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Utilization of Papaya Seeds as an Ingredient for Making Environmentally Friendly Insecticides Against Sangit Weed

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A B S T R A C T

Papaya *(Carica Papaya)* is a plant that is often found in tropical areas, one of which is in Indonesia. Inside the papaya seeds there is a karpain content, the karpain content is able to eradicate the stink bug pest that usually attacks papaya plants. This study used an experimental method in which this method tested the karpain content in papaya seeds. Making a bioinsecticide formula with a ratio of 25 ml and 75 ml; 50 ml and 50 ml and 75 ml and 25 ml. based on research and analysis of field data from the trial results showed that papaya seed extract *(Carica papaya)* at doses of 25%, 50%, 75%, and 100% had an effect on the death of walang sangit so that the higher the carpain content in papaya seeds, the more effective at eradicating insecticides.

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INTRODUCTION

Papaya *(Carica papaya)* is a plant that usually grows in the tropics, one of the areas where papaya plants grow is Indonesia. In Indonesia papaya grows from lowlands to high **.** Papaya plants have a lot of benefits starting from the roots to the leaves. Usually people consume papaya fruit to be used as additional nutrition in their daily intake, besides that papaya has a high enough carbohydrate and water content so it is suitable for healthy dieters. Then there is a part of papaya which is often considered to have no benefits, namely papaya seeds, in papaya seeds there are ingredients including alkaloids, flavonoids, tannins, saponins, essential oils, anthraquinines, and anthocyanins (Satriyasa, 2007). The alkaloid content in which there is karpain content is an active compound from papaya seeds which is disliked by insects, this content works by damaging the nervous system in insects. This compound has been researched and tested as a basic ingredient for the manufacture of environmentally friendly natural bioinsecticides, bioinsecticides from papaya seeds can be used to control pests such as caterpillars, ticks, thrips and other insects. The use of this bioinsecticide has the advantage of being more environmentally friendly and does not cause side effects in its application, but it should be underlined that the application of this bioinsecticide has weaknesses related to its useful life. For this reason, it is necessary to carry out routine handling of treated plants so that efforts to control pests can be optimally carried out.

One of the plant pests that can be given control by this bioinsecticide is the stink bug. Walang sangit is a nuisance insect that often damages plants. Walang sangit has a special characteristic, namely insects that usually emit a pungent odor from their bodies, then walang sangit usually sucks the grains during the filling phase of grain in rice plants so that rice productivity can be disrupted by these insects. One of the treatments for this problem is to use natural bioinsecticides made from papaya seeds, this will certainly reduce and control the stink bug pests that commonly attack plants. Spraying papaya seed distillate water is able to optimally control the stink bug with regular and continuous treatment. From these problems the author seeks to make research breakthroughs by utilizing papaya seeds in the manufacture of natural bioinsecticides that are environmentally friendly.

LITERATURE REVIEW

Carpaine content

The content of karpain is an alkaloid compound found in papaya seeds. This compound is found in seeds that are young and green in color. The karpain compound consists of two isomers, namely alpha karpain and beta karpain, both of which are compounds that act as natural insecticides. (Alzanado, 2022). Then the researchers tested this content as the main ingredient in making bioinsecticides that are environmentally friendly and can be applied to various types of plants. The way this compound works is by damaging the nervous system of insects that suck juice from papaya seeds, so that insects will experience nerve malfunctions and will cause death in insects.

Aside from being an insecticide, karpain also has antimicrobial, antioxidant, and anti-inflammatory properties that can be used in the herbal medicine industry. However, in several research cases the use of papaya seed extract still needs to be re-examined because the dose effect is quite high.

Bioinsecticide

Bioinsecticides are insecticide products made from natural ingredients derived from biological compounds from animals and plants. Bioinsecticides have different properties from synthetic insecticides which are made from synthetic chemicals which can harm health and the environment (Salasiah, 2018). Bioinsecticides have advantages, including:

1. Environmentally friendly, meaning that bioinsecticides will not pollute the surrounding environment.
2. Effective and efficient in pest control, meaning that the compounds contained in papaya seeds are able to control pest attacks.
3. Safer for human health.
4. Easy to search and find.

METHODOLOGY

This study uses an experimental method in which this method examines the chemical content in plants which can then be used in the manufacture of compounds for specific research needs. This research was conducted from January to March 2022 at Yogyakarta State University and Sawah Godean, Sleman, DI Yogyakarta. This study used a direct test with the dose of papaya seeds mixed with water to be used as a natural pesticide for rice bugs, taking into account the dose of papaya seed powder in each treatment and the variation in the length of treatment time.

RESEARCH RESULT

The results of experiments and tests from studies that have been carried out using three different doses of papaya seed extract with water and also 100% papaya seed extract. The dose used is a dose of 25%, 50%, 75% and 100% content of papaya seed extract. The results of this study are as follows:

Table 1. Number of Walang Sangit died in 10 hours

No	Jam	Jumlah Walang Sangit Mati					Rata-Rata
		P0	P1	P2	P3	P4	
1	0	0	0	0	0	0	0
2	1	0	0	3	3	3	1,8
3	2	0	0	4	4	4	2,4
4	3	0	0	4	4	4	2,4
5	4	0	0	3	2	3	1,6
6	5	0	0	6	6	4	3,2
7	6	0	0	6	7	6	3,8
8	7	0	3	5	5	6	3,8
9	8	0	3	6	6	7	4,4
10	9	2	5	6	6	6	5
11	10	5	4	7	7	7	6

Information:
P0 : Supervision and Control
P1 : Spraying Bioinsecticide with a dose of 25%
P2 : Spraying Bioinsecticide with a dose of 50%
P3 : Spraying Bioinsecticide with a dose of 75%
P4 : Spraying Bioinsecticide with 100% Papaya Seed Extract

DISCUSSION

The research was conducted through the following stages:

Manufacture of Bioinsecticides

Manufacturing Steps:

1. Prepare tools and materials.
2. Papaya seeds inside papaya fruit set aside.
3. Papaya seeds that have been removed from the flesh are washed thoroughly.
4. Papaya seeds that have been washed are drained in a place that has been prepared.
5. After being drained, the papaya seeds are dried in direct sunlight for 2 day.
6. Papaya seeds mashed using blender.
7. Papaya seeds are filtered until smooth until it is like flour
8. The papaya seed powder, put into a basin, by slowly adding 600 ml of water.
9. Stir or knead by hand until it becomes porridge.
10. The mixture is squeezed out with filter paper or cloth.
11. Do it repeatedly, so that no dregs follow filtered,
12. The exterminator liquid can be sprayed on the intended pest.

Acclamation

Acclimation is the process of adapting the physiology and behavior of an organism in response to changes in the environment, or the modification of the phenotypic characteristics of an organism caused by the environment, known as acclimatization. An old mineral water bottle with 15 holes serves as a container for the adaptation of the stink bug. These holes serve as an inlet for air. Up to 25 pieces of used glass are used; each glass holds 10 grasshoppers. The stinging locust undergoes acclimatization for about three hours in order to successfully adapt. The praying mantises will be fed 10 grains of rice per cup every two hours to ensure they are well fed.

Bioinsecticide Treatment

1. **Treatment I at a dose of 25% (25 ml of papaya seed extract + 75 ml of water)**
   a. The papaya seed solution is sprayed on the stink bugs that have been provided. There are 10 stink bugs in every 1 container, with 5 containers in each treatment.
   b. Spraying is carried out once an hour, at 04.00, 05.00, 06.00, 07.00, 08.00, 09.00, 10.00, 11.00, 12.00 and 13.00, with 3 to 4 sprayings.
   c. Number of stink bugs that died after 1 hour of observation after spraying.
2. **Treatment II at a dose of 50% (50 mL papaya seed extract + 50 mL water)**
   a. The papaya seed solution is sprayed on the stink bugs that have been provided. There are 10 stink bugs in every 1 container, with 5 containers in each treatment.
   b. Spraying is carried out once an hour, at 04.00, 05.00, 06.00, 07.00, 08.00, 09.00, 10.00, 11.00, 12.00 and 13.00, with 3 to 4 sprayings.
   c. Number of stink bugs that died after 1 hour of observation after spraying noted.
3. **Treatment III with a dose of 75% (75 mL papaya seed extract + 25 mL water)**
   a. The papaya seed solution is sprayed on the stink bugs that have been provided. There are 10 stink bugs in every 1 container, with 5 containers in each treatment.
   b. Spraying is carried out once an hour, at 04.00, 05.00, 06.00, 07.00, 08.00, 09.00, 10.00, 11.00, 12.00 and 13.00, with 3 to 4 sprayings.
   c. Number of stink bugs that died after 1 hour of observation after spraying noted.
4. **IV treatment at a dose of 100% (100 mL papaya seed extract)**
   a. 100 mL of papaya seed solution is sprayed on the stink bug that has been provided.
   b. There are 10 walang sangit in every 1 container, with 5 containers in each treatment.
   c. Spraying is carried out once an hour, at 04.00, 05.00, 06.00, 07.00, 08.00, 09.00, 10.00, 11.00, 12.00 and 13.00, with 3 to 4 sprayings.
   d. Number of stink bugs that died after 1 hour of observation after spraying noted.
   e. Observation result concluded.

Results of Observations on the Use of Papaya Seeds as a Bioinsecticide

Observation of the effect of papaya seed extract (*Carica papaya*) on the stink bug was carried out for 10 hours. The application is done by spraying with 3 doses, namely 25% dose, 50% dose, and 75% dose, and by spraying once every

1 hour, so that there is enough time to kill the stink bugs. It is enough to make papaya seed extract only once, then divide it into four different doses in 4 spray bottles. Data collection which was carried out once every 1 hour also aims to maintain the freshness of the rice grains used as food for walang sangit.

Each treatment requires 10 grains of rice for walang sangit food, because walang sangit only eats a few grains of rice every 1 hour. Researchers used several different measurements to see the number of dead stink bugs, namely 25%, 50%, and 75%. Observations were made on the stink bug for 1 hour after spraying. Researchers use three variables. the control variable is the same number of stink bugs, namely 50 stink bugs in each experiment. independent variables, namely the different doses between the papaya seed extract mixture and water, 25%, 50%, and 75%. The dependent variable is the number of dead stink bugs, so that the most effective dose of papaya seed extract with water is obtained for eradicating stink bugs every 1 hour every 10 hours.

The results of the observations showed that papaya seed extract (*Carica papaya)* which had been tested on the stink bug had an effect. Based on the table. 1, at the 1st hour it has shown that there is a dead stink bug. The dead stink bugs occurred in P2, P3 and P4 as many as 3 stink bugs, with an average of 1.8. This shows that papaya seed extract has an effect on weeds fierce.

In treatment P1 with a dose of 25%, the stink bug did not die at 1 hour. This could be due to the action of the papaya seed extract at low doses, allegedly tending to be slower than at higher doses. At the 2nd and 3rd hour, P2, P3, and P4 the number of stink bugs that died was 4. This was suspected because the papaya seed extract which functions as an insecticide had reacted to the stink bug's body.

At the 5th hour the number of dead bugs was only seen at P2, in this case 6 were killed by the slow process of stink bugs at P1 at a dose of 25% thought to be due to the active compound contained in the new papaya seed extract show a reaction to the body of the stink bug. In addition, at low doses, the liquid does not emit a pungent aroma. At low doses, alkaloids will be a stomach poison for insects. As stated by Cania and Seryaningrum (2013) that alkaloids in insects act as stomach poisons.

The death of the stink bug quickly began to occur at the 6th hour in each treatment, at P1 6 stink bugs, P2 7 stink bugs and at P3 6 stink bugs, with an average of 3.8. Stink bugs die the fastest every 1 hour, found at P3 with a dose of 75%. At P1 and P2 the death of stink bugs at 7, 8, 9 hours tended to be more stable. This is thought to be due to increased immunity from test insects or often called insect resistance. The death of the stink bug did not reach 100% because the observation time was only 10 hours. After the bioinsecticide from papaya

seeds was applied at 1st and 7th hour, the four treatments (P1, P2, P3, and P4) showed the presence of a dead stink bug, except for control.

Overall the death of the stink bug in the last hour of observation was P0 (control) 5, P1 (25% dose) 4, P2 (50% dose) 7, P3 (75% dose) 7, and P4 (100% papaya seed extract) 7 It is at the 10th hour that the increase in the death of the stink bug occurs quickly and thoroughly.

CONCLUSIONS

Based on the research and trials that have been carried out, papaya seed-based bioinsecticides can be made by grinding them, then filtering them until they are completely powdery, mixed with water, then squeezed using a cloth or filter paper repeatedly to get the maximum papaya seed extract. .

After several experiments, it can be concluded that a bioinsecticide with a dose of 75% (75 mL of papaya seed extract + 25 mL of water) is the most effective for eradicating the stink bug. The highest average figure is 6 compared to other doses of papaya seed extract and water.

RECOMMENDATIONS

For future *inventors* , the authors suggest using other natural ingredients as ingredients for making bioinsecticides to eradicate the stink bug using even more varied doses. Subsequent *inventors* were also able to perform better tests, with a more measurable time needed to kill the stink bugs and to maintain the freshness of the grains. paddy.

ADVANCED RESEARCH

Based on the research, experiments, and tests that have been carried out, this research is going well, but further development is needed regarding the composition of the papaya seed extract with a mixture of water. in its application this bioinsecticide has a long application period so that insect control can be optimally carried out and as an effort if there is resistance in insects. Then it is necessary to have a lab test on the treated plants to see if there are any side effects to the application of this bioinsecticide.

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