International Journal of Social Science (IJSS)
Vol.4 Issue.5 February 2025, pp: 621-626
ISSN: 2798-3463 (Printed) | 2798-4079 (Online)
DOI: https://doi.org/10.53625/ijss.v4i5.9709

EFFECTIVITY TEST OF SIRSAK (*Annona muricatal*) LEAVES EXTRACT ON DEATH OF AMERICAN KECOA (*Periplaneta americana*)

By
Kholila Samosir[1], Indra Martias[2], Risman Kurnia[3], Aurel Syakira[4]
[1,2,3,4]Poltekkes Kemenkes Tanjungpinang, Sanitation Study Program,Tanjungpinang, Indonesia;
Email: [1]kholilahsam@gmail.com

Article Info
Article history:
Received Dec 04, 2024
Revised Dec 29, 2024
Accepted Jan 27, 2025

Keywords:
American pineapple
Cranberry
Leaf
Extract

ABSTRACT
Cockroaches are still the biggest parasite causing health problems in the world. The type of cockroach commonly found in the human environment includes the American cockroach *(Periplaneta Americana*). One way to control cockroaches is by using vegetable insecticides, such as soursop leaf extract. The purpose of this study was to determine the effectiveness of soursop leaf extract on the death of American cockroaches *(Periplaneta Americana*). Type of *Pre-Experiment* Research with research design that is *After Only Design.* The population and sample of this study used 45 American cockroaches *(Periplaneta Americana*). The results of soursop leaf extract treatment of American cockroaches *(Periplaneta Americana)* with a concentration of 20% obtained the number of cockroach deaths as many as 15 tails, then 25% concentration obtained the number of cockroach deaths as many as 15 tails, and 30% obtained the number of deaths as many as 15 tails in 3 different treatments. The conclusion of this study on the death of American cockroaches *(Periplaneta Americana*) using extracts with the most effective time for the death of American cockroaches *(Periplaneta Americana*) occurred at 8 o'clock, at 10 o'clock, and at 12 o'clock. Suggestions in this study are to be able to utilize soursop leaf extract as a natural insecticide that is more environmentally friendly and to further research can conduct further research to find more effective concentrations of soursop leaf extract

Corresponding Author:
Kholila Samosir
Poltekkes Kemenkes Tanjungpinang, Sanitation Study Program,Tanjungpinang, Indonesia;
Email: kholilahsam@gmail.com

1. INTRODUCTION

Insects are a class of organisms with the largest number of species. Some insects play a beneficial role in agriculture and some play a destructive role in life. Apart from feeding on domesticated plants and acting as disease-causing agents for crops, cockroaches can spread a number of harmful bacteria, such as Salmonella and Streptococcus, which can adversely affect human health and agriculture. In addition, cockroaches play an important role in the health industry as pollinators, predators, and producers of valuable compounds (Priwahyuni et al., 2020).

Cockroaches are dorsiventral flat insects with an oval body shape. Given their role as disease carriers, cockroaches are considered pests. Worldwide, cockroaches continue to be the most common parasites that cause disease. Although cockroaches are able to adapt to a variety of environments, they are most commonly found in hot and humid areas (Ummah, 2022).

Some cockroach species that are often found in human environments are the German cockroach, Australian cockroach and American cockroach. These species are often found in residential environments. The American cockroach is an insect capable of eating plants and is often found in Indonesian settlements (Firdaust & Purnomo, 2019).

International Journal of Social Science (IJSS)
Vol.4 Issue.5 February 2025, pp: 621-626
ISSN: 2798-3463 (Printed) | 2798-4079 (Online)

Vector control is a collective term for all activities or actions intended to minimize vector populations until they no longer pose a threat to the spread of vector-borne diseases (Amad. H, 2018).

Pollinated soursop leaves are one of the plants that can be utilized as a vegetable pesticide. Because soursop leaves are a stomach poison and contact poison, they can also function as larvicides, pesticides, midges, and antifeedants. Tamarind and acetogenin, the active ingredients in soursop leaves, start working as soon as they enter the digestive tract. As the acetogenin chemical poisons the cells of the digestive tract and inhibits enzyme activity in the insect's digestive tract, the test insect eventually dies. The tannin and acetogenin content in pollinated soursop leaves can be utilized as a natural pesticide (Ummah, 2022).

The results of research (Wahyuni & Anggraini, 2018) using soursop leaf extract and observation for three hours showed that American cockroaches (Periplaneta Americana) can be killed with soursop leaf extract at any concentration. The results of experiments conducted with soursop leaf ethanol extract at doses of 5%, 10%, 20%, and 30% against American cockroaches (Periplaneta Americana). The 5% concentration has the lowest mortality of American cockroaches, which is 11.11, while the 30% concentration has the highest mortality, which is 53.33 (Wahyuni & Anggraini, 2018).

Based on the above statement, the research is interested in submitting a final project proposal entitled "Test the effectiveness of soursop leaf extract (Anonna muricatal) on the death of American cockroaches (Periplaneta Americana)".

2. RESEARCH METHOD

This type of research is a Pre-Experiment research with a research design that is After Only Design. The population used in this study was the number of American cockroaches and the sample in this study was 45 American cockroaches (Periplanetta Americana) with a criterion of 5 for each soursop leaf extract which was carried out 3 times repetition. The location of observation and research was carried out at the Laboratory of the Department of Environmental Health DIII Polytechnic of the Ministry of Health of Tanjung Pinang. While the location of collection and collection of research objects in Bukit Bestari District with the implementation time in January-August 2024. The data analysis used in this study is univariate which explains the characteristics of each variable studied.

3. RESULTS AND ANALYSIS

The results of the study using various concentrations of 20%, 25% and 30% soursop leaf extract applied to cockroaches were observed every 8 hours, 10 hours, 12 hours, 14 hours, 16 hours and 24 hours for a total of 3 treatments. The results of soursop leaf extract treatment can be presented in the table, namely**:**

Table 1. Results of Soursop Leaf Extract Treatment

Time and Repetition	American Cockroach *(Periplaneta Americana)* Mortality Rate		
	Concentration and Number of American Cockroaches (Periplaneta Americana) that died		
	20%	25%	30%
8 o'clock			
1	1	2	2
2	2	2	3
3	2	2	3
10 o'clock			
1	1	2	2
2	0	1	2
3	1	1	2
12 o'clock			
1	3	2	1
2	3	2	0

International Journal of Social Science (IJSS)
Vol.4 Issue.5 February 2025, pp: 621-626
ISSN: 2798-3463 (Printed) | 2798-4079 (Online)
DOI: https://doi.org/10.53625/ijss.v4i5.9709

3	2	1	0
14th hour			
1	0	0	0
2	0	0	0
3	0	0	0
16th hour			
1	0	0	0
2	0	0	0
3	0	0	0
24 Hours			
1	0	0	0
2	0	0	0
3	0	0	0
Total	15	15	15
Average	1	1	1
Percentage	100%	100%	100%

Based on Table 1, it can be seen that the number of deaths of American cockroaches *(Periplaneta Americana)* after being treated with soursop leaf extract with an observation time of 24 hours at a concentration of 20% the average death of cockroaches is 1 with a percentage of 100%, a concentration of 25% the average death of cockroaches is 1 with a percentage of 100%, and a concentration of 30% the average d e a t h o f cockroaches is 1 with a percentage of 100%.

The results of testing soursop leaf extract against American cockroaches *(Periplaneta Americana)* with a concentration of 20% obtained the results of cockroach deaths as many as 5 tails at 8 hours, at 10 hours as many as 2 cockroaches and at 12 hours as many as 8 tails. At a concentration of 25%, the results obtained the death of 15 cockroaches with death as many as 6 tails at hour 8, at hour 10 as many as 4 cockroaches and at hour 12 as many as 5 cockroaches, then at a concentration of 30% the results obtained the death of 15 tails with death as many as 8 tails at hour 8, at hour 10 the dead cockroaches were 4 tails, and at hour 12 as many as 1 cockroach.

4. DISCUSSION

Characteristics of Soursop Leaf Extract

Plants used in the manufacture of vegetable insecticides in this study are soursop leaves (Anonna Muricatal L). Soursop is an annual plant that grows once a year. Soursop leaves have chemical content such as saponins, tannins, alkaloids, flavonoids, which are toxic to insects (Sihombing, 2022).

Saponin compounds function as lavarside and insecticide. Saponins are secondary metabolite molecules that cause damage to cell proteins and cell membranes by lowering the surface tension of the skin. This allows harmful substances to enter the pest's body and eventually kill it (Shofa N.W, 2021). Tannin compounds are macro molecular compounds that act as nutrient repellents and are able to inhibit enzymes so that there is a decrease in starch hydrolysis and blood sugar in animals, tannin compounds are naturally able to interact with proteins and can form complex proteins that are toxic so that they cause reduced appetite through inhibiting the enzyme amylase in digestion so that insect development will be inhibited (Khairat A.R, 2022).

The method of action of alkaloid chemicals as antibacterials is believed to include disrupting the peptidoglycan component in bacterial cells, which causes incomplete cell wall layer formation and subsequent cell lysis (Sa'adah M.S, 2020). Flavonoid compounds are antibiotics that work by interfering with the organism's ability to function, therefore it is clear that plants containing these components are usually used as antibacterials. The permeability of the bacterial cell wall can be damaged by flavonoids, and when flavonoids and bacterial DNA interact, lysosomes and microsomes are produced (Sa'adah M.S, 2020).

International Journal of Social Science (IJSS)
Vol.4 Issue.5 February 2025, pp: 621-626
ISSN: 2798-3463 (Printed) | 2798-4079 (Online)

Soursop leaves (Anonna Muricatal L) used in this study have characteristics of fresh green leaves, the size of the leaves used varies from 6-18 cm long to 3-7 cm wide. Making soursop leaf extract (Anonna Muricatal L) produced in this study, begins with a soaking process for 3 days using 96% ethanol. After obtaining the results of soaking, namely concentrated extracts, then proceed with the oven for 2 hours at a temperature of 50°C. The characteristics of soursop leaf extract (Anonna Muricatal L) used in this study are dark green color, no pungent odor and liquid texture.

American Cockroach (Periplaneta Americana) Mortality Rate

This study used a vegetable insecticide made from soursop leaf extract (Anonna Muricatal L) to kill American cockroaches (Periplaneta Americana) with an object of 45 American cockroaches (Periplaneta Americana) consisting of 5 heads at each concentration of 3 repetitions at 8, 10, 12, 14, 16, and 24 hours. The concentrations of soursop leaf extract used in this study were 20%, 25% and 30%.

The results showed that the highest mortality of American cockroaches (Periplaneta Americana) after treatment occurred at a concentration of 30%, this is because the higher the concentration of soursop leaf extract, the more effective the death of cockroaches. The death of American cockroaches (Periplaneta Americana on thetest media in each repetition using soursop leaf extract began to occur at 8 o'clock, namely at a concentration of 20%, there were 4 cockroach deaths consisting of 1 c o c k r o a c h in the first treatment box, 2 cockroaches in the second and third treatment boxes, then at 8 o' clock at a concentration of 25%, there were 6 cockroach deaths consisting of 2 cockroaches in the first, second and third treatment boxes. And 30% concentration found the death of cockroaches as many as 8 cockroaches consisting of 2 cockroaches in the first treatment box, 3 cockroaches in the second and third treatment boxes. Repetition using soursop leaf extract began at 10 am, namely at a concentration of 20%, there were 2 cockroach deaths consisting of 1 cockroach in the first treatment box, and the third treatment, then at 10 o'clock in the 25% concentration, there were 4 cockroach deaths consisting of 2 cockroaches in the first treatment box, 1 cockroach in the second and third treatment boxes, and at a concentration of 30%, there were 6 cockroach deaths consisting of 2 cockroaches in the first treatment box, 1 cockroach in the second and third treatment boxes. of 2 in each of the first, second and third treatment boxes.

Repetition of the last hour at 12 o'clock at a concentration of 20% found the death of cockroaches as many as 8 cockroaches consisting of 3 in the first and second treatment boxes, the remaining 2 in the third treatment box, then at a concentration of 25% found the death of 4 cockroaches consisting of 2 cockroaches in the first and second treatment boxes, and 1 cockroach in the third treatment box. While at a concentration of 30%, 1 cockroach death was found in the first treatment.

The results of this study showed the death of American cockroaches (Periplaneta americana) after observation, where the cockroaches did not move when touched. At various concentrations of treatment with exposure to soursop leaf extract, the cockroach appeared restless and actively moved up and down. After 15 minutes, the cockroach's body weakened and did not move, until it finally died. Based on research conducted (Kemalasari & Ramlan, 2018), cockroaches sprayed with pandan leaf juice showed changes in the body, including the carapace drying, shrinking, and the thorax remaining intact, all of which are indicative of organ injury. This happens because chemicals called saponins and flavonoids are toxic to insects.

This study is in accordance with research conducted (Wahyuni & Anggraini, 2018), proving that the death of American cockroaches (Periplaneta Americana) occurs after 3 hours of exposure to 4 kinds of concentrations, namely 5%, 10%, 20% and 30%. This is due to the content of secondary metabolites in soursop leaf extract, namely saponins, flavonoids, tannins and alkaloids. These secondary metabolites have biological activities that can damage the nervous system and vital organs of cockroaches. The saponin content in soursop leaf extract is known to have the properties of chemical compounds that can damage cockroach cell membranes, thus disrupting cellular function and causing death.

Research conducted (Puri et al., 2021) related to the efficacy test of peppermint leaf extract against American cockroaches (Periplaneta Americana), the results showed that if peppermint leaf extract is effective as a natural insecticide against these insects at concentrations of 5%, 10%, 20%, and 30%. This is because the more essential oil content in an insecticide, the more effective the insecticide is. In addition to essential oils, peppermint leaves also contain active compounds such as flavonoids, triterpenes, and alkaloids. These substances have various harmful effects that can lead to the death of the American cockroach, also known as Periplaneta Americana. Furthermore, it is known that after being sprayed with peppermint leaf extract, American cockroaches (Periplaneta Americana) show more aggressive behavior and uncontrolled movement due to flavonoid compounds in peppermint leaves entering the respiratory system and disrupting the suggestion system (Puri et al., 2021).

Research conducted (Putri Rahmawati et al., 2021) shows that garlic extract is effective as an insecticide. The effect of garlic ethanol extract on the mortality of American cockroaches (Periplaneta Americana) was observed at concentrations of 1%, 5%, 10%, 20%, and 30%. The concentration of garlic extract that produced the highest mortality was at 30% concentration. The more garlic extract present, especially flavonoids, the more effective as an insecticide because these compounds can bind to proteins and inhibit metabolic processes that kill insects. Garlic contains a

chemical called allixin, which gives it a unique aroma and inhibits the growth of parasites by destroying their cell membranes.

5. CONCLUSION

Death of American cockroaches (Periplaneta Americana) at all concentrations was most effective for the death of American cockroaches (Periplaneta Americana) occurred at 8 hours there were 15 cockroaches, at 10 hours there were 15 cockroaches, and at 12 hours there were 15 cockroaches.

REFERENCES

[1] Firdaust, M., & Purnomo, B. C. (2019). Mechanical Vector Control of Periplaneta Americana with Baiting Gel Application Containing Borax and Sulfur Material. Journal of Environmental Health, 11(4), 331.
[2] Kemalasari, K., & Ramlan, D. (2018). Effect of Various Concentrations of Pandan Wangi Leaf Juice (Pandanus Ammaryllifolius) as an Insecticide on Cockroach Mortality in 2017. Buletin Keslingmas, 37(2), 230-234.
[3] Khoerul Ummah. (2022). The Ability of Soursop Leaf Powder (Annona Muricata L) as a House Cockroach (Periplaneta Americana) Repellent.(Number 8.5.2017).
[4] Rahma Annisa Khairat. (2022). Effectiveness Testing of Soursop Leaf Extract as a Vegetable Pesticide to Control Koksi Beetle Pests (Epilachna Admirabilis) in Eggplant Plants (Solanum Melongena L.).
[5] Priwahyuni, R., Wardianti, Y., & Sepriyaningsih, S. (2020). The Effect of Amethyst Seeds (Datura Metel) as a Bioinsecticide on American Cockroach (Periplaneta Americana) Mortality. Bioedusains: Journal of Biology and Science Education, 3(1), 24-32.
[6] Puri, D. R., Harnani, Y., & Hayana, H. (2021). Effectiveness Test of Peppermint Leaf Extract (Mentha Piperita) as an Insecticide Against American Cockroaches (Periplaneta Americana). Public Health Media, 1(2), 263-272.
[7] Putri Rahmawati, R., Etikasari, R., Setyaningrum, I., Yulianta Wilisa, O., Nur Andjarwati, F., Faculty of Health Sciences, F., & Muhammadiyah Kudus, U. (n.d.). EFFECTIVENESS OF BIOINSECTICIDA OF ETANOL EXTRACT OF WHITE ANGEL (Allium sativum) ON AMERICAN KECOA MORTALITY (Periplenata americana).
[8] Sihombing, E. Y. Scientific Paper on the Ability of Soursop Leaf Powder (Annona Muricata L) as a House Cockroach (Periplaneta Americana) Repellent.
[9] Siti, M. S. (2020) Scientific Paper on the Inhibition of Soursop Leaf Extract (Annona Muricata Liin) on Bacterial Growth Literature Review.
[10] Wahyuni, D., & Muktitama, R. E. (2019). Mortality Test of American Cockroach (Periplaneta Americana) Using Durian Peel Extract (Durio Zibethinus Murr). Photon: Journal of Science and Health, 9(2), 9-18.
[11] Wilda Nailish Shofa. (2021). Effect of Neem Leaf Extract (Azadirachta Indica), Soursop Leaf (Annona Muricata), and the Combination of Both as a Vegetable Insecticide Against Armyworms (Spodoptera Litura F.)

International Journal of Social Science (IJSS)
Vol.4 Issue.5 February 2025, pp: 621-626
ISSN: 2798-3463 (Printed) | 2798-4079 (Online)

THIS PAGE IS INTENTIONALLY LEFT BLANK