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## Toxicity of Chinaberry Leaf Purified Extract (*Melia azedarach L.*) and Creekpremna Leaf (*Premna serratifolia L.*) to *Aedes aegypti L* Larval Mortality

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### Abstract

*Aedes aegypti L.* is a vector of dengue fever. One of the efforts to eradicate dengue fever is by controlling the disease vector. The use of natural larvicides that are environmentally friendly is an option to replace chemical insecticides that have negative impacts on the environment. The aim of this study was to compare the toxicity of purified extracts of *Melia azedarach L.* (Mindi) and *Premna serratifolia L.* (Daun Buas-Buas) on the mortality of *Aedes aegypti L.* mosquito larvae. The sample used in this study ranged from 600-700 *Aedes aegypti L.* mosquito larvae in each extract. The study used a completely randomized design (CRD) and the Minitab 14 for Windows application to perform the analysis. The results of the study showed that the toxicity of purified extracts of *Melia azedarach L.* (Mindi) and *Premna serratifolia L.* (Daun Buas-Buas) on the mortality of *Aedes aegypti L.* mosquito larvae was different. The LC50 value for purified extract of *Melia azedarach L.* was higher at 1265.93 ppm, while the LC50 value for purified extract of *Premna serratifolia L.* was lower at 1635.49 ppm

**Keywords:** Toxicity of Chinaberry Leaf, *Melia azedarach L.*, Creekpremna Leaf, *Aedes aegypti L* Larval Mortality

### Introduction

Dengue Hemorrhagic Fever (DHF) is a disease that caused by the dengue virus that transmitted by the *Aedes aegypti L.* mosquito [6]. *Aedes aegypti L.* in its life cycle has the habit of breeding (laying eggs) in places that are waterlogged and not directly touch to ground, old tires that are flooded with rainwater, used cans and bottles, flower vases, bird drinking places, bamboo strips and so on. Dengue disease first appeared in the world in the 1780s occurring simultaneously in Africa, Asia and North America. This dengue case occurred for the first time in Indonesia in Surabaya in 1968, the number of cases was 58 people with 24 of them died [35]. Dengue Hemorrhagic Fever (DHF) is still a national health problem and often has the status of an extraordinary event with a fairly high number of cases in a number of regions. The highest dengue cases are found in Indonesia and always exist from year to year. Data on cases in 2018 and 2019 reported that dengue cases is increased. A total of 65,602 cases occurred in 2018, and an increase of 138,127 cases [9]. The incidence of dengue fever with a fairly high number of cases in endemic areas gave rise to various preventioz efforts that have been done. However, until now no cure or vaccine has been found for the prevention of DHF disease. So that the control of dengue disease depends on the control of the vector, namely the *Aedes aegypti L.* mosquito [30].

Several efforts have been made to eradicate cases of Dengue Hemorrhagic Fever (DHF), one of which is by using methods that are often used in the fight against *Aedes aegypti L.* is to use larvicide abate or themepos. From 1967 to the present, chemical insecticides are still the main choice in effort to eradicate the mosquito nests because they are considered more effective and the results can be seen in a relatively fast time [20]. However, the use of synthetic insecticides can be bad for human health, plant contamination, environmental pollution, ecological balance, and also cause insects to become resistant and can even cause gene mutations [14].

Ignorance of resistance, causes another negative impact because the insecticide residues used will enter the environmental system and reach the food chain until it returns to humans [26]. Accordingly it is necessary to develop new insecticides that are more selective, safe, and biodegradable in nature [27, 15]. Efforts that can be made are by utilizing surrounding plants as bioinsecticides or natural larvicides [5]. Using of plants as bioinsecticides is carried out by purified extraction process. This extraction process is an important initial step in plant research [4]. Using of purified extracts is an alternative that used to minimize the mass of an extract in the practical purpose of manufacturing the preparation pharmaceutically because some of the components contained can be reduced by the process. This is also to maintain some of the chemical content of extracts that have a synergistic effect so that they can maximize the treatment process.

This purification process can eliminate ballast substances such as fat, chlorophyll and others are non-polar, so that it can affect biological activity and still maintain its active compounds [10]. Purification of the extract will obtain a higher level of active chemical content than the crude extract because the purification of the extract will extract the components of the compound that have a therapeutic effect only and minimize the ballast substance from being extracted [2]. Utilizing of plants using purified extracts is a new step that has not been done much. Therefore, it is hoped that the use of purified extracts can produce greater toxicity of the extract as a repellent.

Plants that can be used as bioinsecticides are chinaberry leaves (*Melia azedarach* L.) and creek premna leaves (*Premna serratifolia* L.). The chemical content contained in chinaberry leaves are alkaloids, flavonoids, saponins, tannins, steroids. In a previous research by [28], chinaberry leaf granules (*Melia azedarach* L.) were declared insecticidal, because they produced secondary metabolites, namely triterpenoids and flavonoids. The content of secondary metabolites found in creek premna leaves (*Premna serratifolia* L.) such as flavonoids, alkaloids, tannins, steroids, saponins, terpenoids, and phenolics [33, 29]. Based on the content of secondary metabolites contained in the two plants, there are several compounds that are known to have larvicide activity, including alkaloids, flavonoids, tannins, and saponins [27].

According to Rijayanti (2014), secondary metabolite compounds have various mechanisms of action that work synergistically. Secondary metabolite compounds that are used as insecticides and can work synergistically are flavonoids, alkaloids, saponins, and tannins. Using of purified extracts in research is not only a new step that has not been widely carried out, but it is also expected that the compounds contained can have a synergistic effect that can increase the toxicity effect of purified extracts on the larvae of the *Aedes aegypti* L. When the two different toxic compounds are mixed together, it is possible that the mixture of active compounds is synergistic or antagonistic. This is amplified by the opinion of Prijono (1999) that in a plant extract, in addition to some of the main active compounds, there are usually also other compounds that are less active, but their presence can increase the overall activity of the extract (synergy). Synergistic means that both compounds can increase toxicity which is characterized by the smaller concentration value required to kill the larvae, while the antagonist means that both compounds cannot increase toxicity power.

Based on the background above, it is necessary to conduct a study with the title "Toxicity of Chinaberry Leaf Calcified Extract (*Melia azedarach* L.) and Creek Premna Leaves (*Premna serratifolia* L.) against *Aedes aegypti* L. Mosquitoes and their Utilization of New Bioinsecticides.

## 2. Methods

Research on the toxicity of extracts of chinaberry leaves (*Melia azedarach* L.) and creek premna leaves (*Premna serratifolia* L.) against mortality of *Aedes aegypti* L. mosquito larvae belongs to the experimental type of research. This study used a Complete Randomized Design (RAL). This research will be carried out at the Toxicology Sub-Laboratory of the Biology Education Study Program, University of Jember.

## Tools and Materials

Tools that used in this study were blenders, sieves, measuring cups, glass jars, spatulas, rotary evaporators, glass funnels, ovens, beaker glass, erlenmeyer, analytical scales, drip pipettes, object glass, shakers, plastic cups, plastic tubs, microscopes, cameras, cover glass, mortar, and pistils, refrigerators. Materials that used in this study were mindi leaves (*Melia azedarach* L.) and savage leaves (*Premna serratifolia* L.), gauze, aluminum foil, filter paper label paper, aquades, larvae of the late and early *Aedes aegypti* instar III mosquitoes, 96% ethanol, n-hexane and abate. Aquades are used as a habitat for larvae during the testing process as well as as negative control. Meanwhile, abate is used as a positive control and reference book instrument.

## Extraction of Chinaberry Leaves (*Melia azedarach* L.) and Creek Premna Leaves (*Premna serratifolia* L.)

Collecting Chinaberry leaves and Creek Premna leaves according to the criteria with fresh leaves and not get damage by parasites. Cut the leaves into small sizes to speed up the drying process. Drying until the dry weight of the simplicia is stable. The drying process also extends its shelf life so that simplicia is not easily damaged and maintains the quality of simplicia (Supriningrum et al., 2018). Grind using a blender until it becomes powder. Weighing leaf powder by 400 grams. Add 96% ethanol in a ratio of 1:5. Stir until homogeneous and then covered with aluminum foil. Leaving the solution extract mixture for 3x24 hours and stirring periodically (Manurung et al., 2020). Filter the maceration results using buncher funnel and filter paper to separate the deposits of mindi leaves and savage leaves with the maceration results. The maceration results are concentrated with rotary evaporator of 50°C 60 RPM so that a thick extract of mindi leaves and savage leaves is obtained. The extracts that have been successfully made are transferred in an extract glass and wrapped in aluminum foil and stored in the refrigerator to keep them in good condition.

## Purification of Viscous Extracts of Mindi Leaves (*Melia azedarach* L.) and Savage Leaves (*Premna serratifolia* L.)

The purification process begins by weighing the viscous extracts resulting from the extraction stage of Chinaberry leaves (*Melia azedarach* L.) and Creek Premna leaves (*Premna serratifolia* L.), then the extract is dissolved in 96% ethanol in a ratio of 1: 10 and put into a separate funnel. Then add n-hexane as much as 1: 1 to the split funnel do the shaking for about 1 minute, then let it stand until it forms 2 separate layers [18]. The n-hexane layer is separated, and

repetition is carried out until the n-hexane phase is clear. The solution resulting from the separation, namely the ethanol phase obtained, is then concentrated so that a purified extract is obtained [36, 2].

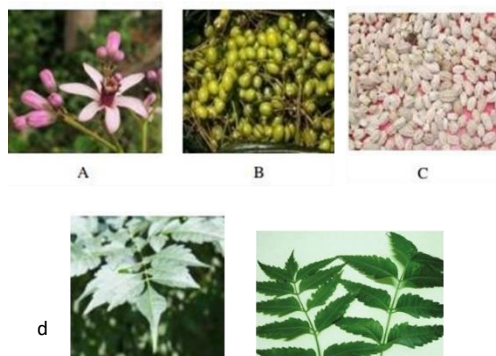


**Fig 1:** Morphology of (a) mindi flowers, (b) mindi fruit, (c) mindi seeds, (d) mindi leaves [17].



**Fig 2:** Leaves of the Buas-Buas [29]

### Preliminary Test Phase

Preliminary test stages were carried out to obtain concentrations of extracts of Chinaberry leaves (*Melia azedarach L.*) and Creek premna leaves (*Premna serratifolia L.*) which can kill the larva of *Aedes aegypti L.* by 5% and 95% of the number of tests. The first step is to fill several plastic cups with aquades as much as 100 ml, adding a purified extract of Chinaberry leaves (*Melia azedarach L.*) and Creek premna leaves (*Premna serratifolia L.*) with serial concentrations capable of killing *Aedes aegypti L.* mosquito larva by 5% and 95% from the test larva. Slowly inserting 20 larvae of the initial instar III to IV test into each plastic cup using a pipette, then closed using gauze then observing the number of test larvae that died within 24 hours by touching the flexible stem of the test larva and observed its movement after that recorded the number of mortality of *Aedes aegypti L.* mosquito larvae.

### Final Test Phase

The serial concentration that used in the final test is determined based on the results of the preliminary test. The final test was carried out by inserting 20 larvae of the *Aedes aegypti L.* mosquito in each concentration series and repeating 4 times in each concentration series. The final test stage uses abate positive control and negative control using aquades. The steps in the final testing phase are as follows filling plastic cups with 100 ml of water, adding a purified extract of Chinaberry leaves (*Melia azedarach L.*) and Creek Premna leaves (*Premna serratifolia L.*) using serial

concentration. Put twenty test larva into each glass using a pipette and close with gauze and then observe the mortality of the test larva for 24 hours. Recorded the number of test larval mortality and determined the magnitude of the LC50 value using probit analysis afterwards analyzed the results of the toxicity of the purified extract of Chinaberry leaves (*Melia azedarach L.*) and Creek premna leaves (*Premna serratifolia L.*).

### Data Analysis

There are several things analyzed in this study, namely: To determine the mortality percentage of *Aedes aegypti L.* mosquito larva due to toxicity of the purified extract of Chinaberry leaves (*Melia azedarach L.*) and Creek Premna leaves (*Premna serratifolia L.*) was calculated using the mortality formula as follows.

$$\text{Mortality} = \frac{(\text{number of death larva})}{(\text{number of test larva})} \times 100\%$$

If the death of larvae at control is 5-20% then a percentage correction is carried out using the Abbot formula:

$$A1 = (A - B) / (100 - B) \times 100\%$$

### Description

A1: Percentage after correction

A: Percentage of test larvae death

B: Percentage of control larval death

If the percentage of death larva at control is greater than 20% then the test is considered a failure or must be repeated. If more than 10% of the test larvae become pupae then the test must be discarded and repeated (WHO, 2005:11).

Determined LC50 within 24 hours of serial concentrations of extracts of Chinaberry leaves (*Melia azedarach L.*) and Creekpemna leaves (*Premna serratifolia L.*) using probit analysis. The software used is Minitab 20 for Windows.

### 3. Result and Discussion

*Aedes aegypti* Larval mortality is increasing with concentrations of extracts of Creek premnaleaves (*Premna serratifolia L.*) and Chinaberry leaves (*Melia azedarach L.*) Based on the research results that have been carried out, the average mortality of test larvae was obtained.

**Table 1:** Mortality (%) of *Aedes aegypti* Mosquito Larvae with Concentration of Purified Extract Savage Leaf (*Premna serratifolia L.*) with 24-hour unveil time

| Concentration<br>(ppm) | Aedes aegypti Mosquito<br>Larva Mortality (%) |    |    |     | Mean ± SD  |
|------------------------|-----------------------------------------------|----|----|-----|------------|
|                        | Deuteronomy                                   |    |    |     |            |
|                        | 1                                             | 2  | 3  | 4   |            |
| 700                    | 5                                             | 0  | 0  | 10  | 4 ± 4,787  |
| 1200                   | 20                                            | 30 | 20 | 25  | 24 ± 4787  |
| 1700                   | 55                                            | 60 | 60 | 55  | 58 ± 2,886 |
| 2200                   | 80                                            | 85 | 75 | 85  | 81 ± 4,787 |
| 2700                   | 90                                            | 95 | 95 | 100 | 95 ± 4,082 |
| Contrl                 | 0                                             | 0  | 0  | 0   | 0 ± 0,0    |

**Table 2:** Mortality (%) of *Aedes aegypti* Mosquito Larva with Concentration of Purified Extract Chinaberry Leaves (*Melia azedarach L.*) with Dedah Time 24 hours

| Concentration | Aedes aegypti Mosquito | Mean ± SD |
|---------------|------------------------|-----------|
|---------------|------------------------|-----------|

| (ppm)   | Larva Mortality (%) |    |     |    |            |
|---------|---------------------|----|-----|----|------------|
|         | Deuteronomy         |    |     |    |            |
|         | 1                   | 2  | 3   | 4  |            |
| 100     | 0                   | 10 | 0   | 5  | 4 ± 4787   |
| 548     | 25                  | 20 | 30  | 25 | 25 ± 4082  |
| 995     | 45                  | 50 | 55  | 40 | 48 ± 6,454 |
| 1448    | 75                  | 70 | 65  | 70 | 70 ± 4,082 |
| 1900    | 95                  | 95 | 100 | 95 | 96 ± 2,5   |
| Control | 0                   | 0  | 0   | 0  | 0 ± 0,0    |

The two tables above show that a concentration of 0 (control) was not found for larvae that died. In Table 1. It is known that the lowest mortality was found at a concentration of 700 ppm

**Table 3:** Differences in Probit LC50 Analysis Results of Toxicity of Creek premna Leaf Purified Extract with Mindi Leaf Purified Extract against *Aedes aegypti* Mosquito Larvae with an Unveil Time of 24 hours

| Lethal Concentration (LC <sub>50</sub> ) | LC <sub>50</sub> (ppm) | Lower Limit (ppm) | Upper Limit (ppm) |
|------------------------------------------|------------------------|-------------------|-------------------|
| Creek premna Leaf Purified Extract       | 1635,49                | 1530,06           | 1730,04           |
| Chinaberry Leaf Purified Extract         | 1265,93                | 1179,08           | 1346,35           |

Based on the results of the probit analysis in Table 3, it is known that the LC50 value with an unveil time of 24 hours against creek premna leaf extract is 1635.49 ppm, with a lower limit of 1530.06 ppm and an upper limit of 1730.04 ppm while the LC50 value with a dedah time of 24 hours against chinaberry leaves is 1265 ppm, with a lower limit of 1179.08 ppm and an upper limit of 1346.35 ppm.

#### 4. Discussion

Results and data analysis based on Tables 1 and 2 that the higher the concentration of extracts of creek premna leaves (*Premna serratifolia* L.) and chinaberry leaves (*Melia azedarach* L.) used in the treatment, the higher the mortality or mortality rate of *Aedes aegypti* L mosquito larvae. This is due to the content of toxic compounds contained in the purified extract. The higher the concentration of the solution, the more active substances that enter the body of the larvae so that the larva's resistance to solutes decreases and the larvae become more vulnerable, as a result of which there will be higher mortality [33].

Mortality of *Aedes aegypti* L. mosquito larvae based on Table 1 is known to be the lowest creek premna leaf purified extract (*Premna serratifolia* L.) at a concentration of 1700 ppm at 5%, at a concentration of 2700 ppm capable of causing larval mortality of 95%, and by 100% for 24 hours. This shows that the extracts of creek premna leaf purified extracts require high concentrations above 600 ppm to be able to kill the test larvae, which is much higher than the concentration required for chinaberry leaf extract to kill the test larvae.

Based on Table 2. Shows that the higher the concentration of chinaberry leaf purified extract (*Melia azedarach* L.) the higher the average mortality of *Aedes aegypti* L mosquito larvae. Death of the larvae of the *Aedes aegypti* L mosquito. The lowest was at a concentration of 100 ppm with an average mortality of 5%, while the mortality of *Aedes aegypti* L. mosquito larvae was the highest, namely at a concentration of 1900 ppm with an average mortality of 95%. In the negative control using aquades did not cause death with an average mortality of 0%, while in the negative control using abate caused death with an average mortality of 100% within 24 hours. This shows that chinaberry leaf purified extract is more toxic than creek premna leaf purified extract, because chinaberry leaf purification requires a lower concentration than creek premna leaf extract to kill larva.

with an average mortality of 5% and the highest average mortality at a concentration of 2700 ppm of 100%. In Table 2. Mortality was lowest at a concentration of 100 ppm at 5% while the highest at 1900 ppm was 100%. This shows that the toxicity of creek premna leaf extract and chinaberry leaf is different, where the toxicity of chinaberry leaf extract is higher than that of creek premna leaf extract. The data that obtained from the results of the study were analyzed using Probit Analysis to determine LC50, where LC50 is the concentration needed to kill 50% of the test larvae. The data from the probit analysis are presented in the following table.

Larval mortality in the next study was analyzed using probit analysis to determine LC50, where LC50 is the concentration that needed to kill 50% of the test larva. Based on probit analysis, it is known that LC50 from the creek premna leaf calcified extract is 1635.49 ppm with a lower limit of 1530.06 ppm and an upper limit of 1730.04 ppm (Table 3). Larval mortality for chinaberry leaf purified extract was also followed by probit analysis. Based on probit analysis, it is known that LC50 from Srikaya seed extract is 1265.93 ppm with a lower limit of 1179.08 ppm and an upper limit of 1346.35 ppm.

The difference in the toxicity of the purified extract of creek premna leaves and chinaberry leaves (Table.3) shows that the toxicity of the purified extract of creek premna leaves is lower than that of the purified extract of chinaberry leaves. The difference in toxicity is due to the different active compounds between the two purified extracts.

Based on previous research, the content of secondary metabolites that contained in the ethanol extract of creek premna leaves (*Premna serratifolia* L.) is flavonoids, alkaloids, tannins, steroids, saponins, terpenoids, and phenolics [33, 29]. In the study, ethanol extract was continued with purification using a non-polar solvent (n-hexane) to remove ballast substances that are still contain in the extract so that the extract that obtained is polar [22, 4]. So the results of the purification of the ethanol extract of savage leaves (*Premna serratifolia* L.) retain polar compounds, namely the alkaloid group, flavonoids, saponins, and tannins. These compounds are known to have larvicide activity, including alkaloids, flavonoids, tannins, and saponins [23]. Polarity in a substance in a solvent during extraction, polar compounds will only dissolve in polar solvents such as water and ethanol. According to Triana (2015) ethanol extracts are fractionated (liquid-liquid extraction) using n-hexane solvents and water. Thus, the compounds in the chinaberry leaf purified extract (*Melia azedarach* L.) contain polar compounds, namely flavonoids, alkaloids, saponins and tannins.

The mechanism of action of alkaloid compounds (carpaine) as larvicides acts as stomach poison and contact poison. Alkaloids enter the body of the larvae through absorption and degrade the skin cell membranes then enter inside to damage the cells and interfere with the work of the larval nerves by inhibiting the work of the enzyme acetylcholinesterase which breaks down the neurotransmitter acetylcholine into acetyl

Co-A and choline so that the larvae become convulsed, paralyzed, and even die. The occurrence of discoloration in the larval body to become more transparent and the larval body movement that slows down when stimulated by touch and always bends the body is also caused by alkaloid compounds [1].

Alkaloids also play a role in inhibiting the three main hormones in insects. The three main hormones that are inhibited are brain hormone, edicsonic hormone, and insect juvenile hormone. When insect growth hormone is inhibited, its growth will be disrupted and then die. Based on the results of observations during the test, the test larva showed symptoms of anxiety, one of which was the symptoms of poisoning due to alkaloid compounds. This compound causes the larva's body movement to slow down when stimulated by touch, as well as always bending the body. Symptoms of anxiety during observation were seen when compared to the control group, where the control larvae showed a resting state by being on the surface forming a certain angle.

Alkaloid compounds (carpaine) as larvicides act as stomach poisons and contact poisons. Alkaloids enter the body of the larvae through the absorption and degradation of the skin cell membranes then enter the inside to damage the cells and interfere with the work of the larval nerves by inhibiting the work of the enzyme acetylcholinesterase which breaks down the neurotransmitter acetylcholine into acetyl Co-A and choline so that the larvae become dry, paralyzed, and even die. The mechanism of action of alkaloid compounds by inhibiting the enzyme acetylcholinesterase or sodium bridge which plays a very important role in the nervous system and also acts as stomach poisoning or stomach poison if the compound enters the body of the larvae, the digestive apparatus will be damaged so that the larva die. Alkaloids also degrade cell membranes to enter and damage cells. The occurrence of discoloration in the larval body becomes transparent and the movement of the larval body that inhibits when stimulated by touch and always bends the body is also caused by alkaloid compounds [19].

Flavonoids work as respiratory inhibitors. Flavonoids have a way of working by entering the body of the larvae through the respiratory system which will then cause nerve disorders and damage to the respiratory apparatus and result in the larvae not being able to breathe. Due to the entry of flavonoid compounds through the siphon, it causes damage to the siphon so that the larva must align their position with the surface of the water to facilitate the oxygen intake process [23, 8].

Saponins have the ability when they enter the body in the form of larvae can cause hemolysis of blood vessels and can reduce the surface tension of the mucous membrane of the digestive tract of the larvae so that the walls of the digestive tract become damaged. Saponin compounds work as stomach poison, namely entering through the mouth (digestive system) and poisoning the larva. If saponins enter the body of the larvae, the digestive system of the larva will be disturbed. In addition, the larvicide activity of saponin compounds can reduce tension on the surface of the mucous membrane of the larva digestivus tract so that the walls of the digestive tract become damaged [32].

Saponins that enter the body of larva can interact with mucosal cells in the digestive tract and make them more permeable, thereby reducing the ability of the larval digestive tract to transport nutrients. Lack of nutrient intake, as a result of indigestion and the assimilation process, can decrease the

growth rate of such larvae [33]. There are research results that support this hypothesis because in the studies conducted, the test larvae tested after treatment lost much weight or shrank than the larva that became controls. In addition, the mechanism of action of saponins according to Taufiq et al., (2015) is by denatured proteins and enzymes inside the outer membrane and vulnerable cell walls, then binding to the cytoplasmic membrane so that it disrupts and reduces the stability of the cell membrane. This causes cytoplasmic fluid to come out of the cell resulting in cell death [31].

Saponins can also lower the surface tension of the skin of larvae as well as be able to bind free sterols in food digestion. So that the decreasing supply of sterols will interfere with the molting process in the larvae [25].

The tannin compounds contained function as larvicides, especially as stomach toxins because they can inhibit the activity of enzymes by forming complex bonds with proteins in enzymes and substrates that can cause indigestion and damage cell walls in larvae (Arimaswati et al., 2017). Tannin compounds will bind to proteins in the digestive system that the larvae need for growth which causes the process of protein absorption in the digestive system of the larvae to be disrupted. In addition, tannin compounds will cause a decrease in the activity of enzymoproteases in converting acidamino-acids. Tannin compounds can bind to the protease enzyme. The process of binding enzymes bound by tannins causes the work of these enzymes to be inhibited, so that the process of cell metabolism can be disrupted and the larvae will lack of nutrients. This results in the growth of larvae. If this process takes place continuously the growth of larvae will be inhibited and have an impact on the death of larvae [7]. Tannins have an effect that will lead to decrease in the activity of the protease enzyme in converting amino acids. The process of cell metabolism in the larvae of the *Aedes aegypti* L. mosquito can be disturbed, so the larvae will lack nutrients. In addition, this compound can also bind to proteins in the digestive system that larvae need for growth [13].

Research on the toxicity of chinaberry leaf and creek premna leaf purified extracts against the mortality of *Aedes aegypti* L. mosquito larvae showed that chinaberry leaf purified extracts were more toxic compared to creek premna leaf purified extracts. This is due to the presence of several active compounds found in chinaberry leaf purified extracts, namely flavonoid compounds, alkaloids, saponins and tannins and there can also be new compounds contained in chinaberry leaf purified extracts.

## 5. Conclusion

Based on the results of the study, it can be concluded that the amount of LC50 extracted from chinaberry leaves (*Melia azedarach* L.) is higher at 1265.93 ppm while the amount of LC50 extract is 1635.49 ppm.

## 6. Suggestion

It is necessary to conduct further research on the influence of environmental factors on the toxicity of mindi leaf and savage leaf purified extracts on *Aedes aegypti* L. mosquitoes. Further research can be done by measuring environmental factors such as humidity temperature, and it is also necessary to carry out further testing related to the KLT Test to determine the exact content of active compounds in the purified extracts of chinaberry leaves and creek premna leaves.

## 7. Acknowledgment

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### Conflict of Interest

Authors declare that they do not have any conflict of interest.

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