

# Training on making biopesticides as effort to strengthen organic agriculture by Taruna Tani Lestari

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## ABSTRACT

Pests are one of the problems in agriculture. The use of organic pesticides still needs to be developed in Gentungan Village. Training in making biopesticides is useful for controlling pests and diseases by utilizing environmentally friendly natural ingredients. In addition, to foster the ability of Taruna Tani Lestari in Gentungan Village to be able to make biopesticides independently and disseminate them to local farmers. The implementation method was carried out with presentations and questions and answers, practices, modules, and evaluation designs. The material presented included the meaning and benefits of biopesticides, natural ingredients used, the correct dosage, and the stages of making biopesticides. After the training, the output obtained included members of Taruna Tani Lestari knowing the natural ingredients for making biopesticides, members of Taruna Tani Lestari understanding the benefits of using biopesticides, members of Taruna Tani Lestari being able to make biopesticides independently and educate local farmers and display biopesticide products.

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## 1. INTRODUCTION

Pests becomes a challenge in the progress of agricultural businesses. One crucial factor in improving agricultural productivity is pest management. Pests are organisms that disrupt cultivated plants (Tuhuteru et al., 2019). It is impractical to completely eradicate plant pests, but efforts to reduce their population are essential (Salaki et al., 2012). The majority of farmers traditionally control pest infestations using chemical substances like synthetic pesticides. However, the continuous use of synthetic pesticides has adverse effects on the environment and human health. Implementing environmentally friendly and health-safe pest control measures is considered imperative (Saputri et al., 2023).

Efforts to manage pests and diseases in organic agriculture are imperative, necessitating careful consideration of their constituents. An effective approach involves the utilization of pesticides formulated with natural or biopesticide-based ingredients. Biopesticides represent a promising alternative for the

control of pests and diseases, harnessing natural substances readily available in the environment. According to [Arsyadana & Suryani \(2014\)](#), biopesticides are derived from plant-based sources, wherein plants rich in active compounds serve multifaceted functions as defense mechanisms, attractants, antifertility agents, biocides, antioxidants, and antimicrobials. In accordance with the perspectives of [Sihombing & Samino \(2015\)](#), biopesticides serve as organic pesticides applied to manage pest populations below the economic threshold. The capability of farmers to autonomously produce biopesticides is paramount for cultivating a healthful production outcome and streamlining expenditures associated with pesticide acquisition.

Gentungan Village stands as a pioneering village in organic farming, situated in the Karanganyar Regency, Central Java Province. According to the Central Statistics Agency (BPS) data in 2022, Gentungan Village spans an area of 298 km<sup>2</sup>. Positioned in the Mojogedang Subdistrict, Gentungan Village is recognized as a focal point for organic agriculture and boasts a 109.89Ha expanse of rice fields ([Purnomo et al., 2022](#)). The agricultural potential of Gentungan Village garners wholehearted support from the community's young farmers. The village's farming regeneration is evident through the establishment of Taruna Tani Lestari, initiated by members of the Student Affairs and Development Program (PPK Ormawa) of HM Pelita UNS in 2022. Presently comprising 18 individuals, Taruna Tani Lestari continues to synergize with students from PPK Ormawa HM Pelita 2023 to advance organic farming. Serving as a hub for young farmers, Taruna Tani Lestari is equipped with diverse innovations in agriculture, from cultivation to post-harvest processing. In their agricultural endeavors, the Taruna Tani actively engage in pest and plant pest (Organisme Pengganggu Tanaman or OPT) control measures.

The capability of Taruna Tani Lestari in producing biopesticides and utilizing residual natural materials in the vicinity is still underdeveloped. Hence, it is essential to conduct training on biopesticide production for Taruna Tani in Gentungan Village. Training, fundamentally, is a learning process ([Bariqi, 2018](#)). Biopesticides, originating from biomass waste, possess advantages such as being non-hazardous to human health, environmentally friendly, with a straightforward and cost-effective process ([Purwandari et al., 2022](#)). The community engagement activities by PPK Ormawa HM Pelita are motivated by the local farmers' needs, as they are increasingly adopting environmentally friendly organic farming practices. The application of biopesticides is safer for preserving the survival of predators and parasitoids, whereas synthetic insecticides almost eradicate all natural enemies ([Prayogo & Bayu, 2020](#)). The ability of Taruna Tani Lestari to independently produce biopesticides, serving as a facilitator, contributes to assisting the community in Gentungan Village in achieving economic savings, as the costs of purchasing pesticides can be reduced by producing their own biopesticides.

This training enables Taruna Tani Lestari to become more acquainted with various surrounding plants that can be utilized as raw materials for biopesticides. The objective of the biopesticide training program is to equip Taruna Tani Lestari with practical skills in biopesticide production. Additionally, local farmers are expected to independently utilize natural materials to supply inputs, thereby fostering organic farming practices. Support is also provided to Taruna Tani Lestari and local farmers in land cultivation activities and plant care to ensure the optimal implementation of the training outcomes. The results of this community engagement initiative include the application of biopesticides and the dissemination of their utilization in Gentungan Village. The implementation stages are illustrated in Figure 1.

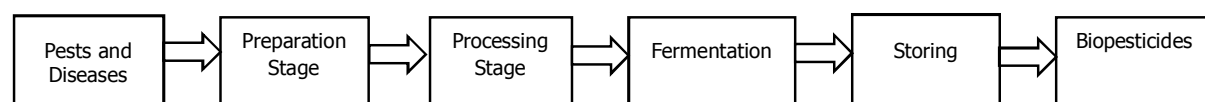


Figure 1. Implementation stages

## **2. METHODS**

### **Activity Design**

The training for biopesticide production was conducted at the residence of one of the members of Taruna Tani Lestari, Mr. Yuda, on Saturday and Sunday, August 12-13, 2023, located in Gentungan Village, Mojogedang District, Karanganyar Regency. This training was organized by the implementation team of PPK Ormawa HM Pelita in collaboration with relevant partners, including Kans.Id and Gentungan Village. The activity was initiated based on our discussions with community figures regarding unresolved issues in Gentungan Village, particularly concerning the prevalent use of chemical pesticides, which accelerates soil degradation. Therefore, we conducted a training on biopesticide production to introduce environmentally friendly alternatives to Taruna Tani Lestari in Gentungan Village.

The purpose of the biopesticide training is to provide knowledge and skills to Taruna Tani Lestari in producing environmentally friendly pesticides that are effective in controlling pests and diseases in agricultural crops. It is expected that through this training, Taruna Tani Lestari can shift from using chemical pesticides to environmentally friendly alternatives that do not harm soil microorganisms, thus preserving soil fertility. Additionally, the training aims to reduce farmers' production costs and enhance agricultural productivity.

### **Implementation Methodology**

#### **Presentation and Q&A session**

The training on biopesticide production is one of the sessions organized by the implementation team, PPK Ormawa HM Pelita 2023. The methodology for conducting the biopesticide training involves the use of presentation and Q&A methods. Presentation is a learning strategy where a presenter delivers material to the audience using specific media. The presentation method is used to facilitate the explanation of biopesticide-related topics, enabling participants to comprehend the information presented visually and auditorily. The presentation is conducted using a PowerPoint Presentation to provide participants with information not only from the speaker but also through visual aids. The presentation covers details about biopesticide production, including the definition of biopesticides, potential plant-based pesticides, tools and materials, and the manufacturing process. The objectives of the presentation method include information delivery, convincing the audience, entertaining, motivating and inspiring, conveying messages, and presenting ideas or concepts (Suana, 2020). In addition to presentations, the next implemented method is the Q&A session. The Q&A method is carried out in order to create a livelier training environment, allowing participants to express opinions and ask questions about unclear concepts. The Q&A method involves presenting lessons in the form of questions that must be answered, particularly from the speaker to the participants and vice versa (Manik, 2020).

Based on observations during the biopesticide training, there was noticeable active participation from the participants. This was evident in the frequency of participants asking questions, sharing opinions based on experience, and responding to questions posed by the presenter. The Q&A method proved to be an effective strategy, providing participants with opportunities to express their views and motivating others to cultivate a sense of curiosity. The implementation of the Q&A method in the biopesticide production training was conducted in group sessions with the goal of stimulating critical thinking among participants and offering experiences that contribute to their overall learning.

## **Practical training**

Competency enhancement can be achieved through structured and systematic training efforts to improve knowledge, skills, and behaviors in individual, organizational, and group capacities. Practical training is crucial to support the training process. The hands-on method is employed so that training participants can immediately apply the information provided by the facilitator. This approach allows participants to understand both the theory and practice of biopesticide production under the guidance of the trainer. The advantages of the practical method include participants being able to demonstrate their knowledge in real-life conditions, trainers providing direct feedback, and the immediate identification of information or skills that participants still need (Santoso, 2015).

The biopesticide production training begins with the trainer introducing the tools and materials used in the training. Subsequently, the trainer provides participants with the opportunity to directly engage in the biopesticide production using the tools and materials provided, under the guidance of the trainer. The practical aspect of biopesticide production also acquaints participants with readily available materials in their home environment, such as garlic, which is utilized for its bulb as an insecticide. Additionally, other plants are highlighted for their potential as botanical pesticides. Participants can easily grasp the material through the provided modules, facilitating a comprehensive understanding of the training content.

## **Module**

The biopesticide production training module is presented to Taruna Tani Lestari in the form of a PowerPoint presentation containing introductory and in-depth discussions on biopesticides. The module's development aims to enhance the participants' skills (Wijaya & Iriani, 2020). The success of biopesticide production relies heavily on the stages and materials used. Given its crucial significance, the training incorporates a module to serve as a reference for participants in both biopesticide production and as a teaching material for others. Trainers can create and develop their teaching materials that align with the content to be delivered. One essential teaching aid developed by a trainer is the module. A module is a written or printed learning tool systematically organized to provide information on learning materials, methods, learning objectives based on competencies, self-learning activity instructions (Self Introduction), and opportunities for participants to self-assess through exercises presented in the module (Al Azka et al., 2019).

## **Evaluation design**

The implementation of biopesticide production training extends beyond practical stages; there is a need for competence testing through tests or questionnaires. Several questions are provided to participants to serve as a baseline measure for assessing their understanding after completing the biopesticide production training. The execution of biopesticide production training involves three criteria that serve as fundamental benchmarks to gauge the participants' understanding. The success criteria for the training implementation include adherence to the planned training design, timeliness, active participation in discussions and Q&A sessions, participant count, and the smooth progression of activities until completion.

The success criteria from the participants' perspective include participants understanding the definition, functions, and benefits of biopesticides; participants comprehending the tools and materials used in biopesticide production; participants being able to practice the biopesticide production process

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and apply the information in the future. The success criteria from the organizers' perspective involve providing information tailored to participants' needs, delivering clear and effective examples, allowing participants opportunities for hands-on practice, ensuring an adequate number of participants, and providing excellent service by the organizing team.

### Activity Schedule and Implementation Stages

The schedule of implementation is a crucial tool in the time management of an activity. It serves as a method for determining and establishing the timing and resource allocation during the course of the activity. The purpose of creating the schedule is to define the stages of work according to the sequence of the implementation time, acting as a guide and control mechanism to ensure that the activities proceed according to the schedule. Additionally, it serves as a tool for evaluating the completed activities. The meeting schedule for the biopesticide production training is in Table 1.

**Table 1.** The schedule of training session meetings

<b>1st Meeting</b>	
Date	Saturday, 12 August 2023
Implementer	PPK Ormawa HM Pelita and Kans.id
Activity	<ul style="list-style-type: none"><li>- Explanation related to the upcoming activities, namely the provision of materials</li><li>- Explanation about biopesticides, ranging from potential materials for making biopesticides to the process of making biopesticides</li><li>- Providing feedback through interactive discussion related to the material of biopesticide production</li></ul>
Goal	Introducing the initial activities in the process of training for making biopesticides. Providing information about biopesticides and their benefits.
<b>2nd Meeting</b>	
Date	Sunday, 13 August 2023
Implementer	PPK Ormawa HM Pelita and Kans.id
Activity	<ul style="list-style-type: none"><li>- Introducing the initial activities in the process of training for making biopesticides</li><li>- Providing information about biopesticides and their benefits</li><li>- Explanation of the implementation method</li><li>- Introduction to the tool and materials to be used</li><li>- The process of making biopesticides</li><li>- Evaluation of obstacles in making biopesticides that have been carried out and the solutions used</li></ul>
Goal	<ul style="list-style-type: none"><li>- Introducing the proper way to make biopesticides</li><li>- Providing and introduction to the equipment used in the implementation of this community service program and examples of works that will be used as references in the implementation of the community service program</li></ul>

The implementation stages are a series of steps or processes that must be carried out to execute an activity in a structured and effective manner. The implementation stages consist of several phases such as planning, preparation, execution, and closure. The planning stage is the initial phase of an activity containing a detailed activity plan prepared before the actual implementation. The preparation stage involves field preparation, personnel, and everything needed for the smooth execution of the activity. The execution stage is the culmination of the entire activity plan, including the opening, welcome,

presentation of materials by speakers, Q&A, practice, and closure. Lastly, the closing stage is the final phase of an activity, concluding with the evaluation of the activity.

### **3. RESULTS AND DISCUSSION**

The biopesticide production training is one of the community service programs aimed at enhancing the self-sufficiency of Taruna Tani Lestari in the village of Gentungan to produce natural pesticides for organic farming. Biopesticides are considered an alternative to maintaining soil quality and optimizing the quality of agricultural produce by increasing antioxidant levels beneficial for health (Latumahina et al., 2020). The biopesticide production training is tailored to the needs of Taruna Tani Lestari in the village of Gentungan due to a lack of understanding of the economical production of biopesticides using natural ingredients. In addition to using natural ingredients, the application of biopesticides can serve as an alternative and cost-effective solution compared to expensive chemical pesticides (Mulyani et al., 2022). This activity is designed to motivate Taruna Tani in the village of Gentungan to independently create biopesticides. The implementation of this training is divided into three stages.

The first stage involves an explanation of the activities to be carried out during the training. Subsequently, the second stage involves the delivery of explanations, including both theoretical and practical aspects, of the biopesticide production training. In its implementation, the training is conducted in two sessions, divided into three activities: introduction, execution, and closure. The first meeting begins with an introduction to the trainer and an overview of the topics to be covered. The training session includes the presentation of material, followed by a question and answer session. The second meeting starts with an introduction to the practical aspects of biopesticide production, covering the tools and materials to be used. The execution activity involves the practical application of biopesticide production using the prepared tools and materials, and the closing activity includes the conclusion of the training event. The final stage is an evaluation phase related to the training implementation, identification of challenges, finding solutions, and planning post-biopesticide production training activities.

#### **Implementation Stages**

##### **Presentation**

The presentation involves the delivery of material by the presenter, starting with an explanation related to biopesticides. The purpose of this explanation is to provide the audience with a general understanding of biopesticides so that they can grasp the overall concept of the training. The material presentation continues by introducing various types of biopesticides, biopesticide ingredients, and the process of biopesticide production. Technical explanations and practical demonstrations of biopesticide production aim to enable participants to understand the benefits, create, and apply biopesticides to plants. The strengths of the presentation include the delivery of information aligned with the speaker's genuine emotions. Another advantage is that the presentation media features enable participants to engage in interactive question and answer sessions with visually appealing displays (Sundari et al., 2021).

##### **Material selection**

Material selection is carried out with the aim of informing participants about what can be utilized to create biopesticides. This stage enhances participants' knowledge and practical skills related to the basic ingredients of biopesticides. Material selection aims to increase knowledge, learning, and

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skills regarding the selection of basic ingredients for biopesticide production, training in biopesticide manufacturing, and guidance on direct application to agricultural fields (Oktavia et al., 2020).

Plants with the potential to become biopesticides include papaya, betel, garlic, bintaro fruit, and others. The materials used in this biopesticide production training include garlic, turmeric, galangal, ginger, bird's eye chili, soursop leaves, mahogany seeds, stink beans, stink fruit, wood ash, cigarettes, and water. Once the material selection is prepared, the production and practice of biopesticides can be initiated.

### **Design**

This stage is the phase conducted before the creation of an object, system, component, or structure. The aim of this stage is to ensure that the created object has functionality, aesthetic value, and utility. Designing provides practical skills for an individual in designing or structuring a product. Design introduces creativity that links form, structure, material, color, image, typology, and design elements with product information for effective marketing (Rahayu & Sutama, 2023). Through this process, a clear picture or design perspective can be easily developed through sketching. The biopesticide is packaged in a 1-liter container accompanied by a product sticker.

### **Material processing**

In the material processing stage, the raw materials for biopesticide production are processed. The raw materials include 3 cloves of garlic, 100 grams each of turmeric, ginger, and galangal, 3 bird's eye chilies, soursop leaves, 10 mahogany seeds, 3 stink beans, 5 jengkol seeds, and 1 cup of wood ash. Processing is carried out with the help of a mortar until the ingredients are well mixed and then stored in a gallon containing 1 liter of water to be dried. One example of environmentally friendly farming implementation is the use of eco-friendly pesticides (Mamat & Sukarman, 2020).

### **Review**

This stage is conducted after 1 week of the fermentation period for the biopesticide. The products made by the participants are reviewed to ensure their readiness for use. The key to plants that have the potential to be biopesticides is the presence of a pungent smell (Rahayu et al, 2018).

### **Display**

After the biopesticide is ready for use, samples are taken to be displayed in activities such as expos or bazaars at Universitas Sebelas Maret. The biopesticide is packaged in 1-liter jerry cans and labeled to be introduced to visitors. Through this introduction, it is hoped that more people will be educated about biopesticides and develop an interest in making their own natural pesticides as a form of environmental concern. This aligns with research Adriyani (2006) indicating that pesticides with granule formulations undergo processes in soil and water, posing a possibility of soil and water pollution.

### **Closing**

The final stage of the biopesticide training activity involves storing the potential biopesticide and concluding with a prayer and expressions of gratitude to all parties involved. In the following week, a check is conducted to ensure the readiness of the biopesticide for use.

### **Material content of the activity**

The activity's material content consists of a community service program that provides training on biopesticide production to the Taruna Tani Lestari (Youth Farmers) of Gentungan Village and representatives from the surrounding community. The organizing team collaborates with partners who have expertise in teaching and guiding the training, covering both theoretical aspects and practical biopesticide production. The training materials have been carefully prepared based on research findings and summaries from various references related to biopesticides. These materials serve as a fundamental guide for the practical implementation of biopesticide production, detailing the necessary tools, materials, and procedures.

The training materials are designed to be concise and straightforward, focusing on key points for easy comprehension. The material presentation takes place during the first meeting of the training program. The topics covered include an overview of botanical pesticides, an explanation of plants with potential as botanical pesticides and their benefits, the dual-purpose production of botanical pesticides and organic fertilizers, tools and materials for biopesticide production, and the actual process of making biopesticides. In practice, the training is divided into two sessions, with the first session dedicated to understanding the material and the second session involving hands-on biopesticide production. The training is facilitated by a partner, Kans.id, through a PowerPoint presentation (PPT) during the presentation session. The training materials on biopesticides can be accessed through the following link: [https://drive.google.com/file/d/1L6vrBEuZ9xVHO5jART-aUvbighV3YcOu/view?usp=drive\\_link](https://drive.google.com/file/d/1L6vrBEuZ9xVHO5jART-aUvbighV3YcOu/view?usp=drive_link)

The training activity is conducted in two sessions, with the first session starting with the introduction of one of the partner teams as the presenter. The biopesticide-making training begins with introducing the presenter, followed by the presentation of materials. The first material covers a general introduction to biopesticides, proceeds to the introduction of tools and materials used in the biopesticide-making process, and concludes with material on how to make biopesticides. The material presentation process takes place interactively involving the presenter, Taruna Tani Lestari from Gentungan Village, the supervising lecturer, and other invited guests. The learning process becomes more engaging when discussions are held about the presented material. Figure 2 illustrates the material presentation activity in the biopesticide-making training.



**Figure 2.** Material presentation activity

The second meeting involves the practical activity of making biopesticides, starting with the preparation of tools and materials. The subsequent process involves mixing the materials in the specified proportions outlined in the guide material. The instructor in the training always provides instructions for each manufacturing process to ensure compliance with the correct procedures and rules. The manufacturing process begins with the grinding of all types of materials using the provided mortar and



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pestle. The grinding process does not take much time as there are no hard-textured materials. Almost all training participants enthusiastically engage in each step of the biopesticide-making process.



**Figure 3.** Raw materials (left) and process of making biopesticides (right)

The pesticide-making process continues by mixing the liquid ingredients in a container with the finely ground raw materials. The biopesticide liquid, not an instant product, needs to be covered and left to stand for two weeks after the manufacturing process. The biopesticide-making training activity concludes with a review of the manufacturing process and the resulting product. The review not only covers the process but also provides solutions to any challenges encountered during the biopesticide-making process.



**Figure 4.** Biopesticide display at the Expo of Village Product mentored by MBKM 2023 students

The results of the biopesticide, which has been produced, were sampled to be showcased at the Expo of Village Products Mentored by MBKM 2023. The biopesticide used as a display product from the training was packaged in 1 L jerry cans and labeled to be introduced to the visitors. The main objective of setting up the display at the Expo of Village Products Mentored by MBKM 2023 is to attract the interest of visitors to learn more about processed biopesticide products that use natural and cost-effective ingredients. The hope in placing this biopesticide product display is to educate visitors about natural pesticides that should be applied as a form of concern for organic and sustainable agriculture.

### Discussion

This community service program is directed towards Taruna Tani Lestari in the village of Gentungan, focusing on the production of biopesticides as an effort to strengthen organic farming in the village. The

activity is carried out by Taruna Tani Lestari from the village of Gentungan, along with representatives from the surrounding community who are members of the Karang Taruna organization in the village, participating as trainees in this workshop. The implementation of this activity is led by the PPK Ormawa HM Pelita 2023 team, collaborating with partners who have the potential to provide guidance and instruction, covering topics from biopesticide-related materials to the actual practice of biopesticide production. In this context, Taruna Tani Lestari from the village of Gentungan is highly enthusiastic about participating in the biopesticide production. During the implementation of this community service program in the form of a training workshop, the goal is to enhance participants' knowledge about biopesticide production for controlling rice field pests. This is essential because, according to [Aprilianti & Mulyawan \(2021\)](#), while the use of pesticides is not uncommon, excessive use can lead to negative impacts such as the emergence of new pests, pest resistance, and the extinction of predators. Therefore, the community service program, in the form of biopesticide production training, aims to help participants gain knowledge and techniques for producing environmentally friendly natural pesticides as an alternative to traditional pesticides.

Based on the results of the activities, the implementation of the community service program by the organizing team from Universitas Sebelas Maret Surakarta yielded the following outcomes: (1) It commenced with an introduction to the material presented by the partner in the biopesticide-making training, followed by the core material presentation. The material began with an overview of biopesticides. It then proceeded with the introduction of tools and materials, concluding with the practical aspect of biopesticide production. The delivery of material proceeded smoothly and interactively, involving all participants, invited guests, and team members present; (2) Through this community service program, it successfully increased the knowledge of Taruna Tani Lestari and honed practical skills in biopesticide production. The knowledge enhancement is evident in the tangible outcome of biopesticides produced by the participants; (3) There was an elevation in the participants' knowledge about natural ingredients in the surrounding environment that have the potential to be used as raw materials for biopesticides; (4) Providing module material in the form of a PowerPoint presentation containing dosage information and guidance serves as an additional knowledge tool regarding the biopesticide production process, utilizing readily available and discoverable materials. This can focus participants' knowledge on the utilization process until the biopesticide application, creating a semi-finished product, as it awaits the drying process before being ready for use as a pest control agent in rice fields.



**Figure 5.** Active participants as supporting factors in activities

In the implementation of this community service, several success factors contributed to the enhancement of knowledge among Taruna Tani Lestari, namely: (1) Assistance provided by members of Taruna Tani Lestari Gentungan Village in offering facilities such as the venue and actively involving

participants contributed to the success of the training program; (2) Support from the partner organizing team in delivering training materials to the participants; (3) The high level of interaction and enthusiasm displayed by the participants during the activities. Additionally, the strong interest was evident in the Q&A sessions aimed at obtaining information from the presenters during the practical sessions; (4) The absence of other distracting activities throughout the program. This was due to the prior permission obtained from relevant parties, including community leaders at the RT and RW levels, as well as the security personnel at the venue. Furthermore, since the participants were already acquainted, there was no awkwardness among them, facilitating effective and interactive communication; (5) Provision of refreshments by the organizing team during the community service program. Refreshments were provided to keep participants engaged and motivated during the training sessions.

The implementation of this community service program also encountered several inhibiting factors in the process of enhancing knowledge for Taruna Tani Lestari during the activity, namely: (1) The direct training format required practical explanations to the participants in each session. This was based on the participants' limited knowledge of the techniques and processing methods involved in biopesticide production; (2) A hindrance was identified in the teaching method employed during the training, which heavily emphasized practical aspects. Some participants still needed specific assistance in biopesticide production. The evaluation of Taruna Tani Lestari's biopesticide production skills was conducted through a post-test, indicating that they could independently produce biopesticides by understanding the direct training on biopesticide production. This outcome was reasonable considering that the training utilized facilities owned by one of the participants from Taruna Tani Lestari Gentungan Village, which were not designed as a dedicated workspace. This program aims to provide benefits to Taruna Tani, especially, and also to the PPKOK HM Pelita team. The success of the training program is marked by the improvement in knowledge and skills (Taba et al., 2023). This success can be further enhanced to provide new knowledge for all involved parties.

#### **4. CONCLUSION AND RECOMMENDATIONS**

The community service program in the Gentungan Village aims to provide practical training, introduction, and knowledge to the participants, who are members of the Taruna Tani Lestari, regarding the production of biopesticides using natural ingredients readily available in the environment. The achievement of this training program is an increase in the capabilities of Taruna Tani Lestari in producing biopesticides, understanding their benefits, and their application. The impact of this training is the attainment of enhanced abilities by Taruna Tani Lestari to independently produce biopesticides and utilize them to reduce the costs of purchasing production inputs. Taruna Tani Lestari has successfully educated local farmers, especially those engaged in organic farming, on creating and implementing biopesticides. Furthermore, the hope is that through this program, the village of Gentungan can continue to lead in promoting organic farming in the Karanganyar Regency.

Based on the conducted community service, it is recommended for future endeavors to establish small class formations for additional materials and the reinforcement of the participants' skills. Ongoing mentoring is essential to ensure the adoption of the innovations presented during the training. In the implementation of the training, it is crucial to involve stakeholders to promote program sustainability. Members of Taruna Tani Lestari are advised to continue striving to be key informants in disseminating knowledge and practical skills related to the production of biopesticides using natural ingredients. It is hoped that with the completion of this community service activity, it can serve as a viable alternative and solution that can be comprehensively applied in the village of Gentungan.

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## REFERENCES

- Adriyani, R. (2006). Usaha pengendalian pencemaran lingkungan akibat penggunaan pestisida pertanian. *Jurnal kesehatan lingkungan*, 3(1), 95-106.
- Al Azka, H. H., Setyawati, R. D., & Albab, I. U. (2019). Pengembangan modul pembelajaran. *Imajiner: Jurnal Matematika dan Pendidikan Matematika*, 1(5), 224-236. <https://doi.org/10.26877/imajiner.v1i5.4473>
- Aprilianti, I., & Mulyawan, S. (2021). Pelatihan pembuatan biopestisida dan pemanfaatan lahan untuk tanaman hortikultura. In *Proceedings UIN Sunan Gunung Djati Bandung*, 1(13), 57-66.
- Arsyadana, A., & Suryani, T. (2014). *Efektivitas biopestisida Biji Mahkota Dewa (Phaleria macrocarpa) dengan lama fermentasi yang berbeda untuk mengendalikan Hama Keong Mas (Pomacea canaliculata) pada Tanaman Padi (Oryza sativa L)* (Doctoral dissertation, Universitas Muhammadiyah Surakarta).
- Bariqi, M. D. (2018). Pelatihan dan pengembangan sumber daya manusia. *Jurnal studi manajemen dan bisnis*, 5(2), 64-69. <https://doi.org/10.21107/jsmb.v5i2.6654>
- Latumahina, F., Mardiatmoko, G., & Tjoa, M. (2020). Penggunaan biopestisida nabati dari bahan dasar TOGA untuk pengendalian hama rayap pada pembibitan pala dan cengkeh milik Kelompok Tani Spirit di Desa Liliboi. *Jurnal Karya Abdi Masyarakat*, 4(2), 288-298. <https://doi.org/10.22437/jkam.v4i2.10539>
- Mamat, H. S., & Sukarman, S. (2020). Manfaat inovasi teknologi sumberdaya lahan pertanian dalam mendukung pembangunan pertanian. *Jurnal Sumberdaya Lahan*, 14(2), 115-132.
- Manik, I. K. (2020). Efektivitas metode tanya jawab multi arah untuk meningkatkan hasil belajar IPS. *Mimbar PGSD Undiksha*, 8(1), 133-142. <https://doi.org/10.23887/jjpsd.v8i1.24598>
- Mulyani, R. B., Melhanah, L. S., & Kresnatita, S. (2022). Pelatihan pembuatan biopestisida secara sederhana pada kelompok tani di Kota Palangka Raya sebagai solusi efisiensi biaya di masa pandemi Covid 19. *Bubungan Tinggi: Jurnal Pengabdian Masyarakat*, 4(2), 467-477. <https://doi.org/10.20527/btjpm.v4i2.5148>
- Oktavia, H. F. (2020). Pemberdayaan petani dalam mengurangi residu melalui pertanian ramah lingkungan di BPP Tambun Utara, Kabupaten Bekasi. *Abdi Wiralodra: Jurnal Pengabdian Kepada Masyarakat*, 2(1), 27-38. <https://doi.org/10.31943/abdi.v2i1.21>
- Prayogo, Y., & Bayu, M. S. Y. I. (2020). Pengembangan teknologi pengendalian hama utama kacang hijau menggunakan biopestisida. *Jurnal Entomologi Indonesia*, 17(2), 70-80. <https://doi.org/10.5994/jei.17.2.70>
- Purnomo, S. H., Emawati, S., Sari, A. I., Rahayu, E. T., & Dewanti, R. (2022). Pengembangan Agrowisata Berbasis Sistem Integrasi Tanaman-Ternak (SITT) di Desa Gentungan, Kecamatan Mojogedang,

### Training on making biopesticides as effort to strengthen organic agriculture by Taruna Tani Lestari

Arthaka Damascena, Divanissa Kusumaningrum, Emi Widiyanti, Ines Fitriana, Lintang Mukti, Perdana Mangayu, Rival Fairuz, Salsyabila Fajrin, Samuel Suryowidhi

Kabupaten Karanganyar. In *Seminar Nasional Pengabdian Masyarakat & CSR-Fakultas Pertanian UNS*, 2(1), 266-273).

- Purwandari, V., Harahap, M., & Tarigan, M. (2022). Pelatihan pengolahan limbah biomassa menjadi biopestisida di SMK Swasta Pertanian Paba-Binjai. *Jurnal Abdimas Mutiara*, 3(2), 13-19.
- Rahayu, N. P. P., & Utama, I. W. (2023). Perancangan kemasan produk Senat Senut Pisang Nugget di Desa Selat. *Abdimas Galuh*, 5(1), 791-796. <http://dx.doi.org/10.25157/ag.v5i1.10039>
- Rahayu, R., Nasir, N., & Nurmansyah, N. (2018). Introduksi penggunaan biopestisida sederhana dari tumbuhan lokal Sumatera Barat. *Jurnal Hilirisasi Ipteks*, 1(4.A), 174-181.
- Salaki, C. L., Paendong, E., & Pelealu, J. (2012). Biopestisida dari ekstrak daun pangi (*Pangium* sp.) terhadap serangga *Plutella xylostella* di Sulawesi Utara. *Eugenia*, 18(3). <https://doi.org/10.35791/eug.18.3.2012.4092>
- Santoso, B. (2015). *Skema dan mekanisme pelatihan: Panduan penyelenggaraan pelatihan*. Jakarta: Yayasan Terumbu Karang Indonesia.
- Saputri, A., Damayanti, F., & Yulistiana, Y. (2023). Potensi ekstrak daun pepaya sebagai biopestisida hama ulat grayak pada tanaman kangkung darat. *EduBiologia: Biological Science and Education Journal*, 3(1), 25-32. <http://dx.doi.org/10.30998/edubiologia.v3i1.15796>
- Sihombing, M. A. E. M., & Samino, S. (2015). Daya repelensi biopestisida terhadap Walang Sangit (*Leptocoris oratorius*, Fabricus) di laboratorium. *Biotropika: Journal of Tropical Biology*, 3(2), 99-103.
- Suana, N. (2020). Pelaksanaan model pembelajaran problem based learning dibantu metode presentasi untuk meningkatkan prestasi belajar IPA siswa. *Jurnal Santiaji Pendidikan*, 10(2), 148-158. <https://doi.org/10.36733/jsp.v10i2.1087>
- Sundari, D. H., Iskandar, I., & Muhlis, M. (2021). Penerapan media presentasi classpoint untuk meningkatkan hasil belajar siswa pada mata pelajaran Bahasa Inggris MAN 19 Jakarta. *Jurnal Pemikiran dan Pengembangan Pembelajaran*, 3(3), 1-9.
- Taba, P., Mustangin, M., Lukman, A. I., & Alisalman, M. (2023). Analisis penyelenggaraan pelatihan pembuatan pestisida nabati bagi binaan CSR PT. GBU Kabupaten Kutai Barat di Desa Jengan Danum. *Kompetensi*, 16(1), 66-74. <https://doi.org/10.36277/kompetensi.v16i1.86>
- Tuhuteru, S., Mahanani, A. U., & Rumbiak, R. E. (2019). Pembuatan pestisida nabati untuk mengendalikan hama dan penyakit pada tanaman sayuran di Distrik Siepkosi Kabupaten Jayawijaya. *Jurnal Pengabdian Kepada Masyarakat*, 25(3), 135-143. <https://doi.org/10.24114/jpkm.v25i3.14806>
- Wijaya, F., & Iriani, A. (2020). Pengembangan modul pelatihan penggunaan aplikasi Edmodo untuk meningkatkan kompetensi ICT guru di sekolah Kristen Kanaan Semarang. *Jurnal Ilmiah Pendidikan dan Pembelajaran*, 4(1), 12-18. <https://doi.org/10.23887/jipp.v4i1.22927>
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