

Production of Eco Enzyme from Household Organic Waste, Which Is Beneficial for Environmental Sanitation

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ABSTRACT

Household organic waste management remains a challenge for sustainable environmental sanitation. This community service aimed to improve the knowledge and skills of the Indonesian Methodist Church, Wesley Residence, in producing eco-enzymes from organic waste to support household cleanliness. The activity involved 30 participants and applied a participatory approach: lectures on organic waste and eco-enzymes, live demonstration, discussion and Q&A, and mentoring before independent home practice. Materials introduced included fermentation containers, brown sugar, organic waste, water, cutting tools, and labels, with a 1:3:10 ratio. Evaluation through observation and participant feedback indicated understanding of waste sorting, eco-enzyme production stages, and application for hygiene. The program enhanced knowledge and encouraged sustainable household environmental behavior.

INTRODUCTION

Community service is a concrete manifestation of the Tri Dharma of Higher Education (Hidayati & Baedawi, 2022). Through these activities, universities not only carry out their educational and research functions but also directly address community needs. Good community service should be relevant to real-world problems, easy to implement, and provide tangible benefits to the targeted audience (Amalia, 2024; Asri & Arham, 2023; Hidayati & Baedawi, 2022; Irwanto, 2025)

One issue that is quite relevant to people's lives is the management of household organic waste. In everyday practice, kitchen scraps such as fruit peels, vegetable scraps, and other organic materials are often considered worthless. However, if properly sorted and processed, this waste can be turned into useful products while simultaneously reducing household waste.

Within church congregations, issues of cleanliness, family health, and environmental stewardship are highly relevant. Households are strategic social units for implementing simple waste management practices. Therefore, this community service activity focused on education and demonstrations of eco-enzyme production as an easy alternative for processing household organic waste using everyday materials.

Household organic waste is leftover material from living things that decomposes easily, such as fruit peels, vegetable scraps, and food scraps. (Sulartini et al., 2024) (Marliani, 2015) (Thoriq, 2021) If not managed properly, this waste can produce odors, attract insects, and worsen the cleanliness of the home environment. Conversely, when sorted and utilized, organic waste can become a valuable learning resource and processing material.

In this activity, participants are encouraged to view organic waste not simply as trash, but as a raw material that can be processed. This shift in perspective is crucial because changes in environmental behavior often begin with a shift in understanding of the objects they encounter every day.

Household environmental sanitation involves efforts to maintain cleanliness, comfort, and health in the living environment (U. C. Y. Putri & Marpaung, 2019) (WHO, 2018). Sanitation does not stand alone. It is related to family members' behavior regarding water management, waste management, surface cleanliness, and the care of living spaces. Therefore, sanitation education needs to be linked to simple practices that can be implemented at home. (Widyasari & Steviani, 2024) (R. A. Putri et al., 2025) (Nastiti et al., 2025) (Gusti et al., 2023).

The eco-enzyme topic was chosen because of its strong educational value. The process is simple, relatively inexpensive, and the results can be reused to support household hygiene (Rahmadani et al., 2023) (Purba et al., 2024). With this approach, community service activities go beyond theoretical instruction and are designed to develop fundamental knowledge, attitudes, and skills that participants can continue to build on independently at home.

The activity partner is the Wesley Residence Congregation of the Indonesian Methodist Church, located on Jl. Jamin Ginting, in the Wesley Residence Housing Complex, in front of the Basarnas Office. The church congregation is an appropriate target for home-based educational activities because interactions

among members occur regularly, the value of cooperation is strong, and congregation development activities have become part of community life.

This community service activity positions eco-enzyme production as a gateway to building sanitation awareness. As participants learn to sort, process, and reuse waste, they simultaneously learn about the discipline of cleanliness, orderliness, and environmental stewardship.

Based on general household needs, organic waste is often not managed separately. Most kitchen waste is still mixed with other waste. As a result, the potential for organic waste reuse remains untapped. Meanwhile, the need for a clean environment and healthy households continues to grow. This creates opportunities for simple, practical, and immediately applicable educational activities.

This activity is designed to address these needs through a counseling and demonstration approach. With approximately 30 participants, the activity can take place in an interactive atmosphere. Participants not only receive explanations but also can ask questions, observe the practical steps, and understand the steps necessary to repeat the process at home.

IMPLEMENTATION AND METHODS

This community service activity uses an educational-participatory approach. The educational approach is used to provide participants with an understanding of household organic waste management, the basic concept of eco-enzymes, and their relationship to environmental sanitation. Meanwhile, the participatory approach ensures that participants not only receive the material passively but also engage in discussions, Q&A sessions, and direct observation of the eco-enzyme production demonstration.

The activity was held on Friday, April 10, 2026, at the Indonesian Methodist Church, Wesley Residence Congregation, Simalingkar Resort, District 2, Region 1, Medan, North Sumatra. The activity partner was the Indonesian Methodist Church's Wesley Residence Congregation. The target group was congregation members who play a role in household activities and have the opportunity to implement independent organic waste management in their respective homes. The number of participants in the activity was estimated at around 30.

The activity was implemented through several stages. The first stage was coordination with partners to determine the theme, time, location, and target participants. At this stage, the service team communicated with the church to tailor the activity to the participants' needs and conditions. The second stage was preparing service materials. The materials were organized in a simple, practical manner so that participants from diverse backgrounds could easily understand them. The main topics covered were the definition of household organic waste, the impact of unmanaged organic waste, the concept of eco-enzymes, the stages of eco-enzyme production, and the benefits of eco-enzymes in supporting household environmental cleanliness.

The third stage is preparing demonstration tools and materials. The tools and materials used in the activity include a container or barrel for fermentation, clean water, brown sugar or palm sugar as a sugar source, and household organic

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waste such as pineapple peels, onion skins, lemongrass, lime, turmeric, and other organic materials commonly used in kitchen activities. In addition, tools such as knives or cutting tools, funnels, and labels to mark the date of manufacture are also used. In this activity, participants are introduced to the general ratio for producing eco-enzymes: 1 part sugar, 3 parts organic waste, and 10 parts water.

The fourth stage is the implementation of the core activities. The activity began with an opening and a prayer, followed by the community service team presenting the material. The presentation was delivered through a lecture or counseling approach, using simple language that was close to the participants' daily lives. After that, the activity continued with a demonstration of eco-enzyme production. The demonstration was carried out to show how to select organic materials, cut them, mix them with water, sugar, and organic waste, and store the mixture in a fermentation container. Participants were also informed about the importance of maintaining the cleanliness of tools and materials, providing adequate air space in the container, storing the container in a shaded area, and opening the container lid periodically at the beginning of the fermentation process to reduce gas pressure.

The fifth stage is a discussion and Q&A session. At this stage, participants are allowed to ask questions about the materials used, the duration of the fermentation process, the characteristics of good fermentation results, and how to use eco-enzymes after the fermentation process is complete. This discussion aims to clarify participants' understanding and reduce the risk of errors when they practice independently at home. The sixth stage is a follow-up confirmation, encouraging participants to start sorting household organic waste and to try making eco-enzymes using materials available at home.

The implementation method for this activity consists of four main forms: counseling, demonstrations, discussions, and brief mentoring. Counseling is used to build participants' conceptual understanding of organic waste, eco-enzymes, and environmental sanitation. Demonstrations are used to show practical steps in real-world settings, providing participants with a clearer technical understanding. Discussions, questions, and answers are used to strengthen participants' understanding and adapt the material to their daily experiences. Brief mentoring is provided throughout the activity to help participants understand the basic steps of eco-enzyme production before practicing them independently.

Evaluation of the activity was conducted descriptively and qualitatively through direct observation of the implementation process, participants' activities, and participants' responses during the activity. Indicators of activity success included targeted participant attendance, successful delivery of materials, demonstration of eco-enzyme production, active participation in discussions, and the emergence of participant interest in implementing organic waste management practices at home. In addition, the success of the activity was evident in the preparation of supporting documents, including attendance lists, documentation, agendas, and reports on the implementation of community service.

Activity data was analyzed descriptively by examining observations during the activity, participant responses in discussion sessions, and the alignment between the activity plan and implementation in the field. The analysis was conducted to illustrate the achievement of the community service objectives: increased participant understanding of household organic waste utilization, increased knowledge of the stages of eco-enzyme production, and growing participant awareness of the importance of environmental sanitation through household behavior.

RESULTS AND DISCUSSION

Overview of Activity Implementation

The community service activity took place on Friday, April 10, 2026, at the Indonesian Methodist Church in the Wesley Residence Complex. The community service team organized the activity as an educational meeting, targeting the church congregation. Overall, the event proceeded smoothly and interactively. Participants followed the program from the opening, presentation, demonstration, and discussion sessions.

The initial step was a joint prayer led by Reverend Marlina Hasibuan to ensure the community service activity would proceed smoothly, according to God's will. The material was then delivered in easy-to-understand language. The team emphasized that organic waste management needs to begin at home. Kitchen waste, often considered useless, can actually be sorted and processed into valuable materials. This explanation guided participants to understand the relationship between household habits and environmental conditions.



Figure 1. Joint prayer led by Rev. Marlina Hasibuan, S.Th

Materials Delivered

1. Understanding household organic waste and examples.
2. Problems that arise if organic waste is not managed properly.
3. The basic concept of an eco enzyme is the result of the fermentation of organic materials.
4. Stages of making eco enzymes, starting from sorting materials to storage.
5. Utilization of fermentation results to support household and environmental cleanliness.
6. The importance of consistent household behavior in maintaining environmental sanitation.

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Demonstration Process

Demonstrations were a crucial part of this activity, helping participants understand the practical steps in concrete terms. The team demonstrated the types of organic materials that can be used, how to cut them for easy fermentation, how to mix water, sugar, and organic materials, and the importance of leaving air space in the container. Participants were also taught to store the mixture in a cool place and to open the container lid periodically during the early stages of fermentation to reduce gas pressure.

In addition to the technical steps, the team also emphasized the importance of clean tools and materials. This is crucial for participants to understand that good results are determined not only by the materials but also by thoroughness in the process. The demonstration provided participants with a clearer picture than verbal explanations alone.



Figure 2. Materials for making ecoenzymes and the delivery of materials

Participant Responses and Participation

Throughout the event, participants demonstrated positive interest. This was evident in their engagement in the question-and-answer session. Questions generally concerned the types of ingredients that can be used, fermentation time, how to determine good results, and how to use eco-enzymes after fermentation is complete. These responses demonstrated that the topics presented were relevant to household needs and piqued participants' curiosity.

The interactions that developed also demonstrated that participants were not only interested in the final product but also in changing habits at home. This is important because the primary goal of the activity is not to introduce a single product, but to build environmental awareness through simple, realistic practices.

Table. 1 Activity Achievements

No	Indicator	Achievements	Information
1	Participants attended as per the target	Achieved	Around 30 congregants attended and followed the activities until the main session.
2	The main material is conveyed	Achieved	Participants received an explanation of organic

			waste management and ecoenzyme production.
3	The demonstration was carried out	Achieved	The stages of mixing ingredients, ratios, and storage are explained directly.
4	Participant interaction	Good	Participants actively asked questions about ingredients, fermentation time, and how to use it.
5	Follow-up commitment	Good	Participants are encouraged to try the practice independently at home.

Based on observations during the activity, the main objectives were achieved at a basic level. Participants gained new knowledge, understood the general steps for making eco-enzymes, and were encouraged to utilize household organic waste more responsibly.



Figure 3. Community Service Activities

From a process perspective, this activity demonstrated that environmental education is more effective when connected to everyday household experiences. The topic of eco-enzymes was relatively easy to grasp because the raw materials are readily available in the kitchen, and the process does not require complicated equipment. This allowed participants to visualize its practical application.

From an empowerment perspective, this activity conveys the important message that changing environmental behavior can begin with small steps. When households begin sorting organic waste, providing fermentation containers, and reusing the waste, a shift in their perspective on waste occurs. This change is the core of community service: a shift from a habit of throwing away to a habit of managing.

From a sanitation perspective, this activity is relevant because home environmental cleanliness is closely linked to how households manage organic waste. While the long-term impacts require continued support, this activity provides an initial foundation for developing more orderly and environmentally conscious habits.

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The community service activity on eco-enzyme production demonstrated that environmental education is well-received when delivered through an approach relevant to participants' daily lives. Household organic waste, such as fruit and vegetable scraps, is readily available in the kitchen. Therefore, the material presented was not only theoretical but also directly related to the participants' household habits. This helped participants understand that waste management is not solely the responsibility of the government or sanitation workers, but also a shared responsibility for every family.

This activity also demonstrated that a demonstration-based instructional method is more effective than simply delivering material verbally. Through the demonstration, participants were able to directly observe the ingredients used, how to mix water, sugar, and organic waste, and how to store the fermentation container properly. The explanation of the need to open the container lid during the initial fermentation stage also provided participants with a practical understanding, enabling the eco-enzyme production process to be carried out more safely. Thus, this activity not only increased participants' knowledge but also provided basic skills that can be practiced independently at home.

From a community empowerment perspective, this activity is crucial because it encourages participants to shift their perspectives on organic waste. Waste previously considered waste can now be processed into useful products. This shift in perspective is crucial for building environmental awareness. As participants begin to understand that household waste can be processed into eco-enzymes, they realize that simple household actions can contribute to environmental cleanliness and health.

The participants' active responses during the Q&A session demonstrated that the material presented was relevant to their needs. Questions about ingredient types, fermentation time, signs of good fermentation, and how to use eco-enzymes demonstrated their interest in trying the practice. This participation indicated that the activity was not a one-way street but also fostered interaction between the community service team and participants. This kind of interaction is important because it strengthens participants' understanding and opens up discussion about potential challenges encountered when practicing at home.

From an environmental sanitation perspective, producing eco-enzymes to manage organic waste can be a simple way to reduce household waste accumulation (Yulistiar & Manggalou, 2023)(Cahyantini & Setyawati, 2023)(Arifian & Kusuma, 2025). Poorly managed organic waste can produce unpleasant odors, attract insects, and disrupt the cleanliness of the surrounding environment (Haryanti et al., 2025)(FADILLA H, 2025). This education program guides participants to be more disciplined in sorting and processing waste. While the long-term impact of this activity cannot yet be fully measured, it has laid the foundation for developing household behaviors that are more environmentally conscious.

This service is supported by several research and service activities, namely, the results of the service (Dewi & Utama, 2022). The project demonstrated that homemakers can utilize organic kitchen waste to produce eco-enzymes. Five housewives successfully processed 9 kg of organic waste into 26 liters of eco-

enzymes, which are useful for household needs and help reduce waste accumulation. The results of the activity (Pranata et al., 2021) showed an increase in participants' knowledge. Before the training, some participants still had low and moderate knowledge. After the training, all participants were in the good knowledge category, indicating that the training was successful in improving their knowledge and skills. (Ekoprodjo & Wibowo, 2024) This confirms that eco-enzymes can be a practical tool for educating Christians to be more environmentally conscious. Based on Genesis 2:15, humans have a responsibility to cultivate and care for the earth. This reference is relevant because community service action is carried out in a setting/environment.

Overall, this community service activity was successful in the initial stages, as participants gained new knowledge, understood the basic process of eco-enzyme production, and demonstrated interest in implementing it. However, long-term success requires follow-up. Participants should be encouraged to try making eco-enzymes independently and then share their experiences regarding the results of their practice. Through mentoring or follow-up meetings, the knowledge gained in this activity will not remain a momentary understanding but can develop into sustainable habits in their homes and congregations.

CONCLUSIONS AND RECOMMENDATIONS

Community service activities on making eco enzymes from household organic waste, beneficial for environmental sanitation, were carried out well at the Indonesian Methodist Church, Wesley Residence Complex, on Friday, April 10, 2026. This activity targeted the church congregation, with an estimated 30 participants.

Substantively, this activity successfully introduced the concept of simple, practical household organic waste management. Participants gained an understanding of the importance of waste sorting, the basic steps in eco-enzyme production, and the relationship between eco-enzyme production and household environmental hygiene and sanitation. The lecture, demonstration, and discussion approach proved helpful in fostering understanding.

Institutionally, this activity strengthens the collaboration between the faculty of Agriculture at the Indonesian Methodist University and the Wesley Residence Congregation of the Indonesian Methodist Church. It also demonstrates that community service can make a real contribution through simple, relevant topics that resonate with the community's needs.

Follow-up activities should focus on helping participants build household practices into real habits. Partners can encourage the formation of organic waste sorting habits in the congregation environment. The service team can develop more applicable follow-up materials, for example, by monitoring fermentation results or by discussing their practical use. The attendance list documents, documentation, and budget realization should be completed to strengthen activity archives.

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