Annual Parasite Incidence (API). The Provincial Health Office of Southeast

Sulawesi (2014) in Southeast Sulawesi stated that in South Konawe the case of malaria is still very high with the number of cases as many as 1,339 cases. The results of malaria program reports show that the number of clinical cases of malaria in Bima Maroa Public Health Center in 2014 was recorded as 16 people.
One of the efforts to eradicate and prevent the transmission of malaria can be done by controlling the vector of the disease. Efforts to control disease vectors can be done biologically in the form of a natural insecticide that is to memafaatkan poisonous plants against insects but has no impact on the environment or environmentally friendly and harmless to humans. Natural insecticides are safe to use because they are easily degraded in nature so they leave no residue in the soil, water, and air. Utomo et al (2010) state that in Indonesia has found 20 species of Anopheles which become malaria vector, one of them is Anopheles aconitus.
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According to research conducted by Fathonah on natural insecticides, the use of natural insecticides in Indonesia can be the right choice, because Indonesia has a variety of plants that have the potential as a natural insecticide. One of the herbs that can be used as a natural insecticide is Carica papaya. In the study of the Power of Killing of Plant Path Powdered Vegetable Seeds made by Utomo (2010), stated that Plants C. Papaya L is a potential plant as a natural insecticide, this is because the content of alkoloid, flavonoids and saponins contained therein can be used as a natural insecticide.
Papaya leaves contain active ingredients such as papain enzyme, carpain alkaloids, pseudo-carpain, glycosides, carposides, saponins, flavonoids, saccharose, dextrose and levulose. Of these ingredients, which have potential as an insecticide are enzymes papain, saponins, flavonoid alkaloids and carpain. According Kalimuthu (2011), These compounds cause various reactions in the body of the larvae so as to interfere with the growth and development of the larvae. Ethanol is a polar compound and can be used to dissolve various organic compounds that are not soluble in water. The use of ethanol solvent will facilitate the separation of the active ingredients contained within the papaya leaf.
The research of papaya leaf extract had been done by Ravichandra R, the result of his research proves that papaya leaf extract or Carica Papaya L can kill Culex quinquefasciatus mosquito larvae with highest mortality rate of 61.6% at 500 ppm concentration with 24 hours contact time. 93.3% at a concentration of 300 ppm within 48 hours of contact with the acquisition of LC50 and LC90 values found respectively of 80.56ppm, 380.67ppm, 60.89ppm and 150.75 (Ravichandran, et al 2014).
Research conducted by Wahyuni found that Carica Papaya leaf and seed extract at concentration 30, 60, 90. 120, 150 ppm, with 70% ethanol can kill Aedes aegypti mosquito larvae with 48 hours contact time with result of phytochemical analysis containing secondary compound metabolite like saponins and flavonoids that contain very high levels of toxicity to kill mosquito larvae.
Based on the data and the above researchers interested in conducting research on the Effectiveness of Killer Power Test of Papaya Leaf Extract (Carica Papaya L.) Against *Anopheles Aconitus* Donits Mosquito larvae as Malaria Prevention in rural areas of South Konawe District.

Method

The type of research used is Experimental research with post test only control group design design. The group was divided into two randomly drawn sections, the experimental group and the control group. Treatment was only in the experimental group. The amount of treatment as much as 5 treatment at concentration 0 ppm (control) 125ppm, 250ppm, 500ppm, and 1000ppm. As for the control group was not given papaya leaf solution (*Carica papaya*) or concentration of 0 ppm, and only used as a control. After a predetermined time observation the number of larvae of *An mosquitoes. Aconitus* was killed in the experimental group and the control group.
This research was conducted from May to August 2017 by taking 12 hours, 24 hours, 36 hours and 48 hours for observation observation of mosquito larvae mortality. The research was carried out in the Laboratory of Analytical Unit, UPT Integrated Laboratory of Halu Oleo University. The population is the instar larvae III / IV *Anopheles aconitus* as many as 500 heads are obtained from the rice fields. Selection of sample using Simple Random Sampling method, where sample taken at random.

Old papaya leaves are washed, then dried in a way diangin-aired indoors without exposure to direct sunlight. After drying, then weighed to obtain the final weight of the leaf that is in dry condition. The dried papaya leaves are then mashed with a blender.
Papaya leaf powder is then soaked (macerated) into a 2 liter ethanol solvent, then stand for 24 hours with 5 soaks. After 5 days, the blend of papaya leaf and ethanol is filtered to separate the extract solution with the dregs. The filtration results are fed into the evaporator or vacuum rotary evaporator to obtain a concentrated or viscous extract. The viscous extract is then inserted into a sterile bottle and covered with aluminum foil.
Some larvae are taken from container where the catch is taken from the rice field area in the countryside to be observed using a binocular microscope. Initial observations were made by Laboratory of Analytical Unit, UPT Integrated Laboratory to ensure that the larvae were larvae of Anopheles Aconitus Donits instrar III / IV mosquito larvae. Based on the observations made and after matching the characteristics of the larvae with the characteristics of *Anopheles Aconitus* Donits mosquito larvae, it can be concluded that the larvae originating from the rice field in the countryside is the larvae of Anopheles Aconitus Donits mosquitoes.
This research is divided into preliminary and final test. The preliminary test is performed to determine the range of concentration of test material that can kill the larvae which is then used as a benchmark on the final test. the research made 4 concentration range, that is 125ppm, 250ppm, 500ppm, and 1000ppm. Concentrations were selected based on previous studies and Repetition is done 4 times. The results research are processed and presented in the form of tables and graphs.
Data analysis to obtain LC50 and LC90 extract of papaya leaf ethanol against *Anopheles aconitus* larvaeis determined by Probit analysis. Probit analysis is an analysis of the organism's response to various concentrations of certain chemicals to produce a particular response or effect. The data analyzed was the mean percentage of deaths from four repetitions at each concentration.

Results
The temperature value of the media at each observation hour

Temperature measurements are performed at the beginning and end of the treatment. This is done to ensure that the death of the test larvae is not affected and caused by the indoor temperature.

Table 1. The temperature value of media at each observation hour

Origin of Extract	Concentration	Temperature (^oC) At Hour			
		12	24	36	48
	0ppm (Kontrol)	25	27	27	27
	125 ppm	25	27	27	27
Papaya Leaves (C. Papaya) With Solvent Ethanol	250 ppm	25	27	27	27
	500 ppm	25	27	27	27
	1000 ppm	25	27	27	27
	0ppm (Kontrol)	25	27	27	27
	125 ppm	25	27	27	27
Papaya Leaves (C. Papaya) With Solvent Aquades	250 ppm	25	27	27	27
	500 ppm	25	27	27	27
	1000 ppm	25	27	27	27

The temperature value of the media at each hour of observation can be seen that in Papaya Leaf (*C. Papaya*) with ethanol solvent in the control group and treatment at 12 o'clock that is 25^0C. whereas at 24, 36, and 48 hours in the control and treatment group were the same ie 27^0C. For papaya leaf (*C. Papaya* L) with Aquades solvent in the control group and treatment at 12 o'clock is also the same as the temperature on Papaya Leaves (C. Papaya) with ethanol solvent being 25^0C, and at 24, 36, and 48 hours in the control and treatment groups were 27^0C, respectively.

Table 2. Observation Treatment Group of Papaya Leaf Extract

Based on 24 Hour Observation Time

Deuteronomy	amount Larvae (n)	24 hour				
		0	125	250	500	1000
1	25		1	4	11	20
2	25		2	3	9	19
3	25		3	5	10	16
4	25		3	5	10	22
amount	100		9	17	40	55
Average Percentage (%)			2	4	10	14

Table 3. Observation Treatment Group of Papaya Leaf Extract

Based on 36 Hour Observation Time

Deuteronomy	amount Larvae (n)	36 Jam				
		0	125	250	500	1000
1	25	0	2	6	16	24
2	25	0	5	4	14	23
3	25	0	4	8	19	22
4	25	0	5	8	19	25
amount	100	0	16	26	68	94
Average Percentage (%)		0	4	7	17	24

Observation Result of Papaya Leaf Extraction Treatment Group Based on Observation Time It can be seen that in the control group (0 ppm) there was no larval mortality (0%). While in the treatment group at concentration 125 ppm, 250 ppm, 500 ppm, and 1000 ppm the number of dead larvae average successively at 24 hours ie 8%, 16%, 40%, and 56%, and at 36 hours at 16%, 28%, 68%, 96%, of all test larvae after treatment. For more details can be seen in the following graph.

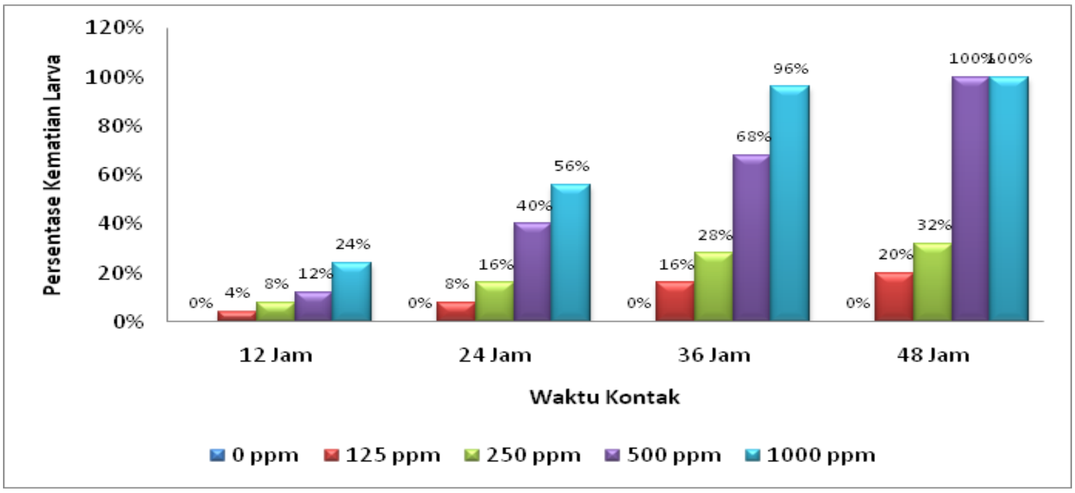

Figure 1. Graph of Percentage of Deaths of Mosquito larvae An. Aconitus After Treatment with Papaya Leaf Extract (*Carica papaya* L) Based on Observation Time

Probit Analysis

The results obtained by observation of treatment group of papaya leaf extract based on observation time in the form of cumulative percentage of death of larvae after 12 hours exposure, 24 hours, 36 hours, and 48 hours were analyzed by using probit test to know the value of LC50 and LC90 from papaya leaf extract (C. Papaya) especially on watu 24 hours and 36 hours after treatment. The results of probit test can be seen in the following figure.

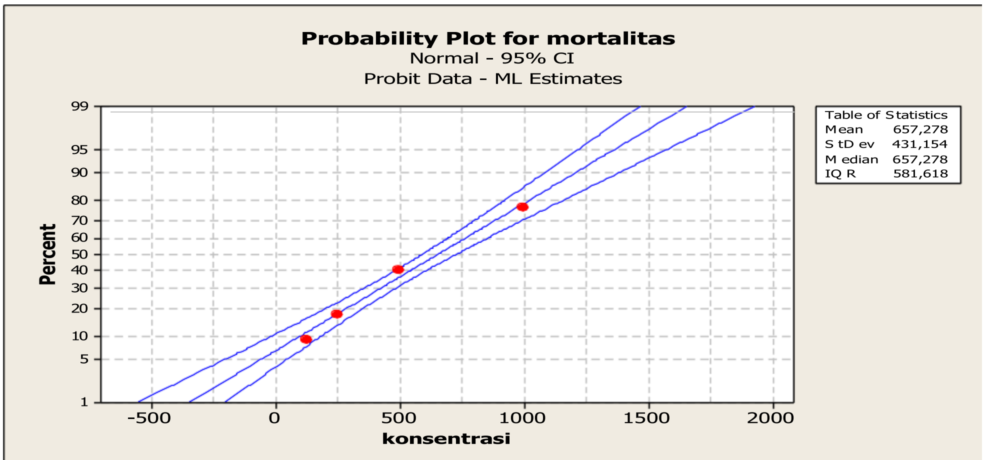

Figure 2. The larval mortality of Anopheles Aconitus Donits mosquito larvae within 24 hours

Based on the picture can be seen that the value of LC50 can be seen from the median value on the curve that is 657,278 ppm. In the picture shows that the greater the concentration of papaya leaf extract, the mortality of Anopheles Aconitus Donits mosquito larvae is also greater. The right curve shows the lower value curve, the middle curve shows the percetile curve and the left shows the upper curve of the data in the appendix. The probable percentage of death of Anopheles Aconitus Donits mosquitoes is in the range of concentration between the lower and upper curves. The increased concentration of papaya leaf extract led to an increased death of Anopheles Aconitus Donits mosquito larvae. This proves the death of Anopheles Aconitus Donits mosquito larvae caused by the toxic nature of papaya leaf extract. However, to find out more about the values of LC50 and LC90 can be seen in Table Values LC50 and LC90 Papaya Leaf Extract.

Table 4. The Value LC50 and LC90 Papaya Leaf Extract 24 Hours

	Leaf Extract Concentration (ppm)	**Lower**	**Upper**
C50	657.278	594.193	731.338
C90	1209.82	1085.58	1384.94

The result of probit test on mortality of test larva showed that the value of LC50 and LC90 (95% CI) at doses respectively 657,278 ppm in 300 ml aquades and doses of 1.209,82 ppm in 300 ml of aquadest, meaning that at a dose of 657,278 ppm in 300 ml aquades papaya leaf extract (C. Papaya L) can kill 50% of Anopheles Aconitus Donits mosquito larvae with lower limit of 594,193ppm and upper limit of 731,338ppm at 95% confidence level. At a dose of 1209.82ppm in 300 ml aquades papaya leaf extract (C. Papaya L) can kill 90% of Anopheles Aconitus Donits mosquito larvae with a lower limit of 1085.58ppm and an upper limit of 1384.94ppm at a 95% confidence level.

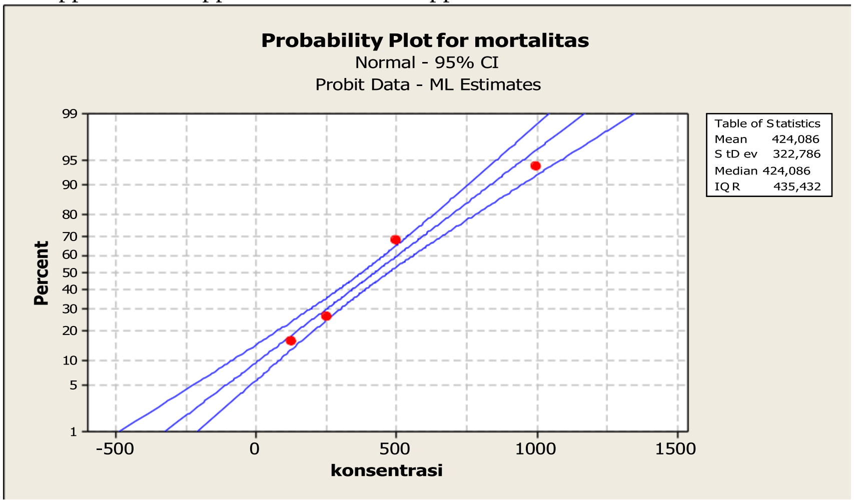

Figure 4. The larval mortality of Anopheles Aconitus Donits mosquito larvae at 36 hours

The value of LC50 can be seen from the median value on the curve of 424.086 ppm. In the picture shows that the greater the concentration of papaya leaf extract, the mortality of Anopheles Aconitus Donits mosquito larvae is also greater.

The right curve shows the curve of the lower value, the center curve shows the percetile curve and the left shows the upper curve of the data in the appendix. The probable percentage of death of Anopheles Aconitus Donits mosquitoes is in the range of concentration between the lower and upper curves. Increased concentration of papaya leaf extract led to increased deaths of Anopheles Aconitus Donits mosquito larvae. This proves the death of Anopheles Aconitus Donits mosquito larvae caused by the toxic nature of papaya leaf extract. But to know more about the value of LC50 and LC90 can be seen in the following table.

Table 5. Value of LC50 and LC90 Papaya Leaf Extract

Value	Papaya Leaf Extract Concentration (ppm)	Lower	Upper
LC50	424,086	77,374	473,409
LC90	837,754	756,479	948,990

Based on probit test to death rate of test larvae, obtained value of LC50 and LC90 (95% CI) respectively at dose 424,086 ppm in 300 ml aquades and dose 837,754 ppm in 300 ml aquades, meaning that at a dose of 424,086 ppm in 300 ml of aquadest extract of papaya leaf (C. Papaya L) can kill 50% of Anopheles Aconitus Donits mosquito larvae with a lower limit of 377.374ppm and an upper limit of 473,409ppm at a 95% confidence level. At a dose of 837,754 ppm in 300 ml aquades papaya leaf extract (C. Papaya L) can kill 90% of Anopheles Aconitus Donits mosquito larvae with a lower limit of 756,479ppm and an upper limit of 948.990ppm at a 95% confidence level.

One Way Anova Test

In addition to using the probit test, the results of this study were also analyzed by one way anova test to determine whether there is an average difference of death of Anopheles Aonitus mosquito larvae in various treatment groups which have normal distribution data requirement and homogeneous data variantIf one way anova test requirements are not met, then the one way anova test will be replaced by crucified-wallis test. Therefore, before conducting further tests on the difference in average death of Anopheles Aconitus Donits mosquito larvae in various treatment groups then first tested the data. One Way Anova test results can be seen in the following table.

Table 6. Normality Test Result of Death of Anopheles Aconitus Mosquito larvae By Kolmogorov-Smirnov

N	Kolmogorov-Smirnov Z	Asymp. Sig. (2-tailed)
16	.673	.755

Normality test is known from the value of Sig. (P-value) kolmogorov smirnov test. If the value p> 0,05 then it can be concluded normal distributed data. In The Table Normality Test Result of Death of Anopheles Aconitus Mosquito larvae By Kolmogorov- Smirnov, show that p> 0,05 (significant value 0,755 bigger than 0,05), so it can be concluded that the tested data meet the requirement of normality.

Table 7. Homogeneity Test Result of Death Variance of Anopheles Aconitus Donits

Levene Statistic	df1	df2	Sig.
4.997	3.	8	2 . 007

Homogeneity test results indicate that the significance value obtained is 0.007 (0.007 less than 0.05) it means that the data obtained have variants that are not the same or not homogeneous. Because the data is not homogeneous (condition of anova not fulfilled) hence this research continued with non parametric statistic method that is with kruskall-wallis test. Kruskall-wallis test results can be seen in the following table.

Table 8. Different Test Results Between Various Treatment Groups Against Anopheles Aconitus Mosquito Death With Kruskall-Wallis

	Mortalitas
Chi-Square	20.609
Df	3
Asymp. Sig	.002

Differentiation test between groups is known from Sig value. (p-value) test kruskall-wallis. If the value of p <0.05 then it can be concluded there is a significant difference in the number of dead larvae between groups that are compared. The result of kruskall-wallis test shows that p <0,05, so it can be concluded that there is a significant difference in the number of dead larvae between groups compared. That is, there is a significant difference in the number of dead larvae between groups compared.

Discussion

The result data showed that the extract of papaya leaves ethanol (*Carica papaya*) has larvasid effect so it can kill the larva of An mosquito. Aconitus. The higher the concentration of papaya leaf ethanol extract the higher the presentation of larval death.

This larvicidal effect is caused by the active compound components contained within the papaya leaf are alkaloids, saponins, flavonoids, and papain enzymes. Efek larvasida ini disebabkan oleh komponen senyawa aktif yang terkandung di dalam daun pepaya yaitu *alkaloid, saponin, flavonoid, dan enzim papain*. The alkaloid compounds found in papaya leaves are karpain alkaloids. Alkaloid compounds work by inhibiting the activity of the enzyme asetylcholinesterase which affects the transmission of nerve impulses, causing the enzyme to undergo phosphorylation and become inactive. This leads to inhibition of the acetylcholine degradation process resulting in the accumulation of asetylcholine in the synaptic cleft. This condition causes a transmission disturbance that can lead to decreased muscle coordination, convulsions, respiratory failure and death (Chidozieh et al, 2014).

Observations have been made on Anopheles Aconitus Donits mosquito larvae in the treatment group, ie at concentrations of 125ppm, 250ppm, 500ppm, and 1000ppm seen begin to curl up and perform telescopic movements, ie upward movement of the water surface quickly. After 48 hours treatment found the dead larva with the body destroyed, floats and does not move when touched with the dropper drops.

The number of dead larvae varies at each treatment concentration. In general it can be concluded that the high concentration of the given concentration will affect the number of dead larvae.

These results indicate that at a concentration of 1000ppm the number of dead larvae average reaches 100%. So the higher the concentration of papaya leaf extract given, the greater the percentage of death of Anophele Aconitus mosquito larvae. This is in accordance with the larvacide effectiveness parameter according to WHO that larvaside concentration is considered effective if it can cause death of test larva between 10-95% which later used to determine the value of Lethal Concentration (LC) and Pesticide Commission that the use of pesticide is effective if it can kill test larvae as much as 90-100%.

According to Junkum, et al (2004), death of larvae during administration of papaya leaf extract occurs because of the substance contained in the papaya leaf. Some of them are enzymes papain, saponin, flavonoid, and tannin. Papain enzyme is a proteolytic enzyme that plays a role in breaking connective tissue, and has a high capacity to hydrolyze the exoskeleton protein by breaking the peptide bond in the protein so that the protein becomes disconnected.

Other compounds in papaya leaves that have a role as insecticide and larvacide are saponins. Saponin is a terpenoid compound that has the activity of binding sterol free in the digestive system, so that the decrease in the amount of free sterols will affect the process of skin turnover in insects (Sukadana *et al*, 2008). In addition, other contents in papaya leaf that potentially kill the larvae are tannins. The complex compounds resulting from the interaction of tannins with proteins are toxic or toxic which can play a role in inhibiting growth and reducing insect appetite through inhibition of digestive enzyme activity (Chen *et al*, 2012). Tanin has a sense that is sepat and has the ability to tanning the skin. Tannins are widely present in vascular plants, in angiosperms found especially in wood tissue. Generally tannin-containing plants are avoided by plant-eating animals because of its bitter taste.

Saponins are compounds that are similar to detergents and have the ability to damage cell membranes. These compounds are able to bind to proteins and lipids that make up cell membranes, causing structural changes of proteins and lipids.

According to Octavianus *et al,* (2014), changes in this structure will result in the reduction of surface tension and the occurrence of osmosis intracellular components so that the cell undergoes lysis.

Flavonoids are powerful inhibitors of the respiratory system. One of the derivatives of flavonoids is rotenon. Rotenone works by inhibiting respiratory enzymes between NAD + (coenzymes involved in oxidation and reduction in metabolic processes) and coenzyme Q (the respiratory coenzyme responsible for carrying electrons in the electron transport chain) resulting in respiratory failure. Papain is a proteolytic enzyme that proceeds deeply solving network bind. When this papain enzyme into the body of the larvae will affect the body's metabolism process where there is a chemical reaction that can cause inhibition of growth hormone so that the larvae can not develop properly and over time can cause death in larvae (Hadi & Soviana, 2012).

In a study of the effectiveness of papaya leaf extract ever conducted by Oladimeji, et al, found that at a concentration of 5% (5000 ppm), the extract killed 40% of Anopheles gambiae larvae within 12 hours, at 24 hours dead larvae of 50%. While at a concentration of 10% (10,000 ppm), the larvae died by 70% within 12 hours, and 80% of larvae died within 24 hours (Komal & Arya, 2013).

Another research using papaya leaf ethanol extract as an insecticide against Anopheles sp mosquito larvae was done by Rahman which was proved by experimental result of research on high concentration of papaya leaf extract that is 4000ppm, Anopheles sp larvae body was destroyed until not remaining. This is due to phenolic compounds that work to damage the cell membrane resulting in lysis in the body of the larvae (Hastuti, 2014). Other studies have also been conducted by Wahyuni, who found that *Carica Papaya* leaf and seed extract at concentrations of 30, 60, 90. 120, 150 ppm, with 70% ethanol can kill Aedes aegypti mosquito larvae with 48 hours contact time with phytochemical analysis secondary compound metabolites such as saponins and flavonoids that contain very high levels of toxicity to kill mosquito larvae (Wahyuni, 2014).

Another study conducted by Kalu, found that the LC50 value of papaya leaf extract for Anopheles larvae, sp at 38.34 mg / ml (38.340 ppm or 3.834%). Against this research used 70% ethanol solvent, whereas in this study the researchers used 96% ethanol solvent in the papaya leaf extraction process. In this study obtained the value of lethal concentration is smaller than the previous study, where this difference is caused by the use of different solvent concentration, the ethanol solvent properties are 70% more polar compared to 96% ethanol so as to attract secondary metabolite compounds having the same polarity as the solvent used, larva type used in this research is An. aconitus that is captured from natural habitats that live at an average temperature of $28^{o}C$, whereas in the Ola study was conducted on Anopheles gambiae larvae where Anopheles species live optimum at $30^{o}C$-$33^{o}C$. Thus, Anopheles gambiae larvae resistance is higher than that of Anopheles endurance tested in this study (Komal & Aria, 2013).

Conclusion

Based on the results of research that has been obtained, it can be concluded that: 1) The concentration of papaya leaf extract (C. Papaya L) is very effective as the cause of death of Anopheles Aconitus Donits mosquito larva especially at concentration 500 ppm and 1000 ppm; 2) The value of LC50 and LC90 papaya leaf extract (C. Papaya) based on probit test at 24 hours was 657,278 ppm and 1209,82 ppm and at 36 hours was 424,086 ppm and 837,754 ppm; 3) The result of Kolmogorov-smirnov analysis shows that p> 0,05. This means that the number of dead larvae between groups satisfies the normality test requirements. The result of kruskall-wallis analysis shows that p <0,05. means that there is a significant difference in the number of dead larvae between groups compared.

Therefore, it is suggested: (1) The results of this study are expected to be an alternative in larval control, especially Anopheles Aconitus Donits mosquito larvae as an eco-friendly vegetable insecticide because the content of pestisidiknya substances more quickly decompose in nature (biodegradable), so it does not cause vector resistance and is relatively safe for humans because the residue is easily lost; (2) a follow-up study to investigate the effectiveness of isolation of secondary metabolite compounds contained in papaya leaf extract as larvicidal to Anopheles Aconitus Donits mosquito larvae and other mosquito larvae, such as Culex, sp; (3) examined the effective duration for papaya leaf extract in killing mosquito larvae, tested the content of secondary metabolite compounds on parts of papaya plants on the same or different varieties of papaya, comparing different extraction methods in making extracts of papaya plants.

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