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COMBINATION OF ANNONA MURICATA LINN SEED AND CLOVE (SYZYGIUM AROMTICUM) SEED EXTRACT AS A BIOINECTICIDE AGAINST HOUSEHOLD COCKHOUSES (PERIPLANETA AMERICANA)

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ABSTRACT (10 PT)
Plants that are potential sources of plant insecticides, one of which is soursop. The active component of soursop seeds is acetogenin, which is considered to be larvicidal, and the azitogenin it contains is also an insecticide, acaricide, antiparasitic, and bactericidal agent. Another alternative to plants that can be used as herbal insecticides, besides soursop fruit seeds, is the clove leaf, which contains essential oil chemicals such as eugenol and other ingredients traditionally used to control cockroaches. The aim of the study was to determine the effect of soursop seed and clove leaf extract as a bioinsecticide in the control of vector cockroaches. This type of study is a real experiment with a research sample of 288 cockroaches. The results of this study showed that the extract of soursop seeds and clove leaves at a concentration of 80% caused the death of 14 cockroaches. The effectiveness level of soursop seed extract and clove leaves in the fight against domestic cockroaches is 80% concentration.

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1. INTRODUCTION

Cockroaches are insects that are considered unhealthy due to their proximity to humans and usually breed and feed in dirty places like garbage cans, sewers and *septic tanks*. They easily transmit the disease to humans. The causative agents of diseases that can be transmitted by cockroaches are various types of viruses, bacteria, protozoa, and helminths and fungi or fungi [1].

Cockroaches can transmit pathogens that are harmful to human health, such as *salmonella*. Namely, the pathogen that causes *salmonellosis*, *Mycobacteriun tuberculosis* is the pathogen that can cause tuberculosis, *Entamoeba histolytica* is the pathogen that causes dysentery, and *Escherchia coli* is the pathogen that can cause gastroenteritis. Cockroaches can also cause property damage as cockroaches are omnivorous and love a variety of foods. So cockroaches can eat and spoil everything around their habitat [2].

Cockroaches are insects from the *Elartidoe, Blatellidae, Cryptocereidae, Poyphagidac,* and *Biaberidae families*. Given the place where they live in dirty places and often touch food, cockroaches are potential carriers of diseases, especially food-borne or gastrointestinal diseases. Like mice, cockroaches live in dirty drains outside of toilets. trees or in the kitchen and bathroom [3].

According to the Decree of the Minister of Health of the Republic of Indonesia No. 374/MENKES PER/III/2010, vectors are living beings that must be controlled. Vector control can be carried out using 3 (three) vector control methods, namely physical and mechanical control, biology and chemistry. Soursop seeds contain many substances, including *anamuricin, annonacin, anomurine, atherospermine, kaklaurin, cogibin, panatellin, xylomacin, reticulin, sabadelin,* and *solamin*. Soursop seeds are also widely used as insecticides. The active ingredient in soursop seeds or the annonacae family is *acetogenin*, which is considered to be larvicidal. and the content of ingredients containing asitogenin also acts as an insecticidal, acaricidal, antiparasitic and bactericidal agent.

Several studies using soursop seed as a vector control agent have been done previously, including by Aurina Devi (2016) where soursop seed extract (*Annona muricata Linn*) is able to control vector cockroaches. Another study by Nelvi Susanti.dkk (2016) concluded that soursop (*Annona muricata Linn*) able to control the American cockroach (*Periplaneta Americana*) at a concentration of 80% with a 50% death of experimental cockroaches. Plants capable of being a plant insecticide, in addition to the seeds of the fruits of the soursop, include an extract of the leaves of the clove (*Syzygium aromacum*). The main component of clove oil contains the main active ingredient eugenol. Cockroach insects can be controlled with clove insecticides using eugenol, which is capable of imparting a characteristic aroma. A study by Nicky Suseno (2017) found that clove (*Syzygium aromatica*) leaf extract can cause death in the Periplaneta Americana cockroach [5].

Based on the above description, the researchers are interested in conducting research on the combination of soursop (Anonna Muricata Linn) seed and clove (Suzygium aromaticum) leaf extract as an herbal insecticide against cockroaches, titled "Effect of Soursop (Anonna Muricata Linn) Seed Extract and Extract clove leaves (Syzygium.ularumum) as a bioinsecticide against cockroaches (Periplaneta Americana). The aim of this study was to determine the effect of soursop seed extract (Annona muricata Linn) and clove leaf extract (Syzygium aromatica) as bioinsecticides in cockroach control.

2. RESEARCH METHOD

This type of study is a *real experiment*, namely, the grouping of the members of the experimental group and the control group is done randomly [6].The entire population in this study consisted of cockroaches that were collected by hand and using simple traps or purchased from bird dealers who sold cockroaches. The sample from this study was 288 cockroaches with the criteria of *Periplaneta americana* adult cockroaches that are still active. This study was carried out at the Vector Laboratory and the Microbiology Laboratory of the Tanjung Pinang Ministry of Health in 2018. The obtained data were presented in the form of a frequency distribution table and analyzed using a computer using *one wuy anova* or *the Kruskal-Wallis test* [7].

3. RESULTS AND ANALYSIS

3.1 Data Analysis

3.1.1 Univariate Analysis

Based on Table 1, the results of this study indicate no death of experimental cockroaches when treated or sprayed with a concentration of 20% soursop seed extract and clove leaves. When treated or sprayed with an extract of soursop seeds and clove leaves at a concentration of 40%, the number of dead cockroaches was greater with treatment I (First), which was 3, and with treatments, a decrease in the number of dead cockroaches was observed. or repetitions of II, III and IV. The number of dead cockroaches in the treatment/repetition [-1V with a concentration of 40% was 7 tails. Then, when treated or sprayed with an extract of soursop seeds and clove leaves with a concentration of 60%. the number of cockroach deaths was greater with treatment 1 (first), which was 5 tails, and there was a decrease in the number of cockroach deaths with treatment or repetition of II, III and IV. The number of dead cockroaches in Treatment/Repeat I_IV with a concentration of 60% was 13 tails. When processed or sprayed with an extract of soursop seeds and clove leaves with a concentration of 80%. the number of cockroach deaths in Treatment I (First) was 6 and it appeared that the cockroaches died at 60 minutes (1 hour after spraying), but in Treatments/Repeats II the number of cockroach deaths still decreased. , III and IV. The number of dead cockroaches in Treatment/Repetition I-IV with a concentration of 80% was 14 tails.

Based on the table above, the results of testing or treating/spraying soursop seed and clove leaf extracts that were sprayed directly on the body or thorax of the *Periplunetta Americana* cockroach can be described with the following description:

1. Concentration 20%

When treating/spraying the soursop seed extract and clove leaf extract with a composition of 0.5 ml of soursop seed extract and 0.5 ml of clove leaf extract, 20 ml of distilled water are added. After shaking until a homogeneous mass is obtained, spray on the body or chest of the test cockroach, which was first placed in the test box. Spraying is carried out by directing the sprayer at the body or chest of the cockroach, regardless of the distance and frequency of spraying. The researchers only tried to have the test cockroach's body completely exposed to the soursop seed and clove leaf extract until the extract dissolved in the aerosol can was used up.

At the moment of spraying, the cockroach's behavior looked restless, he ran back and forth like hot water, and tried to find a way out of the test box. Death at a concentration of 20% in experimental cockroaches did not occur. even when observed for 120 minutes, not a single experimental cockroach died, as in the 2nd-4th repetitions.

2. Concentration 40 %

When treated or sprayed with soursop seed and clove leaf extract, the composition includes 1 ml of soursop seed extract and 1 ml of clove leaf extract, to which up to 20 ml of distilled water is added. The behavior and condition of the experimental cockroach after spraying with extracts fell on the body and chest until all the solution in the sprayer was exhausted or dried. The process of death of cockroaches occurred 30 minutes after spraying, so

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the death increased in minutes, which lengthened. Observations were carried out up to 120 minutes. According to the results of processing or spraying at a concentration of 40%, the number of deaths of cockroaches *Periplaneta americana* was obtained as much as 7 tails, or an average of 0.55 tails.

3. Concentration 60 %

The 60% concentration is a combination of soursop seed and clove leaf extract with a formulation of 1.5 ml of soursop seed extract and 1.5 ml of clove leaf extract with up to 20 ml of distilled water added. The process of death of cockroaches was faster with treatment or spraying with a concentration of 60%, where the death of *Peripianetta americaa* cockroaches began at the 20th minute, and the number of deaths increased at the 30th minute and up to the 120th. when treated or sprayed with extracts at a concentration of 60%, the death of cockroaches *Periplaneta americana* is 13 tails or the average death is 1.08 tails.

4. Concentration 80 %

The 80% concentration was a combination of soursop seed and clove leaf extract with a composition of 2 ml of soursop seed extract and 2 ml of clove leaf extract with the addition of 20 ml of distilled water. The behavior and condition of the experimental cockroaches after spraying the extracts on their bodies and chest, the cockroaches ran very fast and tried to fly, then fell and turned over, as if under the influence of hot water, and quickly stopped and did not move anymore.

The process of death of cockroaches in the test box occurred from the 20th minute and, therefore, the number of deaths fell on the next minute. Even with option I, the experimental cockroaches completely died after 60 minutes or 1 hour after spraying. The number of deaths of experimental cockroaches in the treatment or spraying with a concentration of 80% in the treatment or repetition I-IV was 14 tails, or an average of 1.2 tails.

5. Positive control (synthetic insecticide)

During processing or spraying with various concentrations. The treatment was also carried out in the control group (+). Treatment was given to the control group (+), which tested positive for treatment or spraying with synthetic insecticides or, in this study, with baygon. The process of death of cockroaches Periplaneta Americana in the test box is faster. where, after a fairly short time, the cockroach looks in a panic, runs erratically back and forth, tries to fly and flaps its wings, then its body turns upside down, becomes weak and immobile again, which eventually dies. The process of death of cockroaches is fast, cockroaches die with convulsions and rigid conditions. In the positive control with repeats 1-4, the number of cockroach deaths was 60 with an average of 5 tails.

6. Negative control (Aquades)

When treated or sprayed with soursop seed and clove leaf extract at various concentrations, treatment or spraying was carried out in the control group (-) using distilled water. After that, spraying of the test cockroaches was carried out. The behavior of the cockroach Periplaneta americana varied back and forth in the test chamber, mainly to avoid being sprayed with distilled water. In this study, there were no cases of cockroach deaths in the URS box because the distilled water did not contain insecticides or other toxic substances.

3.1.2 Analysis Bivariat

In Table 2, the results of this study show that the average cockroach that died was the fastest when treated or sprayed at 80% concentration with a mean of 29.83 and a standard deviation of 48.906. The results of statistical testing showed a P value = 0.00 L (p value < 0.05), it can be concluded that there is a significant effect between treatment or spraying with soursop seed extract and clove leaf extract on the death of *Peripianetia americana* cockroaches.

Effect of soursop seed (*Annonna Muricata Linn*) and clove (*Syzgium aromatica*) seed extract on cockroach (*Periplaneetta Americana*) control.

Based on the results of the studies carried out, namely the treatment or spraying with a combination or mixture of soursop seed extract and clove leaves to obtain the body or chest of cockroaches in the test chamber, it is known that when treated or sprayed at a concentration of 20% at repetitions I-IV, death test cockroaches did not occur during processing or spraying. Treatment or spraying with soursop seed extract and clove leaf extract at a concentration of 40% with I-IV repetitions with observations every 10 minutes for 120 minutes, the results showed that the number of deaths of experimental cockroaches was 7 or an average of 0.55. tails, when using an extract concentration of 60%, the number of cases was 13 tails, or an average of 1.08 tails, and when using an extract concentration of 80%, the number of deaths of cockroaches was 14, or an average of 1.2 tails.

The death of cockroaches (Peropianela americana) was caused by the presence of azitogenin in the soursop seed extract, which acts as a larvicide, insecticide, acaricide, antiparasitic and bactericidal agent. Acytogenin is a secondary metabolite from Annonece that is synthesized from a reaction between acetic acid, a polycatide derivative that has a long chain fatty acid, namely 35-39 carbons. The properties of this compound are aliphatic long chains with hydroxyl groups, acetylcarbonyl and 1-3 tetrahydrofuran rings. There is a growing use of acytogenins, especially in the health sector (as an anti-cancer agent), as well as herbal insecticides derived from soursop leaves and seeds. It is also known that soursop seeds contain many substances, including anomycin. annonacin, anomurine, atherospermine, kaklaurin, cogibin, panatellin, xylomatin, reticulin, sabadelin and solamin, which can kill insects, cockroaches. Then the content of clove leaf extract, which contains essential oils, and the content of clove leaf is a chemically active ingredient as an antiseptic agent (clove oil). The essential oil of clove has an antimicrobial effect. The main component of clove oil contains the main active ingredient eugenol. Cockroach insects can be controlled

with clove insecticides using eugeol, which is capable of imparting a characteristic fragrance. Ugenol is used in various industries such as the pharmaceutical industry. Eugenol can act as an insecticide (against insects), a fungicide (antifungal), a bactericide, and a nematocide (against nematodes).

The things mentioned above have been confirmed by previous studies, including a study by Aurina Devi (2016) where soursop seed extract (Annona muricata Linn) was able to control cockroach vectors. Studies by Nelvi Susanti et al. (2016) concluded that soursop seed extract (Anona mmaicata Lim) was able to control American cockroaches (Periplaneta Americana) at 80% concentration with 50% mortality in experimental cockroaches. The use of clove leaf extract to control cockroaches (Peripianetta americana) has been studied by Soseno (2017). where cockroach mortality occurred at a concentration of 80% with a longer death time of over 120 minutes by Niki Soseno (2018) [5].

The difference between this study and previous studies is that this study combined soursop seed extract with clove leaf extract. In this study, it was observed that the content of soursop seeds containing acytogenins and saponins, while the content of clove leaves containing eugenol, made these two ingredients more effective in controlling cockroaches (Periplaneta Americana). trying to fly because after being exposed to a solution of soursop seed extract and clove leaves, he looks like he's been hit with very hot water.

Mortality of cockroaches Periplaneta Americana in the positive control group

The death of experimental cockroaches on the positive control showed that the process of death of cockroaches was faster. After the test cockroach was sprayed with baygon, the cockroach ran and jumped back and forth, then its body turned upside down. convulsions and eventually die. Baygon treatment or spraying of positive controls resulted in the complete death of experimental cockroaches in 30-120 minutes. This is due to the content of baygon or synthetic insecticidal active poisonous substances in the form of compounds of cypermethrin, imoprotin. Praletrin and Propaxur. All these substances belong to the group of pyrothroid insecticides, which are both contact and stomach poisons. This venom attacks the nerve fibers and has a knockdown effect that paralyzes insects and eventually leads to death.

Mortality of cockroaches in the negative control group

When treating or spraying distilled water on cockroaches, there was no negative control of the death of cockroaches at all. The behavior of the cockroaches in the negative control group was only noticed in that the cockroaches ran back and forth to avoid spraying the aquades. This is due to the fact that the Aquadest solution does not contain ingredients that can cause the death of an experimental cockroach.

Most effective concentration of soursop seed and clove leaf extract for killing cockroaches (Periplaneta americana)

According to the results of this study, the obtained results of extracts of seeds of soursop (Annon Muricata Linn) and leaves of cloves (Syygium oromaticum) were as follows: at a concentration of 20%, no cockroaches were encountered in the test. At a concentration of 40%, the number of deaths of cockroaches Periplaneta americana in repeats 1-IV was 7 individuals, or an average of 0.55 individuals. At a concentration of 60% with a repetition of 1-1B, the number of deaths of cockroaches Periplaneta americana was 13 or an average death of 1.08. The number of deaths of experimental cockroaches when treated or sprayed with a concentration of 80% was 14 tails, or an average of 1.2 tails.

Based on the results of this study, it can be concluded that soursop seed extract and clove leaves are the most effective in controlling cockroaches or cause the death of a large number of cockroaches at a concentration of 80%. The results of the statistical tests also showed that P value = 0.001 (p value < 0.05), which means that a significant effect can be inferred between the use of soursop seed extract and clove leaf extract and the mortality of the *Periplaneta Americana* cockroach.

4. CONCLUSION

1. The effect of using extracts of sisak seeds (*Annona muricata Linn*) and clove leaves (*Syzygium aromacum*) in the fight against domestic cocoa (*Periplaneta americana*) is noted.
2. The effectiveness level of soursop seed extract and clove leaf extract against domestic cockroach (*Perplaneta americana*) is 80% concentration. that is, when 2 ml of syzak seed extract and 2 ml of clove leaf extract were combined, 20 ml of distilled water was added. Spraying is directed at the body or thorax of the cockroach, because the wetter the body or thorax of the cockroach is exposed to the solution of soursop seed extract and clove leaf extract, the faster the process of death of the cockroach (*Periplaneta americana*) occurs.

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Research Limitations

1. To enable researchers to make homogeneous research samples in future studies.
2. For future studies to take into account or include in the study variables the spray distance variable and the frequency of spraying on the cockroach's body or thorax.

3. So that the treatment or spraying in the next repetition (repetitions II, III and IV) is not carried out too long, so that the soursop seed extract and clove leaf are not stored for too long.

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