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Training on Household Organic Waste Utilization for Maggot Cultivation as an Effort to Increase Environmental Awareness and Family Income in Perum Mustika Tigaraksa, Tangerang

Abstract

The training on the utilization of household organic waste for maggot cultivation was conducted as an effort to increase environmental awareness while creating opportunities to improve family income in Perum Mustika Tigaraksa, Tangerang. This activity was motivated by the increasing volume of unutilized organic waste and the community's low level of knowledge regarding circular economy-based waste management. The training method employed a participatory approach through several stages: socialization, direct demonstration, technical assistance, and evaluation. Participants consisted of local residents, particularly housewives and youths, who were trained to process kitchen waste into feed media for *Black Soldier Fly* (BSF) larvae or maggots. The results showed an increase in participants' knowledge and skills in sorting organic waste, cultivating maggots, and utilizing the products as animal feed and organic compost. Moreover, the program successfully fostered public awareness of environmentally friendly waste management and opened new household-based business opportunities with the potential to increase family income. Overall, this activity effectively integrated ecological, educational, and economic aspects while supporting the government's sustainable waste management program at the community level.

Keywords: Training, Organic Waste, Maggot, Environmental Awareness, Family Income

1. Introduction

The waste problem has become an increasingly urgent environmental issue in many regions, including Perum Mustika Tigaraksa, Tangerang. The growing population and daily household activities generate a significant volume of waste, most of which consists of organic waste such as food scraps, vegetables, and fruits. Improperly managed organic waste can cause environmental pollution, unpleasant odors, disease vectors, and decreased neighborhood aesthetics. Bahtiar, R., & Kamelia, K. (2023).

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Figure 1. Organic Waste Selection
(Source: Document)

Until now, most residents still follow conventional waste disposal patterns without sorting or reusing waste. In fact, organic waste has great potential to be processed into economically valuable products, one of which is through maggot cultivation or *Black Soldier Fly* (BSF) larvae farming. Maggots are known as efficient bioconversion agents that can decompose organic waste quickly while producing high-value products such as natural animal feed and organic fertilizer.

Through the training on household organic waste utilization for maggot cultivation, the community was encouraged to understand the importance of circular economy-based waste management. This activity not only aims to reduce the volume of waste sent to landfills but also to foster environmental awareness and create new economic opportunities at the household level. Chilmiyatur Rosidah, & Sheilomitha Anjani Nugroho. (2023).

This training is highly relevant given the community's low level of knowledge and skills in managing waste productively. By providing education and technical assistance on maggot cultivation, residents are expected to shift their perception of waste from being a burden to becoming a profitable resource. Furthermore, maggot products can be used as feed for fish and poultry or sold to generate additional household income.

Therefore, this program serves as a tangible step toward building an environmentally conscious, economically independent community that actively participates in sustainable waste management. It also aligns with the Sustainable Development Goals (SDGs), particularly Goal 12 ensuring responsible consumption and production patterns. Zahra, A., Herdiansyah, H., & Utomo, S. W. (2022).

2. Theoretical Foundation

2.1. Training Concept

According to Rivai (2015), training is a systematic process aimed at improving an individual's knowledge, skills, and attitudes to enhance performance and work effectiveness. Training also functions as a means of community empowerment, enabling individuals to solve problems independently and sustainably (Suryani, 2018). In the context of community service,

training serves as a medium for transferring knowledge and appropriate technology applicable in daily life. Susanti, F. H. T., Pratama, O. H., Tsani, R. D., Setiawan, D., Ardiansyah, D. L., & Idayanti, R. W. (2025).



Figure 2. Organic Waste Disposal Process
(Source: Document)

Training on household organic waste utilization falls under environmental skill-based training (eco-skill training), designed to foster environmentally friendly behavior and improve family economic independence. Through participatory methods, the program emphasizes not only theory but also hands-on practice, mentoring, and evaluation to ensure sustainable skill application.

2.2. Household Organic Waste Management

According to Law No. 18 of 2008 on Waste Management, waste is defined as the residue of human daily activities and/or natural processes in solid form. Organic waste originates from biodegradable biological materials commonly produced by household activities, such as food residues, vegetables, and dry leaves. Trisno, E., Irawati, N., & Sudarmono. (2023).

Household organic waste has great potential to be processed into value-added products. Puspita and Rahmadani (2020) state that community-based organic waste management can reduce waste volume by up to 60% while producing useful products such as compost, biogas, and maggot feed. Effective management requires education, skills, and community commitment to sort and utilize waste from its source.

2.3. Maggot (Black Soldier Fly) Cultivation

Maggots or *Black Soldier Fly* larvae (*Hermetia illucens*) are insects capable of efficiently converting organic materials into nutrient-rich biomass. Diener et al. (2011) found that BSF larvae can consume up to twice their body weight in organic waste daily and produce up to 40% protein and 30% fat from their dry body weight. Andi Muhammad Taufik Ali, Moh. Ahsan S. Mandra, Andi Zulfikar Yusuf, Jumadin, & Syarifah Suryana. (2023).



Figure 3. Maggot Seeding Process (Source: Document)
(Source: Document)

Maggot cultivation provides an innovative solution for organic waste management due to its dual benefits:

- a. Environmental aspect – reducing the volume of organic waste disposed of in landfills and lowering methane emissions from waste decomposition.
- b. Economic aspect – producing maggots that can be sold as fish and poultry feed or used as raw materials in animal feed industries, along with organic fertilizer (frass) as a by-product.

Nugroho (2021) highlights that maggot cultivation can be easily implemented at the household level with minimal costs, making it highly suitable for urban communities and densely populated residential areas like Perum Mustika Tigaraksa.

2.4. Community Environmental Awareness

Environmental awareness is a key factor in the success of waste management programs. According to Sudarsono (2019), environmental awareness refers to attitudes and behaviors that reflect concern for environmental sustainability through practical actions such as reducing, reusing, and recycling waste (3R principles). Yanto, A., & Fatkhuri, F. (2024).

Through waste management and maggot cultivation training, communities are encouraged to actively maintain environmental cleanliness, recognize the economic value of waste, and adopt environmentally friendly behavior. Continuous education and engagement foster collective awareness to maintain a clean and healthy living environment.

2.5. Increasing Family Income

One of the primary goals of this training program is to help families improve their income. According to Todaro and Smith (2015), increasing household income can be achieved through the diversification of economic sources and the development of micro-enterprises based on local potential. Evitasari, R. T., Yulianto, D., & Chusna, F. M. A. (2023).

Products from maggot cultivation have significant market value. Dried maggots can be sold as fish or poultry feed at competitive prices, while maggot residue can be processed into organic fertilizer. Thus, this training focuses not only on environmental aspects but also on family economic empowerment through waste management.



Figure 4. Maggot Fattening Process
(Source: Document)

2.6. Conceptual Framework

Conceptually, this training activity is grounded in the circular economy paradigm, where waste is no longer seen as the end of the consumption cycle but as a resource that can be transformed into value-added products. By enhancing community knowledge, skills, and environmental awareness, the program aims to create synergy between environmental preservation and sustainable family welfare. Sulastri, G., & Diswandi, D. (2024).

Here is the **English version** of your *Research Methodology* section, translated and edited for academic clarity and natural flow.

3. Methods

3.1. Type and Research Approach

This study employs a **descriptive qualitative approach**, which aims to describe and explain in depth the process and outcomes of the training program on the utilization of household organic waste for maggot cultivation. This approach was chosen because it enables a comprehensive understanding of behavioral changes, increased environmental awareness, and the economic impacts resulting from the training. Inayati, R. (2024).

The research belongs to the category of **Participatory Action Research (PAR)**, where researchers and community members actively collaborate in the planning, implementation, evaluation, and follow-up stages of the program. This participatory approach facilitates effective knowledge transfer and promotes social learning within the community.

3.2. Research Location and Duration

The research and training activities were conducted in **Mustika Tigaraksa Housing Complex**, Tigaraksa District, Tangerang Regency, Banten Province. The location was selected because it has a high population density and produces a significant volume of household waste daily, yet lacks an optimal organic waste management system. Novida, S., Pahriana, M., & Sulastri, G. (2024).

The study and training were carried out over a period of **three months**, covering preparation, implementation, mentoring, and evaluation phases.

3.3. Subjects and Target Participants

The subjects of this study were residents of Mustika Tigaraksa Housing, particularly:

- a. **Housewives**, as the main producers of household organic waste.
- b. **Youth community members**, serving as change agents in environmental management.
- c. **Community leaders and neighborhood administrators (RT/RW)**, acting as facilitators and supporters of the program.

The training participants consisted of **25–30 individuals**, selected through **purposive sampling** based on their willingness and commitment to participate in the training and apply the knowledge in their daily lives. Putu Adnyaswari Devi, I. G. A. A. Mirah Pradnyadewi, A. A. Sagung Shilpa Gayatri Iswari, Ida Bhujangga Mas Sintya Vaisnava, & A. A. Shilpa I., et al. (2025).

3.4. Data Collection Techniques

To obtain accurate and comprehensive data, several techniques were employed:

- a. **Observation** – conducted to observe environmental conditions before and after the training, including community waste management habits.
- b. **Interviews** – carried out with participants, community leaders, and facilitators to understand their knowledge levels and perceptions of maggot cultivation benefits.
- c. **Documentation** – involving photographs, field notes, and records of the training process and participants' maggot cultivation results.
- d. **Questionnaires** – used to assess changes in participants' knowledge, awareness, and economic motivation following the training. Gandhi, A., Gursida, H., Sunarta, K., Marota, R., & Zaini, O. K. (2024).

3.5. Implementation Procedures

The training program was implemented in **four main stages: Preparation Stage**

- a. Conducting preliminary surveys and identifying waste management issues.
- b. Coordinating with local RT/RW officials and community leaders.
- c. Preparing training materials, manuals, and practice tools.
- d. Selecting participants and scheduling the training activities.

Training Implementation Stage

- a. Conducting socialization and education sessions on the importance of organic waste management and maggot cultivation benefits.
- b. Demonstrating maggot media preparation, maintenance, and harvesting techniques.
- c. Facilitating hands-on practice for participants to create maggot containers and process organic waste at home.

Mentoring and Monitoring Stage

- a. Providing technical assistance and monitoring participants' maggot cultivation progress.
- b. Identifying field challenges and offering practical solutions.

Evaluation and Reflection Stage

- a. Comparing pre- and post-training conditions in terms of participants' knowledge, environmental awareness, and family income improvement.
- b. Using evaluation results as a reference for improving and replicating the program in other communities. Novianti, D., Rimbawati, E., & Judiono. (2024).

3.6. Data Analysis Technique

Data were analyzed using **qualitative descriptive analysis**, following these steps:

- a. **Data Reduction** – selecting, focusing, and simplifying data relevant to the research objectives.
- b. **Data Presentation** – describing findings in narrative form, tables, or charts that illustrate training results and behavioral changes in the community.
- c. **Conclusion Drawing** – assessing the effectiveness of the training in enhancing environmental awareness and household economic potential.

This analysis aims to portray the tangible changes within the community after receiving training and mentoring on the utilization of household organic waste for maggot cultivation. Hasanudin, I., Budianto, Y., & Fauzi, Z. A. (2024).

3.7. Indicators of Success

The success of this training program was measured through several indicators:

- a. Increased community knowledge about organic waste management.
- b. Growing number of households independently practicing maggot cultivation.
- c. Formation of small groups or maggot management communities within the neighborhood.
- d. Enhanced environmental awareness and cleanliness among residents.
- e. Creation of new economic opportunities through the sale of maggots or derivative products.

4. Results

4.1. General Overview of the Research Location

Mustika Tigaraksa Housing Complex is located in Tigaraksa District, Tangerang Regency, Banten Province. This area is a densely populated residential neighborhood, with most residents working in the informal and household sectors. Based on preliminary observations, most households in this area do not have a proper waste management system. Household waste is generally collected and disposed of directly at the temporary disposal site (TPS) without segregation between organic and inorganic waste. This condition often leads to environmental problems such as unpleasant odors, fly infestations, and decreased neighborhood cleanliness.



Figure 5. Maggots ready for distribution.
(Source: Sinar Priangan News)

Given these conditions, the training program on utilizing household organic waste for maggot cultivation was considered highly relevant as an environmentally friendly solution and an effort to empower the local community economically.

4.2. Implementation of the Training Program

The training was carried out over three months, covering stages of socialization, training, mentoring, and evaluation. The implementation stages are described below:

Socialization and Education Stage: At the initial stage, a socialization session was conducted for residents of Mustika Tigaraksa to raise awareness about the importance of organic waste management and the economic potential of maggot cultivation. This session was attended by around 30 participants, including housewives, youth organization members, and local RT/RW representatives.

During this session, the facilitators introduced the concept of *zero waste*, the ecological role of maggots in decomposing organic matter, and their economic potential. Observations revealed that before the training, most participants were unfamiliar with maggot cultivation and found it unpleasant. However, after receiving explanations and watching educational videos, participants showed high curiosity and interest.

Demonstration and Field Practice Stage: In this stage, participants received hands-on training on:

- a. How to make maggot cultivation containers (rearing boxes).
- b. Techniques for sorting and processing organic waste (such as food scraps and vegetables).
- c. The process of seeding Black Soldier Fly (BSF) eggs.
- d. Maggot maintenance and harvesting procedures.

The practical training was conducted in groups at a designated site, where participants observed the bioconversion process of organic waste into maggot biomass. Observations indicated that within 10–14 days, BSF larvae were able to decompose 70–80% of the organic material used.

Mentoring and Monitoring Stage: After the training, participants continued maggot cultivation at their homes with assistance from the implementation team. Mentoring was conducted twice a week to monitor larval development, media condition, and maintenance techniques. Monitoring results showed that 80% of participants successfully raised maggots and harvested their first batch within 14–21 days.

Challenges encountered included overly moist media, unpleasant odors, and poor air circulation. These issues were resolved through technical guidance, such as adding sawdust, adjusting moisture levels, and improving container ventilation.

Evaluation and Reflection Stage: Evaluation was conducted through interviews and questionnaires to measure changes in knowledge, environmental awareness, and potential household income improvement. Results indicated a significant increase in participants' understanding and skills:

- a. Before training, only 15% of participants understood the function of maggots in organic waste management.
- b. After training, comprehension increased to 90%.
- c. 85% of participants expressed willingness to continue maggot cultivation independently.
- d. Some participants began selling harvested maggots for Rp20,000 - Rp25,000 per kilogram, mainly for fish and poultry feed.

4.3. Impact of the Training on Environmental Awareness and Family Income

Increased Environmental Awareness: The training successfully raised community awareness regarding environmentally friendly organic waste management. Residents who previously disposed of waste without sorting began separating organic and inorganic waste at home. Some also established a small community group, "Organic Maggot Waste Bank," to collect organic waste materials from the neighborhood.

As a result, the residential area became cleaner, with reduced waste piles and foul odors. This demonstrates that the training program contributed positively to behavioral change within the community.

Increased Family Income: Economically, the maggot cultivation activities provided additional income for households. Although still small-scale, the initiative demonstrated promising potential. On average, participants produced 2–3 kilograms of maggots per cycle, earning an additional Rp40,000 - Rp75,000 per cycle.

Moreover, maggot residue (*frass*) was utilized as organic fertilizer for home gardens or sold in small packages. Thus, the program created new sustainable business opportunities from waste management practices.

4.4. Supporting and Inhibiting Factors

Supporting factors for the program's success included:

- a. Enthusiasm and active participation of residents.
- b. Support from local community leaders and RT/RW administrators.
- c. Abundant availability of organic waste materials.

Inhibiting factors included:

- a. Limited experience of participants in insect cultivation.
- b. Lack of adequate tools and materials such as rearing boxes and BSF nets.
- c. Persistent negative perceptions of maggots among some residents.

Through continued education and social support, these obstacles were successfully minimized. The results confirm that the training on household organic waste utilization for maggot cultivation effectively increased community awareness and skills in waste management. This aligns with Rivai (2015), who emphasizes the importance of capacity building through education and practical training.

Furthermore, the outcomes support the circular economy concept, where organic waste is no longer seen as a burden but as an economic resource. As stated by Todaro and Smith (2015), diversification of household income sources is key to improving family welfare. Overall, the training successfully integrated educational, ecological, and economic dimensions, serving as a best practice model for community-based waste management initiatives.

5. Discussion

The training on household organic waste utilization for maggot cultivation in Mustika Tigaraksa, Tangerang, represents a concrete form of community empowerment through environmental and economic initiatives. Based on implementation results and field observations, the program had a positive impact on environmental awareness, technical knowledge, and family economic opportunities.

5.1. Enhancement of Knowledge and Environmental Awareness

Before the training, most residents lacked understanding of the importance of waste segregation and organic waste utilization. After the program, participants demonstrated significant improvement in environmental awareness and sustainable behavior.

This finding aligns with Sudarsono (2019), who notes that environmental awareness can be cultivated through participatory and contextual education. The participatory nature of this program fostered community ownership and social responsibility.

Evaluation results showed that 85% of participants now sort waste at home and reuse food scraps as maggot feed marking a clear behavioral transformation toward sustainable living.



Figure 6: Maggots as Chicken Feed
(Source: Document)

5.2. Effectiveness of Maggot Cultivation as a Waste Management and Economic Solution

Maggot cultivation using Black Soldier Fly (BSF) larvae proved to be an innovative and efficient solution for organic waste reduction and income generation. Within 10–14 days, larvae decomposed 70–80% of organic waste — outperforming conventional composting methods.

This supports Diener et al. (2011), who highlighted the larvae’s high bioconversion efficiency and potential as a natural protein source for livestock. Economically, selling maggots at Rp20,000 - Rp25,000 per kg demonstrates tangible benefits and aligns with Todaro and Smith’s (2015) view that household economic diversification strengthens financial resilience.

5.3. Social Change and Community Participation

The Participatory Action Research (PAR) approach encouraged active involvement from planning to evaluation, fostering collective responsibility and social solidarity. A small community group, “Organic Maggot Waste Bank,” was established as a local sustainability mechanism consistent with Mardikanto (2015), who emphasized community participation as the foundation of empowerment success.

Ecological and Economic Impacts: Ecologically, the program reduced household organic waste volume, improved neighborhood cleanliness, and eliminated unpleasant odors. Economically, it provided additional family income and created by-products like *frass* fertilizer, demonstrating a sustainable circular model combining education, ecology, and economy.

Challenges and Solutions: Challenges such as limited experience, inadequate tools, and negative perceptions were addressed through regular mentoring, written manuals, and educational videos - effectively improving participants’ confidence and engagement.

Link to Sustainable Development Goals (SDGs): The program aligns with global SDGs, particularly:

- a. Goal 12: Responsible consumption and production.
- b. Goal 8: Decent work and economic growth.
- c. Goal 13: Climate action.

By turning waste into resources, the training supports a household-level circular economy, echoing the Ellen MacArthur Foundation (2020) framework.

5.4. Implications

This research demonstrates that practical, hands-on training can effectively increase environmental awareness and community welfare. Such programs can be replicated in other densely populated areas facing waste management challenges. It also presents a model for collaboration between academia, local government, and the community toward sustainable local development.

6. Conclusion and Suggestions

6.1. Conclusion

The training program on household organic waste utilization for maggot cultivation in Mustika Tigaraksa, Tangerang, significantly improved participants’ knowledge, skills, and environmental awareness regarding sustainable waste management.

Ecologically, the program reduced household waste volume and improved cleanliness. Economically, maggot cultivation provided families with new income opportunities through maggot and organic fertilizer sales. The program also strengthened collective environmental awareness and applied the 3R principles (Reduce, Reuse, Recycle) at the community level.

Overall, this initiative demonstrates that community-based empowerment programs can foster both ecological sustainability and economic resilience.

6.2. Suggestions

- a. Program Sustainability: Establish a local organic waste and maggot cultivation community group to ensure long-term continuity beyond the training period.
- b. Continuous Mentoring and Monitoring: Local authorities, environmental agencies, and universities should provide ongoing assistance and monitoring to strengthen community capacity.
- b. Improvement of Facilities and Technology: Provide simple facilities such as fermentation containers and maggot cultivation boxes to enhance waste management efficiency.
- c. Environmental Education Continuation: Sustain environmental and entrepreneurship education particularly for youth to nurture early ecological awareness.
- d. Product Development and Marketing: Encourage the development of maggot-based products (e.g., fish feed, poultry feed, organic fertilizer) and provide digital marketing training to expand income opportunities.

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