The 2nd Strada International Conference on Health
Kediri – East Java, Indonesia, August 28-29, 2020
https://thesich.org/sich2
DOI: 10.30994/sich2.v2i1.36

Effectiveness of Giving Red Lemongrass (Cymbopogon Citratus) as a Mosquito Aedes Aegypty Larvaside

Abu Naim[1], Indasah[2], Nurdina[2]
[1] *Master of Public Health Program, IIK STRADA Indonesia, Kediri, Indonesia*
[2] *IIK STRADA Indonesia, Kediri, Indonesia*
Corresponding author: abunaimragil@gmail.com

ABSTRACT

Background: Lemongrass plants contain phytochemicals, this is the content that has a medicinal effect. Among the chemicals considered to act as larvicides are Tannin and Saponin. The purpose of this study was to analyze the effectiveness of the administration of red lemongrass extract (Cymbopogon Citratus) as larvae of Aedes Aegypty mosquitoes.
Methods: The design of this study is a true post-test only design with the focus of the research directed to be to analyze the effectiveness of the administration of red lemongrass extract (Cymbopogon Citratus) as larvae of Aedes Aegypty mosquitoes with 3 types of samples namely 3ml, 4 ml & 5 ml applied with 100 milliliters of water 20 Aedes Aegypty mosquito larvae were given in each sample.
Results: The findings found a dose of 3 ml, at 5 minutes the administration of Red seray extract did not kill mosquito larvae and after 60 minutes the amount of death was 7 mosquito larvae. Dose 4 ml, at 5 minutes administration of Red Lemongrass extract, 1 larvae of mosquitoes died and after 60 minutes the death of 15 Aedes Aegypty mosquitoes was obtained. A dose of 5 ml, at 5 minutes of administration of Red Lemongrass extract, 1 Aedes Aegypty mosquito larvae died and after 60 minutes, 20 mosquito larvae were found. Statistical tests using One Way Anova, the value of 0.000 <0.05 can be concluded that the average number of dead larvae based on levels of red lemongrass extract (Cymbopogon Citratus) is significantly different and the average number of dead larvae based on the time of red lemongrass extract (Cymbopogon Citratus) is significantly different.
Conclusion: The results of this study can be a solution to the problem of increasing the rate of larval free (ABJ) in society at large and the community can cultivate red lemongrass and can be of high economic value as a community business opportunity.

Keywords: Aedes Aegyptus, red lemongrass, larvicide extract

BACKGROUND

Diseases caused by vectors still contribute to the incidence of infectious diseases in the world. WHO (World Health Organization) reports that 17% of infectious diseases are caused by vectors.1 Mosquitoes themselves are vectors that play a role in various diseases, including malaria, DHF (dengue fever), chikungunya.2 In the world, DHF at least infects 50-100 million people per year with up to 20 thousand deaths (WHO, 2012).

Mosquitoes are included in the sub-family Culicidae, family Culicidae (Nematocera: Diptera) is the main vector or infectious disease of arbovirus or arthropod-borne viruses. Worldwide there are more than 2500 species of mosquitoes although most of these mosquito species are not associated with viral diseases (arbovirus) and other diseases. The types of mosquitoes that become the main vector, usually are Aedes sp., Culex sp., Anopheles sp., And Mansonia sp (Sukowati, 2012).

WHO revealed that the larvicide chemical method is the best choice for use in disease situations and vector surveillance that shows a high risk in certain periods and areas with a high possibility of Extraordinary Events. At this time larvacide circulating in the community in several

large countries has been found in many cases of resistance and tolerance. This type of pesticide or larvicide is currently widely used in controlling Ae larvae. aegypti is a temefos (organophosphate). In Indonesia, in Jakarta and Surabaya, resistance cases have been found (Abidatun, 2013).

Lemongrass plants (Cymbopogon citratus) are tropical plants that are often found, especially in Indonesia. People often use this plant as an ingredient in soups, salads, and beverage ingredients. In some previous studies, this plant has the ability to bactericide several bacteria such as Bacillus subtilis, Escherichia coli, Staphylococcus aureus, Salmonella paratyphi, Shigella flexneri. In addition to bacteria, this plant also has the ability as a larvicide against mosquito larvae (Nugroho, 2011).

Lemongrass plants contain phytochemicals, this is the content that has a medicinal effect. The phytochemical content in kitchen lemongrass extracts are Alkaloids, Saponins, Tannins, Anthraquinones, Steroids, Phenolic Acid (Caffeic and P-coumaric derivatives), and Flavone glycosides (Apigenin and Luteolin derivatives). Among the chemicals considered to play a role as larvicides are Tannin and Saponin (Satriawan, 2014).

Based on the above conditions, the authors are interested in researching the effectiveness analysis of the extract of red lemongrass (Cymbopogon Citratus) as larvae of Aedes Aegypty mosquitoes.

METHODS

The analytical study used to measure the effectiveness of the administration of red lemongrass extract (Cymbopogon Citratus) as larvae of Aedes Aegypty mosquitoes. Analytic research is research that looks for influence between variables (Sastroasmoro, 2012). This research design uses a true post-test only design. The design of the True experimental post-test only design is an experimental study using a control group and the sample chosen is not random, with the type of test control design. This design involves one independent variable.

RESULTS

A. Number of Dead larvae

1. Amount of Aedes Aegypty mosquito larvae after being given 3 ml of Red Lemongrass Extract (Cymbopogon Citratus)

Tabel 1. Amount of Aedes Aegypty mosquito larvae after being given 3 ml of Red Lemongrass Extract (Cymbopogon Citratus)

Time (Minutes)	Number of Dead larvae				
	CC31	CC32	CC33	CC34	CC35
5 minutes	0	0	1	0	0
10 minutes	1	1	1	1	1
15 minutes	2	2	2	1	2
20 minutes	2	2	2	2	2
25 minutes	3	3	3	3	3
30 minutes	3	3	4	3	3
35 minutes	4	4	4	4	4
40 minutes	5	4	5	5	4
45 minutes	5	5	6	5	5
50 minutes	6	5	6	6	6
55 minutes	6	6	7	6	7
60 minutes	7	6	8	7	7
Larvae death	7	6	8	7	7

Based on table 1, the results show that in the five repetitions of the experiment with 20 Aedes Aegypty mosquito larvae, it was found that in 5 minutes the administration of Red lemongrass extract (Cymbopogon Citratus) obtained no larvae of Aedes Aegypty mosquito

that died and after 60 minutes the amount of death was 7 larvae. Aedes Aegypty mosquitoes and 13 Aedes Aegypty mosquito larvae left.

2. Amount of Aedes Aegypty mosquito larvae after being given 4 ml of Red Lemongrass Extract (Cymbopogon Citratus)

Tabel 2 Amount of Aedes Aegypty mosquito larvae after being given 4 ml of Red Lemongrass Extract (Cymbopogon Citratus)

Time (Minutes)	Number of Dead larvae				
	CC41	CC42	CC43	CC44	CC45
5 minutes	1	1	1	1	1
10 minutes	2	2	2	2	2
15 minutes	3	3	3	3	3
20 minutes	5	5	5	5	5
25 minutes	6	6	6	6	6
30 minutes	7	7	7	7	7
35 minutes	8	9	8	8	8
40 minutes	10	10	9	10	9
45 minutes	11	11	10	11	10
50 minutes	12	12	12	13	13
55 minutes	13	13	14	14	14
60 minutes	15	14	15	15	15
Larvae death	15	14	15	15	15

Based on table 2, the results show that in the five repetitions of the experiment with 20 Aedes Aegypty mosquito larvae, it was found that after 5 minutes administration of Red Lemongrass extract (Cymbopogon Citratus), there was found 1 larvae of Aedes Aegypty mosquito that died and after 60 minutes the amount of death was 15 mosquito larvae. Aedes Aegypty.

3. Amount of Aedes Aegypty mosquito larvae after being given 5 ml of Red Lemongrass Extract (Cymbopogon Citratus)

Tabel 3. Amount of Aedes Aegypty mosquito larvae after being given 5 ml of Red Lemongrass Extract (Cymbopogon Citratus)

Time (Minutes)	Number of Dead larvae				
	CC51	CC52	CC53	CC54	CC55
5 minutes	1	2	1	1	1
10 minutes	3	4	3	3	3
15 minutes	4	5	4	4	4
20 minutes	6	7	6	6	6
25 minutes	7	8	7	7	7
30 minutes	9	9	8	9	8
35 minutes	10	10	10	10	10
40 minutes	12	12	11	12	12
45 minutes	13	13	13	15	15
50 minutes	15	15	14	17	17
55 minutes	17	17	18	19	19
60 minutes	20	20	20	20	20
Larvae death	20	20	20	20	20

Based on table 3, the results show that in the five repetitions of the experiment with 20 Aedes Aegypty mosquito larvae, it was found that after 5 minutes of administration of Red Lemongrass extract (Cymbopogon Citratus), there was 1 larvae of Aedes Aegypty

mosquito that died and after 60 minutes the amount of death was 20 mosquito larvae. Aedes Aegypty and no leftovers.

B. Statistical Test Results

1. Number of Dead larvae Based on Red Lemongrass (Cymbopogon Citratus) Extracts Levels

a. ANOVA Test

Tabel 4 Anova Test of Dead larvae Based on Red Lemongrass Extract (Cymbopogon Citratus) Levels

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	428.133	2	214.067	917.429	.000
Within Groups	2.800	12	.233		
Total	430.933	14			

Based on statistical tests using One Way Anova, a value of 0.000 <0.05 can be concluded that the average number of dead larvae based on levels of red lemongrass extract (Cymbopogon Citratus) is significantly different.

2. Number of Dead larvae Based on the Time of Red Lemongrass Extract (Cymbopogon Citratus)

a. ANOVA Test

Tabel 5 Anova Test of Dead larvae Based on the Time of Red Lemongrass Extract (Cymbopogon Citratus)

ANOVA

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	1132.560	4	283.140	745.105	.000
Within Groups	7.600	20	.380		
Total	1140.160	24			

Based on statistical tests using One Way Anova, a value of 0,000 <0.05 can be concluded that the average number of larvae die based on the time of administration of red lemongrass extract (Cymbopogon Citratus) was significantly different.

DISCUSSION

Aedes Aegypty mosquito larvae after being given 3 ml of Red Lemongrass Extract (Cymbopogon Citratus)

Based on the results of the study, the results showed that in the five repetitions of the experiment with 20 Aedes Aegypty mosquito larvae, it was found that in 5 minutes the administration of Red lemongrass extract (Cymbopogon Citratus) obtained no larvae of Aedes Aegypty mosquito that died and after 60 minutes the amount of death was 7 larvae. Aedes Aegypty mosquitoes and 13 Aedes Aegypty mosquito larvae left.

Mosquitoes are included in the sub-family Culicidae, family Culicidae (Nematocera: Diptera) is the main vector or infectious disease of arbovirus or arthropod-borne viruses. Worldwide there are more than 2500 species of mosquitoes although most of these mosquito species are not associated with viral diseases (arbovirus) and other diseases. The types of mosquitoes that become the main vector, usually are Aedes sp., Culex sp., Anopheles sp., And Mansonia sp (Sukowati, 2012).

WHO revealed that the larvicide chemical method is the best choice for use in disease situations and vector surveillance that shows a high risk in certain periods and areas with a high possibility of Extraordinary Events (KLB). At this time larvacide circulating in the community in several large countries has been found in many cases of resistance and tolerance. This type of pesticide or larvicide is currently widely used in controlling Ae larvae. aegypti is a temefos

(organophosphate). In Indonesia, in Jakarta and Surabaya, resistance cases have been found (Abidatun, 2013).

Lemongrass plants (Cymbopogon citratus) are tropical plants that are often found, especially in Indonesia. People often use this plant as an ingredient in soups, salads, and beverage ingredients. In some previous studies, this plant has the ability to bactericide several bacteria such as Bacillus subtilis, Eschericia Coli, Staphylococcus aureus, Salmonella paratyphi, Shigella flexneri. In addition to bacteria, this plant also has the ability as a larvicide against mosquito larvae (Nugroho, 2011).

Lemongrass plants contain phytochemicals, this is the content that has a medicinal effect. The phytochemical content in kitchen lemongrass extracts are Alkaloids, Saponins, Tannins, Anthraquinones, Steroids, Phenolic Acid (Caffeic and P-coumaric derivatives), and Flavone glycosides (Apigenin and Luteolin derivatives). Among the chemicals considered to play a role as larvicides are Tannin and Saponin (Satriawan, 2014).

Red lemongrass (Cymbopogon Citratus) extract on Aedes Aegypty mosquito larvae that had been prepared by researchers in the research container. Previously, 5 containers were prepared and each given 100 ml of water, then each of them was put into 20 Aedes Aegypty mosquito larvae that the researchers had prepared. After that researchers added 3 ml of red lemongrass extract (Cymbopogon Citratus) to each study container. And observations were made every 5 minutes to see the number of Aedes Aegypty mosquito larvae deaths.

Based on the results of the study it was found that in the first 5 minutes most of the containers did not show the death of Aedes Aegypty mosquito larvae, even though in the third iteration there was 1 larvae of Aedes Aegypty dead. Over the time the Aedes Aegypty mosquito larvae death increased and at the 60th minute, a total of 7 Aedes Aegypty mosquito larvae died.

In the research process, there were leftovers from the death of Aedes Aegypty mosquito larvae which could be caused by a lack of strong levels of red lemongrass extract (Cymbopogon Citratus) which was applied to mosquito larvae. Researchers also conducted a cob test if 24-hour observations were made to find all Aedes Aegypty mosquito larvae were dead. If the average of mosquito larvae mortality rate every 5 minutes with water content compared with 100: 3 red lemongrass extract obtained an average of 0.58 deaths. The advantage of 100: 3 ml content is that the water used does not experience significant color changes so it is not much different from clear water in general.

Aedes Aegypty Mosquito larvae after being given 4 ml of Red Lemongrass Extract (Cymbopogon Citratus)

Based on the results of the study, the results showed that in the five repetitions of the experiment with 20 Aedes Aegypty mosquito larvae, it was found that after 5 minutes administration of Red Lemongrass extract (Cymbopogon Citratus), there was found 1 Aedes Aegypty mosquito larvae that died and after 60 minutes the amount of death was 15 mosquito larvae. Aedes Aegypty.

Lemongrass plants are believed to originate from Southeast Asia or Sri Lanka. This plant grows naturally in Sri Lanka, but can be planted in various soil conditions in the humid tropics, sufficient sunlight, and has relatively high rainfall. At present, lemongrass plants can be planted extensively in the tropics (Permadi, 2013).

Lemongrass plants have large roots. Its roots are short, rhizome root fibers. Lemongrass stalks clustered and tuberous, soft and hollow. The contents of the stem are tubers for the shoots and yellowish-white. But some are purplish or reddish-white. The trunk is rigid and easily broken and grows perpendicular to the ground (Permadi, 2013).

Mosquito larvicides are divided into 3 types based on their chemical compounds, namely inorganic, natural organic, and synthetic organic. Another classification of an insecticide is based on the way it enters the body of the insect, where stomach poison is eaten and absorbed from the digestive system; contact poison penetrates from the body wall; and respiratory toxins (fumigants) enter the body of insects from spiracles or breath pores (Pratiwi, 2012).

Red lemongrass (Cymbopogon Citratus) extract on Aedes Aegypty mosquito larvae that had been prepared by researchers in the research container. Previously, 5 containers were prepared and each given 100 ml of water, then each of them was put into 20 Aedes Aegypty mosquito larvae that

the researchers had prepared. After that, the researchers added 4 ml of red lemongrass extract (Cymbopogon Citratus) to each study container. And observations were made every 5 minutes to see the number of Aedes Aegypty mosquito larvae deaths. Based on the results of the study it was found that in the first 5 minutes most of the containers contained 1 larvae of Aedes Aegypty dead. With the length of time, the Aedes Aegypty mosquito larvae increased and in the 60th minute, a total of 15 Aedes Aegypty mosquito larvae died.

In the research process, there were leftovers from the death of Aedes Aegypty mosquito larvae which could be due to the strong levels of red lemongrass extract (Cymbopogon Citratus) applied to mosquito larvae. Researchers also conducted a trial if 24 hours of observation were observed that all Aedes Aegypty mosquito larvae died in only 3 hours. If the average mosquito larvae mortality rate every 5 minutes with water content compared with 100: 4 red lemongrass extract obtained an average of 1.25 deaths. The strength of the 100: 4 ml level is that the water used has experienced a color change, but from various reports, bathing water with red lemongrass bath is very good for the body where the body becomes fresher and healthier.

Aedes Aegypty mosquito larvae after being given 5 ml of Red Lemongrass Extract (Cymbopogon Citratus)

Based on the results of the study, the results showed that in the five repetitions of the experiment with 20 Aedes Aegypty mosquito larvae, it was found that after 5 minutes administration of Red Lemongrass extract (Cymbopogon Citratus), there was 1 larvae of Aedes Aegypty mosquito that died and after 60 minutes the amount of death was 20 mosquito larvae. Aedes Aegypty and no leftovers.

Lemongrass leaves are not stemmed. The leaves are rough, long, pointy, and have a distinctive odor. The leaves have rough and sharp edges. The bone bones are arranged parallel. The length of the leaves is around 50-100 cm while the width is approximately 2 cm. Thin flesh leaves and on the surface and at the bottom of the leaf there are fine hairs (Budiasih, 2011).

At present, stomach and respiratory poisons are no longer used as larvicides but as pesticides. The insecticide used as larvicide at this time is a contact poison. Inorganic contact poison is not used as larvicide because it causes serious pollution to the environment, such as mercury. Natural organic contact poisons, such as pyrethrum and alkaloids, are poisons in neuromuscular (Pratiwi, 2012).

Red lemongrass (Cymbopogon Citratus) extract on Aedes Aegypty mosquito larvae that had been prepared by researchers in the research container. Previously, 5 containers were prepared and each given 100 ml of water, then each of them was put into 20 Aedes Aegypty mosquito larvae that the researchers had prepared. After that, the researchers added 5 ml of red lemongrass extract (Cymbopogon Citratus) to each study container. And observations were made every 5 minutes to see the number of Aedes Aegypty mosquito larvae deaths. Based on the results of the study it was found that in the first 5 minutes most of the containers contained 1 larvae of Aedes Aegypty dead. With the length of time of Aedes Aegypty mosquito larvae death increased and in the 60th minute, a total of 20 Aedes Aegypty mosquito larvae died.

In the research process, there was no residue from Aedes Aegypty mosquito larvae, which could be due to the very high levels of red lemongrass extract (Cymbopogon Citratus) applied to mosquito larvae. If the average mosquito larvae mortality rate every 5 minutes with water content compared with 100: 5 red lemongrass extract obtained an average of 1.66 deaths. The excess of 100: 5 ml is the water used to change color but the content of the active substance in red lemongrass extract is felt good for body fitness when bathing using red lemongrass (Cymbopogon Citratus).

Number of Dead larvae Based on Red Lemongrass (Cymbopogon Citratus) Extracts Levels

Based on the normality test, the significance value is 0.610> 0.05 so that it can be concluded that the data contribute normally. Based on the homogeneity test, the significance value is 0.206> 0.05 so that it can be concluded that the data is homogeneous. Based on statistical tests using One Way Anova, a value of 0.000 <0.05 can be concluded that the average number of dead larvae based on levels of red lemongrass extract (Cymbopogon Citratus) is significantly different.

Various types of plants can be used as natural larvicides, where citronella (Cymbopogon nardus L) is one that can be utilized more content contained in the stems and leaves. The main content is in the form of citronella and geraniol, where citronella in citronella is toxic and will cause larval death because the larvae are constantly dehydrated (Aulung, et al. 2014).

Based on the research of Aulung et al. (2014), conducted in Jakarta, the results showed that LC50 at the 2nd hour and the 4th hour was 1.09% and 0.65% of Ae larvae mortality. aegepti, besides, Manurung, et al. (2013), reported that lemon juice with concentrations of 3% and 4% can protect 100% rabbits for 5 minutes from the bite of Ae mosquitoes. aegypti.

The results of this study indicate that the larval mortality is lower than the study conducted by Aulung et al (2014), and when compared with abate (temephos) that lemongrass powder has a significant ability to kill Ae larvae. aegypti although abate (temephos) can kill larvae faster, lemongrass can be a choice to replace abate. Aside from being used as a larvicide, fragrant lemon juice (Cymbopogon nardus L) can be used as a repellent by using a minimum concentration of 3% to protect 100% rabbits for five minutes from the bite of Ae mosquitoes. Aegypti (Nugroho, 2017).

The death of Aedes Aegypty mosquito larvae due to the application of red lemongrass extract (Cymbopogon Citratus) with three different levels caused a difference in each experimental dose. Of the three doses, it was found that at 60 minutes of the trial, at a dose of 3 ml a total of 7 larvae of Aedes Aegypty died, at a dose of 4 ml a total of 15 larvae of the Aedes Aegypty mosquito died and at a dose of 5 ml a total of 20 larvae of the Aedes Aegypty mosquito died all. So it can be concluded that of all the experiments conducted there were significant differences between the three samples, where the lowest Aedes Aegypty mosquito larvae were lowest at a dose of 3 ml and the highest Aedes Aegypty mosquito larvae at the 5 ml dose.

Number of Dead larvae Based on the Time of Red Lemongrass Extract (Cymbopogon Citratus)

Based on the normality test, the significance value is 0.627> 0.05 so that it can be concluded that the data contribute normally. Based on the homogeneity test, it is obtained the significance value of 0.200> 0.05 so that it can be concluded that the data are homogeneous. Based on statistical tests using One Way Anova, a value of 0,000 <0.05 can be concluded that the average number of larvae die based on the time of administration of red lemongrass extract (Cymbopogon Citratus) was significantly different.

In a study conducted by Mulyani in 2014 concerning granules of citronella oil as Aedes aegypti mosquito larvae, able to provide larvacide effect of 88.33% at a concentration of 49 ppm, 60% at a concentration of 42 ppm, and 41.67% at a concentration of 36 ppm (Mulyani, 2014). In a study conducted by Sastriawan in 2014 concerning the effectiveness of kitchen lemongrass (Cymbopogon citratus) as larvae of Aedes aegypti mosquitoes, was able to provide a larvicidal effect of 90% at a concentration of 2500 ppm, 50% at a concentration of 1250 ppm, and 42% at a concentration of 625 ppm (Sastriawan, A, 2014).

The ability of larvicides from red lemongrass extract is produced from several chemical compounds that are in the plant. The phytochemicals in red lemongrass are tannin and saponin. Tannins are phenolic compounds that can precipitate proteins. It is made up of bonds of polymers and oligomers. Tannin itself is in the leaves, buds, roots, stems, and seeds of plants. One of its functions is as a protective plant from insects (Antonello, 2014). It can precipitate protein. In larvae, this can inhibit the protein needed for larvae to grow, so that it can cause larvae to die (Yunita, et al, 2009). Saponins themselves can cause corrosion of the larval digestive tract walls due to the ability of saponins to damage the membrane, besides that saponins can also interfere with the lipid layer on the epicycles and the protein layer on the endocuticles, making it easier for toxic substances to enter the larval body (Widawati, et al, 2013).

The ability of larvicides from the extract of lemongrass kitchen is produced from several chemical compounds that are in the plant. The phytochemicals in kitchen lemongrass are tannin and saponin. Tannins are phenolic compounds that can precipitate proteins. It is made up of bonds of polymers and oligomers. Tannin itself is in the leaves, buds, roots, stems, and seeds of plants. One of its functions is to protect plants from insects.24 It can precipitate proteins. In larvae, this can inhibit the protein needed for larvae to grow, so that it can cause larvae to die (Yunita, et al, 2009). Saponins

themselves can cause corrosion of the larval digestive tract walls due to the ability of saponins to damage the membrane, besides that saponins can also interfere with the lipid layer on the epicycles and the protein layer on the endocuticles, making it easier for toxic substances to enter the larval body (Widawati, et al, 2013).

In a study conducted by Pratiwi (2012) regarding community acceptance of natural larvicides, 72% of respondents were unwilling to apply them in water reservoirs, especially in bathtubs and drinking/cooking water reservoirs. That is because the water that has been affected by lemongrass extract is no longer clear, smelly, so the respondents consider the water unfit for consumption, and are not classified as clean water.

The death of Aedes Aegypty mosquito larvae due to the application of red lemongrass extract (Cymbopogon Citratus) with three different levels and with different observation times found that there were differences in mortality in every 5 minutes of observation. Every 5 minutes or multiple times there was Aedes Aegypty mosquito larvae death which at a dose of 3 ml the average death every 5 minutes was 0.58, at a dose of 4 ml the average death every 5 minutes was 1.25, while at a dose of 5 ml the average death every 5 minutes is 1.66. The more concentrated or the higher the concentration, the longer the contact time can give a higher yield of killing power against the Aedes Aegypty mosquito larvae. So it can be concluded that there is a significant difference in each dose and time of repeated observation of Aedes Aegypty mosquito mortality which is applied to the application of red lemongrass extract (Cymbopogon Citratus).

CONCLUSION

1. With a dose of 3 ml, at 5 minutes administration of Red lemongrass extract (Cymbopogon Citratus) there were no Aedes Aegypty mosquito larvae that died and after 60 minutes the amount of death was 7 larvae of Aedes Aegypty mosquito and 13 larvae of Aedes Aegypty mosquitoes were killed.
2. With a dose of 4 ml, after 5 minutes of administration of Red Lemongrass extract (Cymbopogon Citratus), 1 Aedes Aegypty mosquito larvae died and after 60 minutes the amount of death was 15 larvae of Aedes Aegypty mosquitoes.
3. With a dose of 5 ml, after 5 minutes administration of Red Lemongrass extract (Cymbopogon Citratus), there was 1 larvae of Aedes Aegypty that died and after 60 minutes the amount of death was 20 larvae of Aedes Aegypty mosquito and there was no residue.
4. Based on statistical tests using One Way Anova, the value is 0.000 <0.05 so that it can be concluded that the average number of dead larvae based on levels of red lemongrass extract (Cymbopogon Citratus) is significantly different.
5. Based on statistical tests using One Way Anova, a value of 0,000 <0.05 can be concluded that the average number of dead larvae based on the time of administration of red lemongrass extract (Cymbopogon Citratus) was significantly different.

SUGGESTION

1. For Respondents

   It is hoped that the results of this study can be a solution to the problem of increasing the rate of larval free (ABJ) to the wider community and the community can cultivate red lemongrass and can be of high economic value as a community business opportunity.
2. For Further Researchers

   It is hoped that further researchers will need to deepen and add more research on the effect of giving citronella extract (Cymbopogon Citratus) as an invitro and invivo anti-hyperglycemia activity.
3. For Educational Institutions

   It is hoped that educational institutions can use the results of this study as input for learning in the effectiveness of the administration of red lemongrass extract (Cymbopogon

Citratus) as larvae of Aedes Aegypty mosquitoes and can be developed again for further research to make it more useful for readers and researchers.

CONFLICT OF INTEREST

There is no conflict of interest.

REFERENCES

Abidatun, M., I. (2013). Efektivitas biolarvasida minyak daun jeruk purut (citrus hystrix) terhadap larva instar iii nyamuk aedes aegypti. Fakultas Kedokteran Universitas Jember. Retrieved from http://repository.unej.ac.id/bitstream/handle/123456789/59391/Malfin%20Abidatun%20Istiana h.pdf;sequence=1.

Antonello, C. (2014). Tannins: fascinating but sometimes dangerous molecules. Retrieved from: http://poisonousplants.ansci.cornell.edu/toxicagents/tannin.html.

Aulung, A., Rahayu, S., N., Haque, A. (2014). Pengaruh Ekstrak Serai Wangi (Cymbopogon nardus L) terhadap Kematian Larva Aedes Aegypti. Majalah Kedokteran UKI; 30(2):43-7.

Budiasih K. (2011). Pemanfaatan Beberapa Tanaman yang Berpotensi sebagai Bahan Anti Nyamuk. Universitas Negeri Yogyakarta.

Dwi N., A. (2011). Kematian Larva Aedes Aegypti Setelah Pemberian Abate Dibandingkan Setelah Pemberian Serbuk Serai. Jurnal Kesehatan Masyarakat, 7(1): 91- 6.

Manurung, R., Chahaya, I., Dharma, S. (2013). Pengaruh Daya Tolak Perasan Serai Wangi (Cymbopogon nardus) terhadap Gigitan Nyamuk Aedes Aegypti. Jurnal USU. 2(1):1-9.

Mulyani, S. (2014). Granul minyak serai dapur sebagai larvasida nyamuk aedes aegypti. Traditional Medicine Journal,19(3):138-141.

Nugroho, D. (2011). Kematian larva aedes aegypti setelah pemberian abate dibandingkan dengan pemberian serbuk serai. Jurnal Kesehatan Masyarakat. 7(1): 91-96.

Permadi, I Gede W. (2013). Keanekaragaman Tanaman Obat sebagai Larvasida dalam Upaya Pengendalian Vektor Demam Berdarah Dengue. Jurnal Sains dan Teknologi Lingkungan, 5(1): 12-16.

Pratiwi, A. (2012). Penerimaan masyarakat terhadap larvasida alamai. Jurnal Kesehatan Masyarakat, 8(1): 88-93.

Sastriawan, A. (2014). Efektivitas Serai Dapur (Cymbopogon citratus) sebagai larvasida pada larva nyamuk aedes sp Instar III/IV. Jakarta: Universitas Islam Negeri Syarif Hidayatullah.

Sukowati, S. (2010). Masalah Vektor Demam Berdarah Dengue (DBD) dan Pengendaliaannya di Indonesia. Buletin Jendela Epidemiologi: 2(2): 26-30.

WHO. (2012). Global Strategy for Dengue Prevention and Control 2012-2020. World Health Organization. Retrieved from https://www.who.int/denguecontrol/9789241504034/en/.

Widawati, M., Prasetyowati, H. (2013). Efektifitas Ekstrak Buah Beta Vulgaris L. (Buah Bit) dengan Berbagai Fraksi Pelarut Terhadap Mortalitas Larva Aedes aegypti. Aspirator, 5(1): 23-29. doi 10.22435/aspirator.v5i1 Jun.3162.

Wurisastuti, T. (2013) Perilaku Bertelur Nyamuk Aedes aegypti pada Media Air Tercemar. Jurnal Biotek Medisiana Indonesia, 2(1): 25-31. Retrieved from http://ejournal.litbang.kemkes.go.id/index.php/jbmi/article/view/4188.

Yunita, E., A, Suprapti, N., H, Hidayat, J., W. (2009). Pengaruh ekstrak daun Teklan (Euptorium riparum) terhadap Mortalitas dan Perkembangan Larva Aedes Aegypti. BIOMA: 11-17. Retrieved from https://core.ac.uk/download/pdf/11703242.pdf.

KOMISI ETIK PENELITIAN KESEHATAN
HEALTH RESEARCH ETHICS COMMITTEE
INSTITUT ILMU KESEHATAN STRADA INDONESIA
INSTITUTE OF HEALTH SCIENCE STRADA INDONESIA

KETERANGAN LOLOS UJI ETIK

DESCRIPTION OF ETHICAL APPROVAL

"ETHICAL APPROVAL"

NOMOR : 2351/KEPK/X/2020

Komite Etik Penelitian Kesehatan Institut Ilmu Kesehatan STRADA Indonesia dalam upaya melindungi hak asasi dan kesejahteraan subyek penelitian kesehatan, telah mengkaji dengan teliti protokol berjudul :

Health Research Ethics Committee Institute of Health Science STRADA Indonesia in the effort to protect the rights and welfare of research subjects of health, has reviewed carefully the protocol entitled:

"Effectiveness of Giving Red Lemongrass (Cymbopogon Citratus) as a Mosquito Aedes Aegypty Larvaside"

Peneliti : Dr. Indasah, Ir.,M.Kes
Investigator

Nama Institusi : Institut Ilmu Kesehatan STRADA Indonesia
Name of Institution

Dan telah menyetujui protokol tersebut di atas.
And approved the above-mentioned protocol.

Kediri, 21 Oktober 2020

KETUA

KOMISI ETIK PENELITIAN KESEHATAN

Mohamad As'ad Efendy, S.Kep.,Ns.,M.Kep.

NIK : 13. 07. 12. 143