Ta'awun: Jurnal Pengabdian Kepada Masyarakat
Volume 06, Issue. 01 February 2026, Pages. 215-229

E-ISSN: 2774-941X
P-ISSN: 2774-9150

DOI: https://doi.org/10.37850/taawun.v6i01.1210
https://journal.faibillfath.ac.id/index.php/taawun

COMMUNITY EMPOWERMENT THROUGH THE USE OF ECOENZYMES AS A SOLUTION FOR ORGANIC WASTE MANAGEMENT AND PLANT PEST CONTROL

Teddy Kurniawan[1], Ade Purnama Sari[2], Aida Putri[3], Alifia Rozalna Putri[4], Edi Cahya Manda[5], Fitriana Ramadhani Laode[6], Nickola Saputra[7], Puput Maryani[8], Riska Mulyanti Ikhwan[9], Zakiyyah Rahmadina[10]
[1-10]Universitas Terbuka
email: teddykurniaawan@gmail.com [1]; adepurnamasarigembira120802@gmail.com [2], aidaputri541@gmail.com[3], alifia.rozalnaputri@gmail.com [4] mandaedicahya@gmail.com [5], fitrianaramadhanild@gmail.com [6], nickolasaputra17@gmail.com [7], puput.maryani1988@gmail.com [8], 1814070033.riskamulyantii@gmail.com [9], zakiyyahrahmadina19@gmail.com [10]
*Corresponding Author

Received 07 December 2025; Received in revised form 09 January 2026; Accepted 22 February 2026

Abstrak

Kegiatan pengabdian ini bertujuan untuk memberikan solusi terhadap permasalahan lingkungan di Kompleks Bumi Pelita Kencana RW 09, Kemiri, Pondok Cabe Udik, Kota Tangerang Selatan, yaitu penumpukan sampah organik rumah tangga dan meningkatnya hama pada tanaman warga. Pemanfaatan ecoenzim, cairan hasil fermentasi limbah organik, dipilih karena ramah lingkungan, murah, dan memiliki manfaat ganda sebagai pupuk cair alami sekaligus sebagai pengendali hama. Kegiatan dilaksanakan melalui tahapan sosialisasi, pelatihan pembuatan ecoenzim, aplikasi pada tanaman, serta monitoring hasil bersama warga selama Februari–Maret 2025. Hasil kegiatan menunjukkan partisipasi aktif 25 warga dengan produksi sekitar 30 botol ecoenzim ukuran 1,5liter dan pengolahan ±50 kg sampah organik rumah tangga. Penggunaan ecoenzim pada tanaman cabai, tomat, dan bunga menunjukkan hasil positif, yaitu penurunan serangan hama dan peningkatan kesegaran daun. Selain itu, sekitar 60% warga mulai memisahkan sampah organik dan memproduksi ecoenzim secara mandiri di rumah. Kegiatan ini berhasil menumbuhkan kesadaran ekologis baru, membentuk kelompok lingkungan kecil, serta mengurangi ketergantungan pada bahan kimia pertanian. Proyek ini membuktikan bahwa edukasi partisipatif berbasis aksi nyata dapat menjadi sarana yang efektif untuk membangun budaya pengelolaan sampah berkelanjutan di tingkat komunitas. Kontribusi dari kegiatan pengabdian ini terletak pada penunjukan bahwa model pemberdayaan masyarakat berbasis aksi partisipatif menggunakan ekoenzim efektif dalam mengatasi pengelolaan sampah organik dan pengendalian hama secara alami, sekaligus menumbuhkan kesadaran ekologis, pembentukan lembaga sosial, serta kemandirian masyarakat di tingkat akar rumput.

***Kata kunci**: Ecoenzim, Sampah Organik, Pestisida Alami, Pemberdayaan Masyarakat, Lingkungan Berkelanjutan.*

Abstract

This community service aims to provide solutions to environmental problems in the Bumi Pelita Kencana RW 09 Complex, Kemiri, Pondok Cabe Udik, South Tangerang City, namely the accumulation of household organic waste and the increase in plant pests among residents. The use of ecoenzymes, liquids from fermented organic waste, was chosen because they are environmentally friendly, inexpensive, and offer dual benefits as natural liquid fertilizer and pest control. The activity was carried out in stages: socialization, training in making ecoenzymes, applications on plants, and monitoring results with residents during February-March 2025. The results of the activity showed active participation by 25 residents, producing approximately 30 1.5-liter ecoenzyme bottles and

processing ±50 kg of household organic waste. The use of ecoenzymes in chili, tomato, and flower plants showed positive results, namely a decrease in pest attacks and an increase in leaf freshness. In addition, about 60% of residents have started separating organic waste and producing ecoenzymes independently at home. This activity has succeeded in fostering new ecological awareness, forming small environmental groups, and reducing dependence on agricultural chemicals. This project proves that action-based participatory education can be an effective means of building a culture of sustainable waste management at the community level. The contribution of this study lies in demonstrating that a participatory action-based community empowerment model using ecoenzyme is effective in simultaneously addressing organic waste management and natural pest control, while fostering ecological awareness, the formation of social institutions, and community independence at the grassroots level.

Keywords: Ecoenzymes; Organic Waste; Natural Pesticides; Community Empowerment; Sustainable Environment.

INTRODUCTION

The problem of household organic waste is one of the environmental challenges that continues to grow in Indonesia's urban areas (Yusmartini et al., 2025). Data from the National Waste Management Information System (SIPSN) of the Ministry of Environment and Forestry noted that organic waste accounts for more than 60% of the total national waste stockpile, but the level of management is still very low (Kementerian Lingkungan Hidup dan Kehutanan, 2025). This condition is exacerbated by the habits of most people who still mix organic and inorganic waste, making it difficult to recycle and increasing the volume of waste that ends up in landfills (Nugroho et al., 2025). The use of synthetic chemical pesticides to deal with plant pests in residential environments continues to increase, even though their negative impact on human health and ecosystems has been widely proven (Saputra et al., 2025). These two problems, non-optimal organic waste management, and dependence on agricultural chemicals, are urgent issues that require sustainable community-based solutions.

Community-based waste management is believed to be the most effective approach because it places citizens as agents of change in their own environment (Nurliah et al., 2022). Sustainable behavior change can only occur if the community is actively involved in every stage of program planning and implementation, not just being an object of counseling (Ali et al., 2024). However, on the ground, the gap between theory and reality is still very real. Residents in the Bumi Pelita Kencana RW 09 Complex, Kemiri Village, Pondok Cabe Udik, South Tangerang City, for example, do not yet have an independent organic waste management system, while pest attacks on yard plants continue to increase and are handled conventionally using chemical pesticides. This condition shows that knowledge about environmentally friendly environmental management has not been evenly socialized, and real interventions are needed that can bridge the gap.

© 2026 by the authors. This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

Ecoenzymes are solutions resulting from the fermentation of fresh organic waste such as fruit and vegetable peels with molasses or brown sugar and water, which have been scientifically proven to have dual benefits, namely as an organic liquid fertilizer as well as a natural pest control (Maimakal et al., 2026). Research Istanti, et al., (2023) It shows that ecoenzymes contain active compounds such as alcohol, organic acids, and enzymes that are antimicrobial and can effectively suppress pest growth. The consistent use of ecoenzymes has been shown to improve soil structure and increase nutrient availability for plants (Arifani et al., 2026). The process of making ecoenzymes transforms household organic waste that was originally worthless into useful products, thus directly contributing to reducing the volume of organic waste at the source (Rusdaita et al., 2025). Thus, ecoenzymes offer relevant integrated solutions to address two major problems facing society simultaneously.

Some previous community service activities have introduced ecoenzymes to the community, but most of them are still one-way demonstrations that are limited to the technical aspects of manufacturing without building community capacity in a sustainable manner (Marlina et al., 2023; Palaastita et al., 2024; Maulana et al., 2025). These activities are generally carried out in a single training format without follow-up, so the sustainability of practices at the household level cannot be ensured. The novelty of this service activity lies in the application of the Participatory Action Learning approach which combines socialization, technical training, field assistance, and participatory evaluation in one continuous cycle of activities. In addition, this activity explicitly integrates BAGJA's 5-D method to encourage residents not only to be able to create ecoenzymes, but also to be the driving force of environmental movements in their communities, as well as to form small environmental groups that can maintain the sustainability of post-activity programs.

Based on this background, this service activity aims to: (1) increase the ecological knowledge and awareness of the residents of the Bumi Pelita Kencana RW 09 Complex regarding the sustainable management of household organic waste; (2) train residents in ecoenzyme manufacturing techniques as an alternative to organic liquid fertilizer and environmentally friendly natural pest control; (3) encourage changes in residents' behavior in sorting organic waste and reducing the use of chemical pesticides; and (4) building community capacity through the formation of small environmental groups that can continue and develop ecoenzyme manufacturing practices independently at the household level.

METHOD

The implementation of this community service activity applies participatory action research, which places the community as the main subject in each stage of the activity, starting from planning, implementation, to evaluation of results

(McIntyre, 2008). This approach was chosen because it is considered effective in encouraging behavior change and fostering environmental awareness through the direct involvement of the community in the contextual and meaningful learning process. Thus, this activity is not only knowledge transfer, but also a social transformation rooted in the active participation of citizens.

The subject of the activity consists of two main groups, namely residents of the Bumi Pelita Kencana RW 09 Complex, Kemiri Village, Pondok Cabe Udik District, South Tangerang City, which includes housewives, teenagers, and environmental leaders as direct beneficiaries, as well as students of the Teacher Professional Education Study Program at the Open University as facilitators of activities and drivers of environmental education. This service location was chosen because it has a fairly high level of household waste accumulation, does not yet have an independent organic waste management system, and has great potential to develop community-based environmental movements.

This activity is designed collaboratively by involving the community from the initial stage to create a sense of ownership of the program. At the problem identification stage, residents participate in focus group discussions to map key problems, such as organic waste accumulation and chemical pesticide use habits. Furthermore, at the program planning stage, community representatives participated in compiling activity schedules, determining training locations, and preparing fermentation raw materials. During the implementation of the activity, residents are actively involved in the entire process of making ecoenzymes, starting from the selection of ingredients, mixing, fermentation, to the application of the results to household plants. After the main activity ends, residents are accompanied to conduct self-monitoring and continue the production of ecoenzymes at the household level. This active involvement not only forms a sense of ownership, but also plays a role in maintaining the sustainability of environmental programs.

The implementation of this activity adopts the 5-D BAGJA method, namely Define, Discover, Dream, Design, and Deliver. The Define stage focuses on identifying key environmental problems, namely the accumulation of organic waste and the use of chemical pesticides. The Discover stage explores local potential in the form of household waste such as fruit and vegetable peels as raw materials for ecoenzymes. Furthermore, the Dream stage formulates the community's common hopes to realize the vision of a "Clean, Green, and Independent Environment." At the Design stage, an action plan is prepared in the form of training on ecoenzyme making, benefit education, and advanced management strategies. Finally, the Deliver stage focuses on the implementation of fermentation practices, the application of ecoenzymes to plants, and the evaluation of results.

© 2026 by the authors. This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

The strategy for implementing this activity combines elements of education, demonstration, and field assistance with a learning by doing approach, so that participants can understand the concept through direct experience. To strengthen the environmental literacy aspect, the activity is also equipped with visual media in the form of posters and educational videos. The stages of the activity include six main steps, namely: (1) initial preparation and coordination through field surveys and coordination with RT/RW management; (2) environmental socialization and education that provides counseling on the impact of organic waste and the benefits of ecoenzymes; (3) technical training on ecoenzyme making, in which participants practice mixing organic matter, brown sugar, and water in a ratio of 3:1:10; (4) application and trial of fermented results in household plants as liquid fertilizers and natural pest repellents; (5) assistance and monitoring to assess the success of fermentation and the effectiveness of the use of ecoenzymes; and (6) evaluation and Leadership Project Work Title as a peak activity to present the results and reflections of residents on changes in waste management behavior.

This method of service holistically integrates ecological learning, social action, and participatory leadership in a series of continuous activities. Hands-on experience-based approaches have been proven to increase residents' ecological awareness, strengthen communities' adaptive abilities in managing the environment, and foster a spirit of independence and collaboration in maintaining ecosystem sustainability at the local level.

RESULTS AND DISCUSSION

RESULT

Increasing Citizens' Ecological Knowledge and Awareness

The initial stage of the service activity began with the implementation of a Focus Group Discussion (FGD) to map the initial level of knowledge of residents about organic waste management and the concept of ecoenzymes. The results of the FGD showed that of the 25 participants who attended, most had never heard of the term ecoenzyme, let alone understood how it was made and its benefits. This condition is illustrated by the statement of one of the participants, who revealed:

> "I thought it was just a waste of time, I didn't know it could be something useful. So far, I have been buying mosquito repellent and pesticides at stalls for plants."

The same statement was also conveyed by another participant, who stated that he had never thought about waste sorting because he felt that there were no supporting facilities in the RW 09 environment. The findings of this FGD confirm the existence of a fairly deep ecological literacy gap among citizens, as well as the basis for designing socialization materials that are contextual and relevant to real conditions in the field. After the series of socialization was carried out, the

facilitator team evaluated participants' understanding using a simple questionnaire on a scale of 1–5 that measured three aspects: knowledge of organic waste, understanding of ecoenzymes, and awareness of the impact of chemical pesticides. The results show significant improvements in all three aspects, as shown in Table 1 below.

Table 1. Comparison of Average Scores of Participants' Knowledge and Ecological Awareness Before and After Socialization

No	Measured Aspects	Pre-test Average Score	Post-test Average Score	Increase (%)
1	Knowledge of organic waste	2,1	4,3	+104,8%
2	Understanding of ecoenzymes	1,4	4,6	+228,6%
3	Awareness of the impact of chemical pesticides	2,4	4,2	+75,0%
4	Ability to identify raw materials	1,8	4,5	+150,0%
	Overall average	1,93	4,40	+128,0%

The data in Table 1 shows that the most significant increase in understanding occurs in the aspect of understanding about ecoenzymes, which is 228.6%. This is natural considering that the concept of ecoenzymes is completely new knowledge for most participants. Meanwhile, an increase in awareness of the impact of chemical pesticides by 75% shows that residents are beginning to realize the risks that they have been ignoring in their daily gardening practices.

The enthusiasm of the participants during the socialization session was also reflected in the intensity of the discussions and questions asked. A total of 17 active questions emerged during the question and answer session, most of which focused on the possible application of ecoenzymes to different types of plants and the correct way of storage. One of the youth participants, expressed his interest directly:

> "It is also cool that banana peels and vegetable residues that are usually thrown away can be liquids that can repel pests. I want to try to make it myself at home and invite friends."

The positive response from this group of adolescents is an important signal that practice-based ecological literacy programs have cross-generational appeal, and have the potential to create younger environmental change agents in the community. Overall, the achievements at this socialization stage prove that an educational approach that is contextual, interactive, and based on real problems is able to effectively arouse the ecological awareness of citizens which was previously very low.

© 2026 by the authors. This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

Technical Capabilities of Ecoenzyme Manufacturing

Technical training on the manufacture of ecoenzymes was carried out in two main sessions: a debriefing session on the concept of fermentation and a hands-on practical session. Before entering the practical stage, participants first receive a briefing on the basic principles of anaerobic fermentation, the types of organic matter that can be used, and the right mixing ratio. Visual media in the form of illustrated posters of the creation stages and an 8-minute educational video were used to strengthen the conceptual understanding of the participants before they went directly into practice. The learning by doing approach was chosen because it has been proven to be more effective in transferring technical skills than the lecture method alone, especially for the target group of housewives who are more responsive to direct demonstrations.

In the practical session, all 25 participants were divided into 5 groups, each consisting of 5 people, with each group accompanied by one student facilitator. Each group practiced the process of mixing fresh organic matter (leftover fruit and vegetable peels), brown sugar, and water in a 3:1:10 ratio in sequence into a prepared 1.5-liter plastic bottle. The composition of the raw materials used during the training is shown in detail in Table 2 below.

Table 2. Composition of Ecoenzyme Production Raw Materials in Training Activities

No	Ingredients	Quantity per Bottle (1,5 L)	Total Production (30 Botol)	Propose yourself
1	Fresh organic waste (fruit and vegetable peels)	±500 g	±15 kg	30%
2	Brown sugar / molasses	±167 g	±5 kg	10%
3	Clean water	±833 ml	±25 liters	60%
Total processed organic raw materials			±50 kg	

The mixing process lasts approximately 45 minutes per group, including the stages of weighing materials, cutting organic waste into small pieces, gradual mixing, closing the bottle tightly, and labeling the production date. Once all the bottles were ready, participants were educated on the fermentation monitoring procedure: the bottles should be stored in the shade, opened every 3 days to release CO_2 gas, and gently shuffled to ensure a homogeneous mixture. The new ecoenzyme is ready to be harvested after passing a fermentation period of at least 90 days, characterized by a change in color to golden brown and the appearance of a distinctive acidic aroma. To measure the achievement of the participants' technical competencies, the facilitator team used a skill observation sheet that assessed five technical aspects during the practice. The results of the assessment are summarized in Table 3 below.

Table 3. Results of Assessment of Technical Competencies of Participants in the Manufacture of Ecoenzymes

No	Technical Competence Aspects	Excellent	Good	Enough	Less
1	Precise mixing ratio of materials	16 (64%)	7 (28%)	2 (8%)	0
2	Organic matter cutting techniques	14 (56%)	9 (36%)	2 (8%)	0
3	Bottle closing and labeling procedures	20 (80%)	5 (20%)	0	0
4	Understanding fermentation monitoring schedule	13 (52%)	10 (40%)	2 (8%)	0
5	Ability to re-explain the process to others	11 (44%)	12 (48%)	2 (8%)	0
Average Good and Excellent categories			92%		

The data in Table 3 shows that 92% of participants achieved the "Good" to "Excellent" category in all aspects of the technical competency assessed. The highest achievement was found in the aspect of bottle capping and labeling procedures (100% of participants in the good category and above), while the ability to re-explain the process to others that measured the depth of conceptual understanding was also well achieved by 92% of participants. This indicates that participants are not only able to follow technical instructions, but have also internalized the knowledge so that it can be transferred to others in the community.

The participants' response to the training process was very positive and showed the confidence that grew during the session. One of the participants from the housewife group, revealed:

> "It turns out that it is not difficult to make it. The ingredients are also easy, just collect the fruit peels that we usually throw away every day. I immediately told my husband to prepare a bottle at home."

Meanwhile, the environmental leader of RW 09, conveyed a broader perspective on the potential of this program:

> "If this can continue, we can reduce kitchen waste which has been a problem. Every week we have a lot of organic waste, it's a pity if it's not used. I will invite other residents who have not participated today."

Mr. Hendra's statement indicates the growth of a sense of ownership among community leaders, which is an important social capital for the sustainability of post-activity programs. Overall, the achievement of this technical training which produced 30 ecoenzyme bottles from ±50 kg of organic waste with a competency level of 92% of participants proves that ecoenzyme technology has high

© 2026 by the authors. This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

accessibility and has great potential to be replicated independently by the community outside of formal training sessions.

Behavioral Changes in Waste Sorting and Chemical Pesticide Reduction

Monitoring carried out during and after the activity showed real behavioral changes among the participants. The use of ecoenzymes as liquid fertilizers and natural pest repellents in chili, tomato, and flower plants showed positive results in the form of reducing the intensity of pest attacks and increasing the freshness of the leaves that can be observed visually. Furthermore, the results of the mentoring showed that around 60% of the participating residents had started separating organic waste from inorganic waste in their homes and producing ecoenzymes independently. This change indicates a meaningful shift in habits from conventional waste management patterns to more ecologically responsible practices while reducing residents' dependence on synthetic chemical pesticides in caring for yard plants.

Formation of Environmental Groups and Community Independence

As a result of a participatory and sustainable empowerment process, these service activities succeeded in cultivating the foundations of new social institutions at the community level. Residents who originally only acted as beneficiaries gradually transformed into environmental drivers in their own environment. The formation of small environmental groups at the RW level is one of the most significant indicators of success, because this group is expected to be the driving force for the sustainability of post-activity programs ranging from assisting new residents who want to learn to make ecoenzymes, managing joint production, to expanding the reach of the program to the surrounding environment. The highlight of the entire series of activities was the Leadership Project Work Title, where residents presented the results and reflected on their behavior changes, as well as a space of appreciation for the active contribution of all participants in realizing a more independent and environmentally friendly community.

DISCUSSION

Ecoenzyme-based community service activities at the Bumi Pelita Kencana RW 09 Complex show that an educational-participatory approach can be a catalyst for ecological behavior change at the community level. These findings are in line with the argument that environmental empowerment programs that actively involve the community rather than just as recipients of information have been proven to produce more lasting impacts than conventional one-way counseling (Palayukan et al., 2024). The Participatory Action Learning approach applied in this activity places citizens as subjects who have the capacity to define problems and formulate solutions in their own environment, a principle emphasized by Wood, (2019) as the foundation of meaningful community empowerment. The results of the activity, which showed the active participation of 25 residents across generations ranging from housewives to teenagers and environmental leaders,

reflected the success of the inclusive approach in reaching out to various segments of the community (Citraeni et al., 2025). The enthusiasm of the participants in the FGD sessions and technical training confirmed the findings Jam'an et al., (2025) that citizen participation increases significantly when the programs offered are relevant to the real problems they face on a daily basis.

Technically, the successful production of about 30 ecoenzyme bottles measuring 1.5 liters from ±50 kg of household organic waste proves the effectiveness of ecoenzymes as an appropriate technology that can be easily replicated at the community level. Ecoenzymes are the result of anaerobic fermentation of fresh organic waste with molasses and water that produce bioactive compounds including acetic acid, alcohol, and various enzymes that have antimicrobial and antifungal properties (Marlina et al., 2023). Penelitian Yosephine et al., (2024) Confirming that the routine application of ecoenzymes in agricultural soil is able to increase the activity of beneficial soil microbes, thereby indirectly improving soil fertility and plant resistance to pest attacks. The relatively simple fermentation process only requires containers, leftover kitchen organic matter, brown sugar, and water, making ecoenzymes a very accessible solution for people with economic limitations (Thohir et al., 2026). This is reinforced by the findings of Nugroho et al., (2025) who concluded that the cost of producing household-scale ecoenzymes is very low but produces ecological benefits comparable to commercial agrochemical products, so it has great potential as an environmentally friendly and economical alternative.

The results of observations showing a decrease in pest attacks and increased leaf freshness in chili, tomato, and flower plants after ecoenzyme application are consistent with a number of scientific studies that examine the effectiveness of ecoenzymes as a natural biopesticide. The content of organic acids and proteolytic enzymes in ecoenzymes has been proven to disrupt the nervous system and the protective layer of the body of insect pests, making it effective as a repellent as well as a mild pest killer without damaging the soil microecosystem (Widayati et al., 2025). The phytochemical compounds produced during the fermentation process also act as natural elisellers that increase the systemic resistance of plants to pathogen and pest attacks (Khoiriyani et al., 2025). Compared to synthetic chemical pesticides that leave harmful residues in the soil and plant tissues, ecoenzymes do not leave long-term toxic effects and instead enrich the nutrient content of the planting medium (Siregar et al., 2025). Thus, the field findings in this service activity strengthen the position of ecoenzymes as biopesticides that are suitable for integration in urban farming practices and gardening in the backyard.

The achievement that about 60% of participants began to separate organic waste independently and produce ecoenzymes at home was the most significant indicator of the success of behavior change in this activity. Behavioral changes in

© 2026 by the authors. This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

waste management do not occur instantaneously, but are the result of the process of internalizing values and skills through meaningful hands-on experience (Prasetio et al., 2023). A person to adopt a new behavior is influenced by three factors: attitudes towards behavior, subjective norms of the social environment, and perception of behavioral control These three factors are successfully intervened simultaneously through a participatory approach applied in these activities (Nisa et al., 2025). The study (Tiwow et al., 2024) also found that residents who were directly involved in the practice of making organic waste-based products tended to have a stronger long-term commitment to waste sorting than those who only received verbal counseling. Changes in waste management behavior in one household have a social contagion effect that encourages members of the surrounding community to adopt similar behaviors, so that the impact of these activities has the potential to extend organically.

CONCLUSIONS AND SUGGESTIONS

The use of ecoenzymes as a solution for organic waste processing and plant pest control has succeeded in increasing ecological awareness, technical skills, and community independence in managing household organic waste through a participatory approach and hands-on experience-based learning. This program has resulted in a real impact in the form of processing organic waste into useful products, the formation of a community group as well as behavioral changes towards a more environmentally friendly lifestyle. Overall, this activity proves that real action-based environmental education can be an effective means of building a sustainable culture, strengthening local leadership, and fostering ecological literacy at the community level.

Based on the results of the implementation of service activities, there are several suggestions for the development of programs in the future. First, replication of programs in other areas needs to be carried out so that the ecoenzyme training model can be applied in densely populated areas as a solution for organic waste management as well as a means of increasing environmental awareness. Second, strengthening community institutions is important, where the "Green Ecoenzyme RW 09" group needs to be facilitated to develop into an independent community with the support of environmental institutions and local governments. Third, it is recommended to integrate environmental education into the school curriculum, for example through the Pancasila Student Profile project or extracurricular activities with environmental themes. Fourth, it is necessary to develop innovations in ecoenzyme derivative products, such as natural cleaning liquids, commercial liquid fertilizers, and organic pesticides that have economic value. Fifth, the use of digital media through the creation of video tutorials and community-based e-modules will expand the reach of knowledge dissemination about ecoenzymes. Finally, a long-term impact evaluation needs to be carried out

to assess the sustainability of the management group and changes in community behavior towards the environment. By implementing these recommendations, the service activities themed Utilization of Ecoenzymes as Solutions for Organic Waste Management and Plant Pest Control have the potential to develop into a sustainable social movement that strengthens ecological awareness, encourages a circular economy, and forms an independent green community.

ACKNOWLEDGMENT

We would like to express our deepest gratitude to the Open University, especially the Faculty of Teacher Training and Education (FKIP), for the academic, moral, and facility support provided in the implementation of the Batch 8 Leadership Project Work Work activity with the theme "The Utilization of Ecoenzyme as a Solution for Organic Waste Processing and Plant Pest Control." We also express our appreciation to donors and community service funders who have provided financial and logistical support, so that all stages of activities can run smoothly. We would like to express our sincere gratitude to the Chairman of RW 09, community leaders, and residents of the Bumi Pelita Kencana Complex, Pondok Cabe Udik, who have actively participated in socialization, training, and implementation of sustainability programs. We also extend our deep appreciation to the supervisors and the Open University leadership project examiner team for their constructive guidance and input during the planning process until the preparation of this report. Hopefully the cooperation, support, and spirit of collaboration that has been established can continue in the next service activities for the realization of an independent, empowered, and environmentally friendly society.

REFERENCES

Ali, A. M. T., Mandra, M. A. S., Yusuf, A. Z., Jumadin, J., & Suryana, S. (2024). PKM Pelatihan Pemanfaatan Sampah Organik Rumah Tangga Untuk Budidaya Maggot Bagi Urban Community. *Jurnal Pengabdian Masyarakat,* 2(1), 54-60. https://doi.org/10.59562/abdimas.v2i1.2311

Arifani, D. A., Rukmini, D., Wibiksono, A. N. A., Zuntifa, L. L. I., & Nurmahmudah, N. (2026). Implementasi Program Green Community dalam Penguatan Tata Kelola Sampah Berkelanjutan Berbasis SDGs 11, 12, dan 13 di Dusun Bedis, Ngawi. *Jurnal Masyarakat Madani Indonesia,* 5(2), 1139-1151. https://doi.org/10.59025/kbfwah30

Citraeni Rusdaita, F., Putri, N. S., Fajar Palupi, I., Aulia Rahma, H., Akka Alfiani, D., Kartika Sari, S., Wulandari, N. (2025). Pelatihan Pembuatan Ecoenzim sebagai Upaya Pengolahan Limbah Organik dan Pemberdayaan Kesehatan Masyarakat di Desa Gununglurah. *Jurnal ABDIMAS Indonesia,* 3(3), 58–66. https://doi.org/10.59841/jai.v3i3.3394

Istanti, A., Indraloka, A. B., & Utami, S. W. (2023). Karakteristik Pupuk Cair Eco-

© 2026 by the authors. This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

Enzyme Berbahan Dasar Limbah Sayur Dan Buah Terhadap Kandungan Nutrisi Dan Bahan Organik. *Agriprima : Journal of Applied Agricultural Sciences,* 7(1), 79–85. https://doi.org/10.25047/agriprima.v7i1.503

Jam'an, M., Ummah, H., Rohmawati, S. L., Kartika, A. D., Dewi, R. A., Khusna, A., Nisa, R. (2025). Pemberdayaan Ekonomi Keluarga di Era Digital: Pendekatan Ekspansi Pasar melalui Pemasaran Online. *Jurnal Pengabdian kepada Masyarakat Desa (JPMD),* 6(3), 681-697. https://doi.org/10.58401/jpmd.v6i3.2645

Kementerian Lingkungan Hidup dan Kehutanan. (2025). *Sistem Informasi Pengelolaan Sampah Nasional (SIPSN)*. https://sipsn.menlhk.go.id/

Khoiriyani, V., Rihhadatul Aisya, Z., Afifa, N., & Alfi Raida, S. (2025). Efektivitas Kombinasi Ecoenzim dan Fitoremediasi dalam Pengolahan Limbah Praktikum Uji Asam Basa. *Bhumiputra: Jurnal Penelitian Dan Pengabdian Masyarakat Global,* 2(2), 124-133. https://doi.org/10.63142/bhumiputra.v2i2.225

Maimakal, D., Mallau, S., Maata, J., Lepangkari, L., Langfan, M., Lahlau, D., Karbeka, M., Manimoy, H., & Adang, H. M. (2026). Pembuatan Ecoenzim Berbasis Limbah Organik Untuk Mendukung Penguatan Profil Pelajar Pancasila (P5) Di Sma Negeri Wolwal. *Maju : Indonesian Journal of Community Empowerment,* 3(1), 247-255. https://doi.org/10.62335/maju.v3i1.2338

Marlina, E. T., Hidayati, Y. A., & Badruzzaman, D. Z. (2023). Pemanfaatan limbah dapur menjadi ecoenzim dan kompos di Desa Cangkuang Rancaekek Kabupaten Bandung. *Farmers: Journal of Community Services,* 4(2), 20-24. https://doi.org/10.24198/fjcs.v4i2.46023

Maulana, F., Febrina, B. P., Yardani, J., Agasi, S. Y., Fajri, F., Yaman, H. I., Adnan, M. (2025). Sosialisasi Pemanfaatan Limbah Organik Sebagai Solusi Pertanian Sirkular Di Pesantren An-Najah Cindai Alus Putra Kabupaten Tanah Laut Kalimantan Selatan. *Jurnal Abdi Insani,* 12(8), 3662–3671. https://doi.org/10.29303/abdiinsani.v12i8.2729

McIntyre, A. (2008). *Participatory Action Research.* SAGE Publications.

Nisa, R., & Supriadi, I. (2025). Participatory Journal Management Workshop: a Holistic Approach to Improving Editor Competence for National Accreditation. *Taawun*, 5(01), 81-94. https://doi.org/10.37850/taawun.v5i01.911

Nugroho, C. S. P., Islami, W. T., Sanata, D. T., Riza, A. R., Saputra, A. W., & Rinanto, Y. (2025). Pelatihan Pembuatan Eco-Enzyme Sebagai Upaya Pengelolaan Sampah Organik Rumah Tangga. *Masyarakat: Jurnal Pengabdian,* 2(4), 450–457. https://doi.org/10.58740/m-jp.v2i4.547

Nurliah, N., Elika, S. & Sagena, U. W. (2022). Sosialisasi Pengelolaan dan Pemanfaatan Sampah Organik Rumah Tangga Dalam Memproduksi Ekoenzim. *Jurnal Pengabdian Masyarakat Madani (JPMM),* 2(1), 33–39. https://doi.org/10.51805/jpmm.v2i1.47

Palaastita, N. F., Pratama, I. A., Anzukri, S. K., Safitri, A. N., Kamila, S. S., Subaris, H., & Rois, I. (2024). Pemberdayaan Masyarakat: Pembuatan Pupuk Kompos Sebagai Pengolahan Sampah Organik Rumah Tangga Dengan Media Galon

Bekas Di Dusun Salakan, Bangunharjo, Sewon, Bantul, Yogyakarta. *Ejoin: Jurnal Pengabdian Masyarakat,* 2(4), 656-663. https://doi.org/10.55681/ejoin.v2i4.2589

Palayukan, H, Dewanti, L, Suriyani, S., Ferianti, N., Triyani, S., & Panglipur, I. R. (2024). Pemberdayaan Lingkungan Berbasis Pengelolaan Sampah Melalui Ecobrik Sebagai Penguatan Karakter P5 Serta Aplikasi Geometri 3 Dimensi. *Dedication : Jurnal Pengabdian Masyarakat,* 8(1), 49–56. https://doi.org/10.31537/dedication.v8i1.1707

Prasetio, Hodi Eko. (2023). Pendampingan Pengolahan Kotoran Sapi Menjadi Pupuk Organik. *Mafaza: Jurnal Pengabdian Masyarakat.* 3(1), 75-88. https://doi.org/10.32665/mafaza.v3i1.1713

Rifky, S., Putra, J. M., Ahmad, A. T., Widayanthi, D. G. C., Abdullah, G., Sunardi, S., & Syathroh, I. L. (2024). *Pendidikan yang Menginspirasi: Mengasah Potensi Individu.* Yayasan Literasi Sains Indonesia

Rusdaita, F. C., Putri, N. S., Palupi, I. F., Rahma, H. A., Alfiani, D. A., Sari, S. K., ... & Wulandari, N. (2025). Pelatihan Pembuatan Ecoenzim sebagai Upaya Pengolahan Limbah Organik dan Pemberdayaan Kesehatan Masyarakat di Desa Gununglurah. *jurnal ABDIMAS Indonesia,* 3(3), 58-66. https://doi.org/10.59841/jai.v3i3.3394

Saputra, R. L., Widowati, W., Noorvy, D., & Wilujeng, R. (2025). Pelatihan Pembuatan Kompos Sampah Organik Rumah Tangga di Kota Malang. *Prima Abdika: Jurnal Pengabdian Masyarakat,* 5(1), 30-39. https://doi.org/10.37478/abdika.v5i1.4964

Siregar, I. M., Hakim, A. R., Jailani, M., Pratama, R., Azzahra, R. S., Panjaitan, Z. T., ... & Witra, L. (2025). Pengelolaan Ecoenzim Pertanian dari Limbah Organik Dapur di Desa Simpang Dolok. *Edu Society: Jurnal Pendidikan, Ilmu Sosial dan Pengabdian Kepada Masyarakat,* 5(2), 2069-2076. https://doi.org/10.56832/edu.v5i2.1682

Tiwow, V. M., Abram, P. H., Pulukadang, S. H. V., & Safitri, Y. (2024). Introduction Of CaO From Oyster and Ecoenzim For Making Virgin Coconut Oil. *Journal of Social Science (JoSS)*, 3(7), 383-390. https://doi.org/10.57185/joss.v3i7.335

Thohir, R. S. T. A., Qurotuaini, Z. A., Yanuar, R. G., Priyadi, A. A., Diana, D. E., Saputra, F. G., ... & Mulyati, T. A. (2026). Pemberdayaan Kelompok Bank Sampah Sri Wilis Melalui Pembuatan Sabun dari Minyak Goreng Bekas. *Jurnal Kreativitas Pengabdian Kepada Masyarakat (PKM),* 9(4), 328-336. https://doi.org/10.33024/jkpm.v9i4.12225

Widayati, Tri. Khamimah, Andalan Tri Ratnawati, Camilus Isidorus Ikut, & Rr Suprantiningrum. (2025). Pemanfaatan Sampah Organik Menjadi Ecoenzym Pada Masyarakat Kelurahan Ngijo, Kota Semarang. *Besiru : Jurnal Pengabdian Masyarakat*, 2(11), 1133-1140. https://doi.org/10.62335/besiru.v2i11.1982

Wood, Lesley. (2019). *Participatory Action Learning and Action Research: Theory, Practice and Process*. London: Routledge

Yosephine Louise, I. S., Rohaeti, E., Aznam, N., Arianingrum, R., Budiasih, K. S.,

© 2026 by the authors. This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

Mercuriani, I. S., Fitriyana, N. (2024). Pendampingan Pengolahan Limbah Organik Menjadi Ecoenzyme Bagi Guru-Guru Smp Sekabupaten Magelang. *Jurnal Pengabdian Masyarakat MIPA Dan Pendidikan MIPA,* 8(2), 116–120. https://doi.org/10.21831/jpmmp.v8i2.71193

Yusmartini, E. S., Kharismadewi, D., Atikah, & Rahadianto, W. T. (2025). Pemanfaatan Sampah Organik Rumah Tangga Menjadi Cairan Serba Guna dengan Proses Fermentasi di Panti Asuhan Humairoh Palembang. *Jurnal Abdimas Mandiri,* 9(2), 308–314. https://doi.org/10.36982/jam.v9i2.5820