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Assistance in Organic Waste Management Using Maggots, Biopores, and Composters in Jatirejoyoso Village

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Abstract

Purpose: Jatirejoyoso Village in Kepanjen Subdistrict struggles with organic waste management due to its proximity to a market and extensive agricultural activities. This community service program aims to revolutionize waste management by introducing maggot cultivation, biopore holes, and composters within a circular economy framework. The goal is to enhance the community's capacity to manage waste efficiently, reduce pollution, and create new economic opportunities through the production of maggots, fertilizers, and compost.

Method: The project started with field observations and a Forum Group Discussion (FGD) to identify needs and strategies. Continuous training and assistance were provided in maggot cultivation, biopore creation, and composting, with Standard Operating Procedures (SOPs) involving farmer groups and the village community.

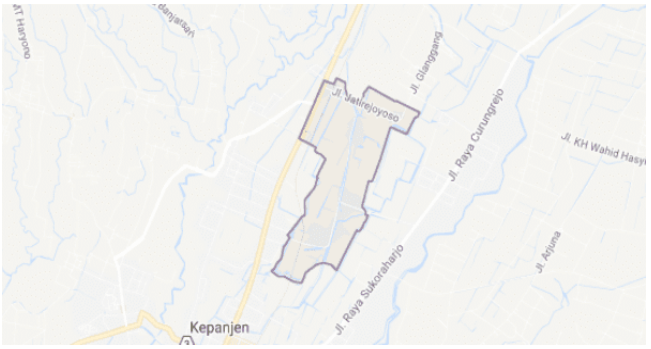
Practical Application: Key technologies implemented include maggot cultivation for high-quality animal feed, biopore holes to support waste management and improve soil absorption, and composters to produce organic fertilizers.

Conclusion: The program successfully reduced organic waste and boosted the community's economic well-being, equipping them with the skills to manage waste sustainably, benefiting both the environment and the local economy.

Introduction

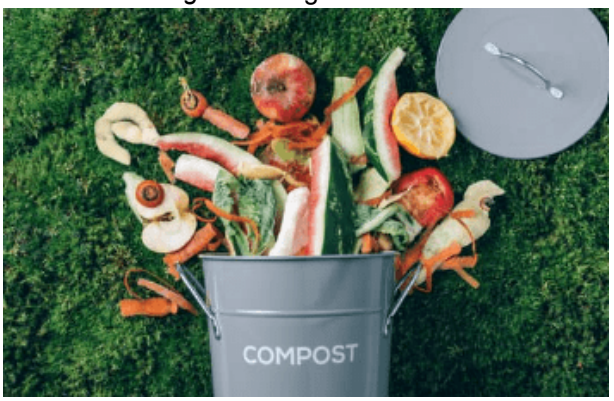
Jatirejoyoso Village, located in Kepanjen Subdistrict, Malang Regency, spans an area of approximately 302.9 hectares with a population of 5,337 in 2020. The village's land is predominantly agricultural, leading most residents to rely on farming and entrepreneurship for their livelihood (Hadaf, 2022). Jatirejoyoso is classified as a developing village, possessing valuable resources but struggling to maximize the potential of its human, economic, and technological resources (Izzalqurny et al., 2023).

Figure 1. Map of Jatirejoyoso Village



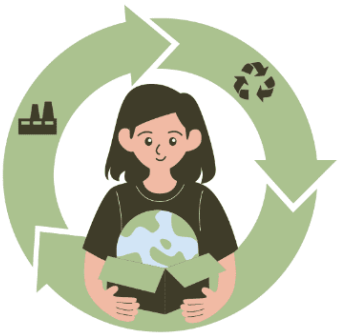
Organic waste management is a significant challenge in many Indonesian villages, including Jatirejoyoso. The village generates substantial organic waste from households, agriculture, and daily activities (Pranata et al., 2021). Poorly managed organic waste can cause severe environmental issues such as soil, water, and air pollution and pose health risks to the community (Utami & Hasibuan, 2023). Additionally, accumulated waste negatively impacts the village's aesthetics and residents' quality of life (Asfo et al., 2024).

Figure 2. Organic Waste



In recent years, the circular economy concept has gained attention as a sustainable approach to waste management and efficient resource use (Suwignyo et al., 2021). This concept shifts waste from being discarded to being reused as a valuable resource (Yuniar 2024). One innovation supporting this approach is maggot cultivation, where Black Soldier Fly (BSF) larvae convert organic waste into high-value products like animal feed and organic fertilizer. Supporting technologies like biopores and composters are also integral to sustainable waste management in the village (Sarasi et al., 2022).

Figure 3. Circular Economy Concept



The assistance program for organic waste management using maggots, biopores, and composters offers a comprehensive solution for addressing organic waste challenges at the village level. The biodegradation process carried out by maggots significantly reduces organic waste volume, while biopores and composters enhance water infiltration and produce high-quality compost. These technologies not only yield valuable products like animal feed and organic fertilizer but also support the creation of a circular economy in Jatirejoyoso Village (Hadi Samsul et al. 2024). By integrating these three technologies, Jatirejoyoso has the potential to manage organic waste more effectively while creating sustainable economic and environmental benefits at the local level.

The organic waste management program in Jatirejoyoso, based on maggots, biopores, and composters, is expected to be a strategic step in addressing environmental issues while raising community awareness and participation in environmental conservation. Furthermore, the program aims to create new sustainable economic opportunities for the village, contributing positively to improving residents' welfare and quality of life (Armi and Nurmahmudah 2023) (Istiqomah & Mahendra 2022).

Jatirejoyoso Village faces severe challenges in organic waste management, primarily due to its proximity to a market, which generates high volumes of organic waste. The waste from the market, households, and agriculture accumulates without adequate management, leading to serious environmental pollution risks.

The current waste management system cannot handle the growing volume of organic waste caused by population growth and increased economic activity. Conventional waste management approaches are inefficient and unsustainable, and the community lacks awareness and skills in transforming organic waste into valuable products. Despite the potential of organic waste as a resource in sectors like agriculture and livestock, innovation is needed to harmonize environmental and economic aspects.

Research indicates that maggot cultivation, specifically using Black Soldier Fly (BSF) larvae, offers a viable solution for managing organic waste in Jatirejoyoso (Hadi Samsul et al. 2024; Karim et al. 2023; Wardhana, Kautsar Eka, Salmitha and Hidayat 2024). Studies show that this technology is environmentally friendly and economically valuable. By utilizing organic waste to grow maggots, the village can produce high-protein animal feed and quality organic fertilizer while drastically reducing waste volume (Isah Fitriani et al. 2024; MahmudiKendid et al. 2024; Sukarnoto et al. 2023).

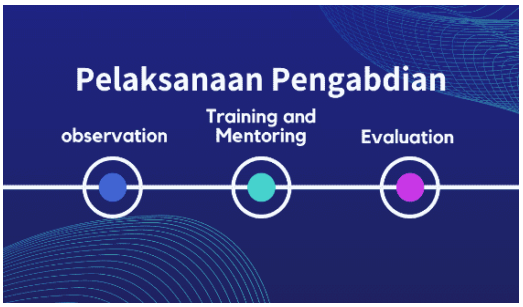
Therefore, the development of a maggot, biopore, and composter-based waste management program in Jatirejoyoso is a strategic move to revolutionize organic waste management, enhance environmental awareness, and create sustainable economic opportunities. This program aims to provide a comprehensive solution that addresses environmental issues and improves the community's welfare by optimizing the economic potential of organic waste.

Method

The community service activity was conducted in Jatirejoyoso Village, Kepanjen Subdistrict, Malang Regency, based on observations and references from various sources indicating that the village faces significant challenges in organic waste management. The program was designed to take place from July to August 2024, focusing on enhancing the knowledge and skills of the village community, particularly farmers, in managing organic waste. The ultimate goal is to support Jatirejoyoso Village in becoming a village with flagship products based on organic waste management that can create added value for the village and its residents.

This community service activity employed several methods to ensure optimal results. These methods include observation, implementation (comprising training and mentoring), and evaluation.

Figure 4. Implementation of Community Service



Observation: The observation phase was conducted as an initial step to identify the real conditions and specific needs of Jatirejoyoso Village regarding organic waste management. This observation also served as the basis for drafting the community service proposal, aimed at obtaining support from Universitas Negeri Malang (UM). Data collection was carried out through direct observation and interviews with village officials and local residents, which then formed the foundation for designing a relevant and sustainable program strategy.

Implementation: Training and Mentoring: The implementation phase consisted of intensive training and mentoring, divided into two main aspects: organic waste management and product development. Training was provided to farmer groups and village residents on techniques for processing organic waste using maggot cultivation, organic fertilizer production, and the formulation of effective Standard Operating Procedures (SOPs). Mentoring was conducted continuously for one to two months to ensure that participants could independently apply the knowledge and skills they acquired. During this phase, farmer groups were also involved in product packaging, labeling, and marketing, which were carried out in parallel to maximize the economic impact of the program.

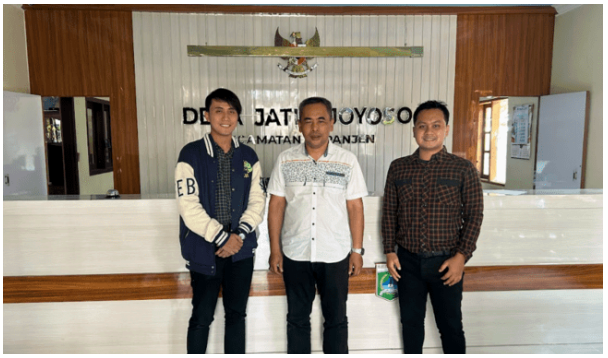
Evaluation: Evaluation was conducted to assess the success of the community service program in achieving its set targets. This evaluation included measuring the improvement in community knowledge and skills, the reduction of organic waste volume sent to landfills, and the increase in community income from the sale of maggot and organic fertilizer products. The evaluation phase also recorded issues that arose during the activities, analyzed and resolved obstacles, and gathered feedback from participants. The results of this evaluation will be used for further improvements and development in future community service programs.

Result

In the initial phase, the community service team from Universitas Negeri Malang (UM) conducted a comprehensive field survey to identify the needs and potential of Jatirejoyoso Village regarding organic waste management. The survey began with in-depth discussions with the village head to obtain a comprehensive overview of the existing

conditions, including the challenges and opportunities faced by the village. These discussions provided valuable insights that became the foundation for formulating a more targeted community service strategy, both in technical and economic contexts.

Figure 5. Observation with the Head of Jatirejoyoso Village

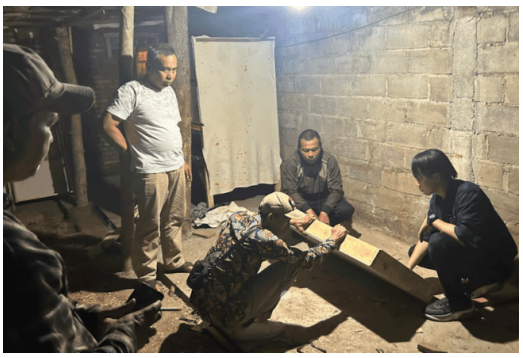


Similarly, the observation phase in Jatirejoyoso Village's community service program was crucial in understanding the real conditions and community needs regarding organic waste management. The observation revealed that organic waste management in the village is inadequate due to the high volume of waste caused by its proximity to the market. Additionally, it was found that some villagers lacked the knowledge and skills to convert organic waste into economically valuable products, such as animal feed or organic fertilizer. These findings served as a strong foundation for designing a more effective program strategy oriented toward sustainable solutions that address environmental issues and improve the village's economic welfare.

The implementation phase focused on intensive training and mentoring to ensure participants not only understood the material presented but also applied it effectively in their daily practices. The training covered three main aspects: organic waste management using maggot technology, biopore application, and composter use. Through this training, farmer groups and villagers were equipped with the necessary technical skills to manage organic waste in an integrated and sustainable manner. Participants were also trained to develop and follow effective Standard Operating Procedures (SOPs) to ensure consistent organic waste management.

Figure 6. Implementation of Training

Figure 7. Implementation of Assistance



Mentoring was conducted intensively for one to two months after the training, focusing on supporting participants in applying the knowledge they had gained. The community service team conducted regular field visits to provide direct guidance, monitor progress, and assist in resolving challenges. This mentoring aimed to enable participants to independently manage organic waste using maggots, biopores, and composters, and to develop products such as animal feed and organic fertilizers. This approach was designed to ensure participants not only mastered the material but also successfully implemented the technology, providing long-term benefits for the environment and village economy.

The evaluation of this community service program was conducted comprehensively to ensure the primary objective—participants' understanding and application of the material—was achieved successfully. The evaluation process began with measuring participants' abilities during the training, emphasizing their understanding of concepts and practical skills in managing organic waste using maggot, biopore, and composter technologies. The evaluation assessed not only participants' theoretical understanding but also their ability to apply the knowledge through direct practice. After the training, post-training evaluation continued with field visits to monitor how well participants could implement the technology in their own environments and to identify challenges they might face in real-world application.

Figure 8. Assistance in Organic Waste Management Using Maggots, Biopores, and Composters in Jatirejoyoso Village

Long-term evaluation was also an integral part of the process, systematically assessing the program's sustainability and its impact on the community. This evaluation included analyzing changes in organic waste management, environmental quality improvement, and the economic impact on the village community. The results showed that most participants successfully implemented the technology and achieved program goals, such as reducing organic waste volume and increasing income from the sale of maggot and organic fertilizer products. However, it was also found that some participants still required additional mentoring to overcome difficulties in effectively applying the material in daily practice. These findings formed the basis for providing continued support to participants in

need and for designing future program improvement strategies to enhance its impact.

Discussion

This community service program demonstrates that simple technologies such as maggot cultivation, biopores, and composters can offer comprehensive solutions for organic waste management in Jatirejoyoso Village. The holistic approach integrating education, technology, and economy has proven effective in empowering the community, enabling them to not only understand the importance of waste management but also directly experience the economic and environmental benefits of these changes. The application of maggot, biopore, and composter technologies successfully addressed the main issues the village had faced, such as organic waste accumulation, environmental pollution, and low income from waste products.

The program's success also highlights the importance of collaboration among various stakeholders, including academics, village government, and the community, in designing and implementing sustainable community service programs. This collaboration ensures that the program does not end with training but continues with long-term mentoring and support necessary for achieving greater impact. However, challenges remain in ensuring the program's sustainability, particularly in maintaining consistency and quality in maggot production and securing stable markets for the products. Further training and long-term mentoring in marketing and business management are essential to address these challenges.

Overall, this program provides evidence that, with the right approach, organic waste management based on simple technologies like maggots, biopores, and composters can be a key strategy in supporting the circular economy and improving the welfare of rural communities in Indonesia. The experience from Jatirejoyoso Village can serve as a model for other villages facing similar challenges, with the hope that this technology can be adopted and adapted to provide widespread and sustainable benefits across rural areas in Indonesia.

Conclusion

This community service program successfully demonstrated that simple technologies such as maggot cultivation, biopores, and composters can effectively address organic waste issues in Jatirejoyoso Village, improve the community's economic well-being, and support the circular economy. Therefore, for sustainability and further development, ongoing support in the form of advanced training, long-term mentoring, and expanded market access is needed to ensure that the benefits of this program continue to be felt by the community.

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