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Socialization and Training on Making Vegetable Pesticides from Papaya Leaves (*Carica papaya. L*) and Garlic (*Allium sativum*) with the Community of Taba Air Pauh Village

Charles Banon[1*], Evi Maryanti[2], Lisa Anggraini[3], Miranda Dwi Indriyani[4], Resika Vanessgia[5], Saskia Shaumi Wulandari[6], Noor Haida Mohd Kaus[7]

[1,2,3,4,5,6] Universitas Bengkulu, Indonesia
[7]Universiti Sains Malaysia, Malaysia
mailto:cbanon@unib.ac.id *

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Abstract

The use of pesticides in large doses and carried out continuously in each planting season will cause several losses, including pesticide residues that will accumulate in agricultural products and waters, pollution of the agricultural environment, decreased productivity, poisoning of animals, poisoning of humans which has an impact bad for their health. To overcome or reduce the negative impact of these pesticides, an alternative control method that can be used is to use natural pesticides. Natural pesticides are an alternative that can be used to overcome the shortcomings of chemical pesticides. The aim of carrying out this community service activity is to provide knowledge and skills to the people of Taba Air Pauh Village, Tebat Karai District, Kepahiang Regency regarding the use of natural ingredients such as garlic and papaya leaves as natural pesticide ingredients. The method applied in community service activities was socialization and training on pesticides from papaya leaves and garlic. Based on the results of community service activities regarding training in making vegetable pesticides from papaya leaves and garlic, the people of Taba Air Pauh Village, Tebat Karai District, Kepahiang Regency have learned about the dangers of long-term use of chemical pesticides and obtained information regarding other alternative materials for using chemical pesticides by utilizing natural materials around Taba Air Pauh Village.

A. Introduction

Pesticides are chemical substances and other materials used to control various pests. For farmers, the types of pests are mites, pest plants, plant diseases caused by fungi, bacteria and viruses, nematodes (worms that damage roots), snails, mice, birds and other animals that are considered detrimental (De Souza et al., 2020; Rajmohan et al., 2020; Sharma et al., 2020).

The use of pesticides in large doses and carried out continuously in each planting season will cause several losses, including pesticide residues that will accumulate in agricultural products and waters, pollution of the agricultural environment, decreased productivity, poisoning of animals, poisoning of humans which has an impact bad for their health (Afifah et al., 2023; Panghituan & Manalu, 2019). To overcome or reduce the negative impact of these pesticides, an alternative control method that can be used is to use natural

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pesticides. Natural pesticides are an alternative that can be used to overcome the shortcomings of chemical pesticides.

Botanical pesticides provide the prospect of improving the quality of agricultural products, are environmentally friendly, and contribute to the stability of cultivated crop yields. Botanical pesticides (biopesticides) are organic compounds and antagonistic microbes that inhibit or kill pests and plant diseases (Butu et al., 2020; Dar et al., 2021; Thakur et al., 2020). The mechanism of botanical pesticides on insect pests can be through contact poisoning by the bioactive compound acetogenin. The mechanism of acetogenin as an insecticide is by inhibiting NADH ubiquinone reductase (complex I) in the respiratory chain, and directly affecting electron transport in mitochondria which causes a decrease in ATP levels so that cells experience apoptosis. Natural ingredients that have the potential to replace chemical pesticides are abundant and easy to obtain around agricultural activities. Several local resource-based ingredients can be used as botanical pesticides, for example turmeric, kapok leaves, sugar apple seeds, kenikir leaves, neem leaves/seeds, mindi leaves/seeds, mahogany seeds, and brotowali. Plants containing phytochemical compounds such as eugenol, alakaloid, polyphenols, tannins and saponins can be used as vegetable insecticides (Sutriadi et al., 2020).

The content of papaya leaves, namely papain, also works actively as a stomach poison that enters the body or provides a response to aphids, thereby reducing the feeding activity of aphids. The working system of papain as a stomach poison in the aphids' body is that it is absorbed by the walls of the aphids' digestive organs and then delivered to the aphids' nerve center so that it has the potential to exert pressure and reduce the metabolic processes of internal organs and inhibit the aphids' feeding activity so that causes aphids to die. The presence of the papain enzyme in papaya leaves makes it effective for controlling caterpillars and sucking pests. This is because the papain enzyme is also in the natural sap which causes insects to become weak through its poisonous power and toxicity or nutritional value. The papain compound is a contact poison that enters the body of the caterpillar and will disrupt the feeding activity of the leaf caterpillars so that the feeding activity of the leaf caterpillars gradually decreases and they die (Ningrum et al., 2023; Vandalisna et al., 2021).

Referring to plant extracts, both garlic cloves and papaya leaves can cause significant larval death. However, garlic cloves are more economical when compared to papaya leaves. Both plants can be used as potential acaricides and further investigation is recommended to identify the active principles in these extracts (Shyma et al., 2019). A pesticide whose active ingredients come from plants or plants and other organic materials which are effective in controlling pest attacks and plant diseases. The results of applying organic pesticides on the death and attack rate of S. frugiperda had a real influence. Organic pesticides are the most effective in reducing death rates and S attacks.

Based on this description, this community service activity aims to provide knowledge and information to the community in Taba Air Pauh Village so that they can understand the dangers of chemical pesticides and the manufacture of vegetable pesticides in reducing environmental pollution by utilizing natural materials available around Taba Air Pauh Village.

B. Research Methods

The method applied in implementing community service activities regarding training in making vegetable pesticides from papaya leaves and garlic for the people of Taba Air Pauh Village, Tebat Karai District, Kepahiang Regency was carried out by holding socialization and training on making natural pesticides. The activities will be carried out in August - November 2023. The socialization stage was carried out with a presentation using power point media to the target audience about vegetable pesticides, their benefits, the manufacturing process, and their application on agricultural land. The training stage for making vegetable pesticides is carried out by demonstrating directly the materials, methods and processes for making vegetable pesticides.

The tools needed to make this vegetable pesticide are a bucket, knife, cutting board, sieve, blender and sprayer bottle. Meanwhile, the ingredients needed to make vegetable pesticides are 10 papaya leaves, 2 liters of clean water and 3 cloves of garlic. The steps for making vegetable pesticides are: (1) First prepare the tools and also what is needed in the manufacturing process, such as taking as many papaya leaves as needed, (2) Both papaya leaves are cleaned and dried by airing, (3) Then the leaves papaya is cut into small pieces and mashed using a blender to get the extract, (4) Before mixing the papaya leaf extract, filter it first, (5) Papaya leaf extract is mixed with 2 liters of water and 3 cloves of garlic, (6) The resulting pesticide is added into the spray bottle provided, (7) Pesticides are ready to be applied directly to community

agricultural land. The application of the botanical pesticides that have been obtained is demonstrated directly to obtain the correct dosage.

C. Results and Discussion

The socialization activity on the dangers of pesticides and a demonstration of making vegetable pesticides from papaya leaves (*Carica papaya L.*) and garlic (*Allium sativum*) with the community in Taba Air Pauh Village was attended by a community group consisting of fathers and mothers. Dissemination of socialization material about the dangers of using chemical pesticides and making vegetable pesticides from papaya and garlic leaves was carried out using PowerPoint and flyers which were distributed to the people present. The material presented was about the dangers of using chemical pesticides, an introduction to plant materials that can be used as plant-based pesticides, and training in making plant-based pesticides from papaya leaves and garlic.The community participated in the activity with great enthusiasm and curiosity, so that the public's attention was focused on the group presenting the activity. Activities presenting material about the dangers of chemical pesticides andthe manufacture of vegetable pesticides from papaya leaves and garlic can be seen in Figure 1.

Figure 1. Delivery of Material about Chemical Pesticides and the Manufacture of Vegetable Pesticides by the Service Team

The next stage, namely a demonstration, is carried out by asking residents to come forward so that it is easier to understand how it is made. Natural pesticides are pesticides whose active ingredients come from plants or plants and other organic materials which are efficacious in controlling pest attacks on plants, containing many bioactive compounds such as alkaloids, terpenoids, phenolics, and also other secondary chemical substances. One part of the plant that can used as a natural pesticide, namely papaya leaves. Papaya plants have potential as a vegetable insecticide. Papaya leaves contain toxic compounds such as saponins, carpain alkaloids, papain, flavonoids (Khadam et al., 2019; Sharma et al., 2022). These bioactive compounds do not interfere with photosynthetic growth or growth photosynthesis activities or the physiological aspects of plants infected with pests, but affect the nervous-muscular system, hormonal balance, reproduction, behavior in the form of attracting, anti-eating and the pest's respiratory system. Garlic is a plant that contains useful alkaloids, allicin, flavonoids, saponins, tannins and sulfur and can be used as a pesticide derived from natural ingredients because these compounds are thought to function as insecticides (Ishaya et al., 2021). Documentation of the demonstration of making vegetable pesticides can be seen in Figure 2.

Figure 2. Demonstration of Making Vegetable Pesticides from Papaya and Garlic Leaves

The application of this botanical pesticide solution is carried out by spraying on eggplant, long bean, chili plants, as well as on plants infected with pests and insects using a sprayer bottle. This spraying is carried out in the morning and evening with a spraying frequency of 3x a week. The frequency of long-term use of botanical pesticides cannot cause damage to land and pest resistance. The results of the botanical pesticides obtained and the application of the botanical pesticides to plants can be seen in Figure 3.

Figure 3. The Results of Natural Pesticides Obtained (A) and Their Application to Eggplant Plants (B)

For future service activities regarding the manufacture of vegetable pesticides, it is suggested that plants that are more easily found in Taba Air Pauh Village be used.

D. Conclusion

Based on the results of community service activities that have been carried out, it can be concluded that the community in Taba Air Pauh Village, Tebat Karai District, Kepahiang Regency knows the dangers of using chemical pesticides in the long term and has gained new knowledge about other alternatives to using these pesticides by using natural materials, namely papaya leaves and garlic where these ingredients can control pests and make the environment less polluted around Taba Air Pauh Village

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