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Empowerment of the Kembang PKK Group in Realizing the Right to a Good and Healthy Environment through the Processing of Organic Waste into Eco-Enzyme

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ABSTRACT

Effective waste management at the household level remains a critical challenge in achieving a sustainable environment and fulfilling community welfare. This initiative focuses on empowering the Kembang PKK women's group to exercise their constitutional right to a healthy environment by converting organic waste into eco-enzymes. The activity method is divided into three stages: preparation, implementation, and evaluation. The implementation stage includes educational outreach on legal and environmental awareness, demonstrations, and hands-on practice of eco-enzyme production. Through this empowerment activity, it is expected to foster a culture of conscious waste segregation, promote independence in managing organic waste, reduce waste volume at the source, and create potential for economic empowerment through eco-enzyme products produced by members of the Kembang PKK group.

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INTRODUCTION

One of the human rights guaranteed in the Constitution of Indonesia is the right to a good and healthy environment, as stated in Article 28H paragraph (1) of the 1945 Constitution of the Republic of Indonesia. This constitutional mandate is further elaborated in Law Number 32 of 2009 on Environmental Protection and Management, as amended by Law Number 6 of 2023 concerning the Stipulation of Government Regulation in Lieu of Law Number 2 of 2022 on Job Creation into Law. Article 70 of this law affirms that the community is positioned as a subject with an active role in environmental protection and management.

At the practical level, the issue of waste has become one of the major challenges in environmental management, both at the national and regional levels(Effendi et al., 2025). Based on data from the National Waste Management Information System (SIPSN) of the Ministry of Environment and Forestry (KLHK) in 2025, the largest source of waste in Indonesia, based on its composition, comes from household waste, accounting for 56.41% (fifty-six point forty-one percent), or approximately 18,697.5 tons of waste (Kementerian Lingkungan Hidup / Badan Pengendalian Lingkungan Hidup, 2025). Household waste that is not properly managed can become a source of diseases (such as diarrhea, typhoid, cholera, helminth infections, dengue hemorrhagic fever, and respiratory disorders), and can cause soil, water, and air pollution, thereby damaging the environment and reducing the quality of family life(Ompusunggu et al., 2025).

The waste problem is one of the serious issues in Bantul Regency. The largest source of waste in Bantul Regency in 2025 comes from household waste at 66.45% (sixty-six point forty-five percent), followed by waste from public facilities at 21.28%, market waste at 5.67%, commercial waste at 2.16%, office waste at 0.79%, waste from specific areas at 0.08%, and other sources at 3.56%(Kementerian Lingkungan Hidup / Badan Pengendalian Lingkungan Hidup, 2025). The Regional Government of Bantul Regency has made efforts to address the waste problem, such as providing waste processing facilities based on the reduce, reuse, and recycle (3R) system(Wijaya et al., 2025), developing waste banks, and educating the public. The Bantul Regional Government continues to seek ways to manage waste, especially household waste, so that it can be processed independently by producers or the community, and has issued Circular Letter Number B/600.1.17.3/04930/DLH of 2025 concerning the Movement for Household Organic Waste Management (Sidik, 2025).

Active community participation is essential in waste management to help reduce waste-related problems (Mudayana et al., 2024), one of which can be carried out through the Family Welfare Empowerment (PKK) group. PKK is a national movement in community development that grows from the grassroots level and is managed by, from, and for the community(Herlinda et al., 2025), aiming to create families who are faithful and devoted to God Almighty, possess noble character and morality, are healthy and prosperous, advanced and independent, uphold gender equality and justice, and have awareness of law and the environment (Kuswardinah, 2017). PKK women, as part of the community, have a strategic role in mobilizing community participation in environmental

issues, particularly in independent-based waste management. They are closely connected to household activities, including waste management; therefore, through the empowerment of PKK groups as key drivers within families and communities supported by appropriate training—they can become agents of change who are capable of disseminating knowledge as well as practicing proper waste management within the surrounding community. The active role of PKK women is essential in creating a collective movement for community-based waste management (Fitria, 2025).

PKK Kembang is one of the community-based family empowerment groups founded on the principles of Pancasila and mutual cooperation at the hamlet level of Kalipucang, Bangunjiwo Village, Kasihan District, Bantul Regency. PKK Kembang consists of approximately 35 women from RT 05 Kembang in Kalipucang Hamlet. It plays an active role in improving the physical and spiritual well-being of the community through the implementation of the 10 Core PKK Programs as follows: Program for the Internalization and Practice of Pancasila; Mutual Cooperation Program; Food Program; Clothing Program; Housing and Household Management Program; Education and Skills Program; Health Program Implementation; Cooperative Life Development Program; Environmental Sustainability Program; andHealthy Planning Program (Pebrianti, 2018). In order to implement the health and environmental sustainability programs, as well as an effort to realize the right to a good and healthy environment in Kalipucang Hamlet, PKK Kembang needs to be equipped with training, one of which is through the processing of organic waste into eco-enzyme. Organic waste is waste that can be naturally decomposed by microorganisms (biodegradable) and is environmentally friendly; if properly managed, it can be transformed into something useful (Sunarsih et al., 2025) such as eco-enzyme.

The service team intends to carry out an empowerment program for the PKK Kembang group in realizing the right to a good and healthy environment through the processing of organic waste into eco-enzyme. This initiative is based on the urgency of the mandate of Article 28H paragraph (1) of the 1945 Constitution of the Republic of Indonesia in ensuring a good and healthy environment, the pressing issue and urgent need to address waste dominated by household sources, and the importance of fostering active community participation through the PKK Kembang group in solving waste problems through a low-cost yet high-impact solution that transforms "problems" (waste) into "benefits" in the form of eco-enzyme. This community service aims to enhance legal and environmental awareness regarding waste management and the fulfillment of the right to a good and healthy environment, facilitate the transfer of knowledge and skills, reduce waste, and promote the economic empowerment of the PKK Kembang group. The service team expects that this empowerment activity will foster a culture of conscious waste segregation, achieve independence in managing organic waste, and develop cadres within PKK Kembang who are capable of disseminating knowledge to the surrounding community on processing organic waste into eco-enzyme as a solution to waste

problems in Padukuhan Kalipucang, while also supporting economic empowerment through the production of eco-enzyme products.

IMPLEMENTATION AND METHODS

The PKK Kembang Group empowerment activity was attended by 27 members of the PKK Kembang group and was carried out from May to June 2025 at the house of one of the PKK Kembang members, located on Roto Kenongo Street, Kembang, RT 05, Kalipucang Hamlet, Bangunjiwo Village, Kasihan District, Bantul Regency. This empowerment activity consisted of three stages: preparation, implementation, and evaluation.The first stage of this activity is the preparation stage, which involves a needs assessment of the PKK Kembang group. The service team held discussions with PKK Kembang members regarding the form of empowerment required, the implementation plan, and the facilities needed for the training.The next stage is the implementation phase, which includes educational outreach and training conducted through lectures, demonstrations, and hands-on practice (Sa'adah et al., 2025) on processing organic waste into eco-enzyme.The next stage is the evaluation phase, which aims to measure participants' understanding after the training activities through question-and-answer sessions and observation of the training outcomes in the form of eco-enzyme products produced by the participants.

The PKK Kembang Group empowerment activity employs an educational outreach method on the processing of organic waste to realize a good and healthy environment, with the aim of increasing legal and environmental awareness and knowledge among PKK Kembang members regarding the management of household organic waste. In addition, this empowerment activity also utilizes a training method on processing organic waste into eco-enzyme.

RESULTS AND DISCUSSION

In an effort to address the waste problem, Bantul Regency continues to intensify and encourage the community to sort household waste, as proper waste segregation can reduce waste problems by up to 70% (seventy percent) (Admin, 2025). In the Circular Letter of the Regent of Bantul Number B/600.1.17.3/04930/DLH concerning the Movement for Household Organic Waste Management, it is stated that in order to optimize the management of organic waste, and following the issuance of Regent Decree Number 524 of 2025 regarding the Emergency Status of Waste Management dated June 30, 2025, it is urged, among other things, that every individual sort waste according to its type and category, at a minimum into three categories: organic waste, inorganic waste(Tampubolon et al., 2025), and residual waste, using separate containers. In addition, it is recommended to provide biopores or other forms of organic waste processing (Purwanta et al., 2025) as solutions for managing organic waste(Anfa et al., 2025).

Organic waste is material that can be naturally decomposed by microorganisms and originates from living organisms. Examples include food scraps, fruit peels, vegetables, and garden waste such as leaves and twigs.Inorganic waste, on the other hand, consists of materials that do not naturally decompose and usually originate from industrial processes. Examples include plastic, paper, metal, glass, and other materials made from synthetic substances (Holimah et al., 2024). Residual waste refers to materials for which recycling technology is not yet widely available or that do not have sufficient economic value to be recovered by industry. Examples include multilayer plastics, Styrofoam, disposable diapers, sanitary pads, thermal paper, and used tissues (Plastic SmartCities, 2025).

Women in PKK groups play an important role in waste management; through proper empowerment and training, they gain knowledge and skills, are able to practice community-based waste management, and disseminate this knowledge, especially to the surrounding community (Fitria, 2025). The PKK Kembang group, as part of the community in Bantul Regency, needs to be provided with knowledge and skills in processing household waste, one of which is through the conversion of organic waste into eco-enzyme. Eco-enzyme, also known as an environmentally friendly enzyme, is made from household residues or waste such as vegetable scraps and fruit peels that are commonly discarded by the community (Permadi et al., 2023). Eco-enzyme is a dark brown liquid produced through the fermentation of water, fruit and vegetable peels, and brown sugar(Parmawati et al., 2025) in a ratio of 10:3:1(Erna et al., 2025). Eco-enzyme has various uses, such as a household cleaner, a natural fertilizer and pesticide, reducing the effects of greenhouse gases and global warming, benefiting marine plants and marine life, and reducing pollution (Sihite, 2024)(Prarikeslan et al., 2023).

The service team conducted an educational outreach activity on realizing the right to a good and healthy environment through the processing of organic waste into eco-enzyme, along with a hands-on practice session on making eco-enzyme, on Friday, June 27, 2025, at the home of one of the PKK Kembang group members located on Roto Kenongo Street, RT 05 Kembang, Kalipucang Hamlet, Bangunjiwo Village, Kasihan District, Bantul Regency. During the implementation stage of the outreach, the service team provided education on the right to a good and healthy environment as a fundamental right guaranteed under Article 28H paragraph (1) of the 1945 Constitution of the Republic of Indonesia and Law Number 32 of 2009 on Environmental Protection and Management (PPLH). Environmental management is not only the responsibility of the government but also requires active community involvement (Ripels, 2025) The PKK Kembang group can actively participate in managing the environment in their surroundings, one of which is through the processing of organic waste into eco-enzyme(Surani et al., 2025).

Figure 1. The PKK Kembang Group is Listening Attentively to the Outreach Session

The next stage involved the practical session on making eco-enzyme. The service team invited an environmental activist focused on organic waste management, Mrs. Hetty Dyah Kartini, who first provided an explanation about eco-enzyme, its benefits, the production process, and proper storage methods.Mrs. Hetty explained that eco-enzyme is a versatile natural liquid produced through the fermentation of sugar, fruit and vegetable scraps (clean and still fresh), and water in a ratio of 1 (kg/g) sugar : 3 (kg/g) organic material : 10 (L/ml) water. She first demonstrated the form of finished eco-enzyme that had been fermented for at least three months.

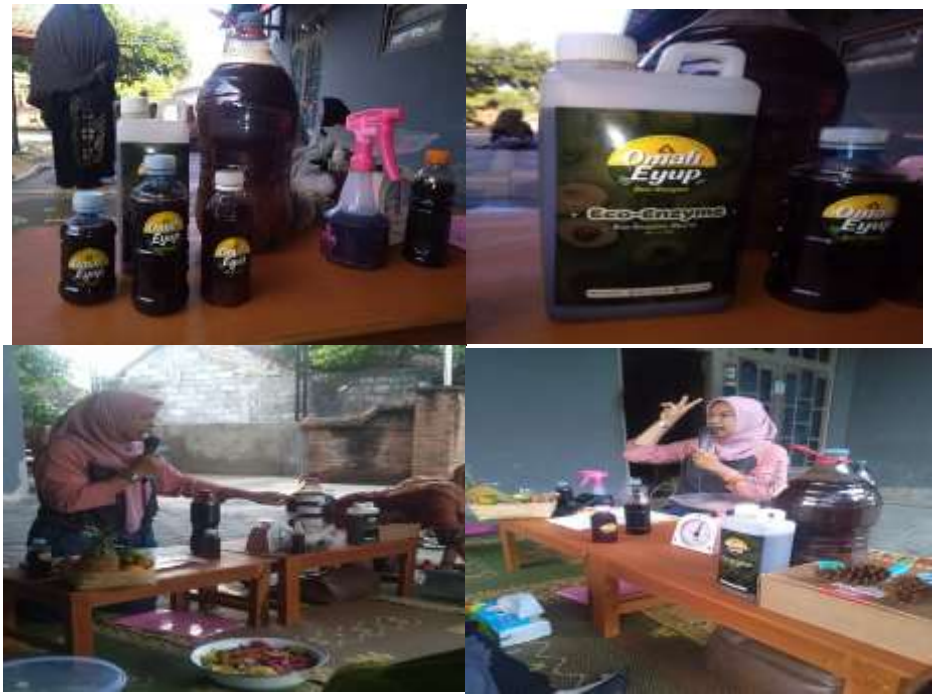

Figure 2. Mrs. Hetty is Explaining and Showing the Form of Eco-Enzyme that has Been Fermented for at Least Three Months

Mrs. Hetty further explained the benefits of eco-enzyme and its applications in daily life. It can be used as a natural floor cleaner, natural detergent and fabric softener, liquid soap, a solution for removing pesticides and cleaning germs from fruits and vegetables, as a toner and an ingredient in facial creams, a substitute for toothpaste, mouthwash, organic fertilizer, and other uses.Eco-enzyme also offers health benefits, such as functioning as a hand sanitizer, helping to treat various types of wounds, supporting personal hygiene, and addressing certain skin conditions. It is also beneficial for improving air quality and restoring polluted water sources such as lakes, rivers, and drainage systems. In addition, eco-enzyme is useful for soil and agriculture, as it can help rehabilitate barren land into arable farmland and can be used as a fertilizer or applied to plants affected by pests.

During the eco-enzyme production stage, Mrs. Hetty explained that clean water must be used, such as refill water, well water, rainwater, or bottled water. The organic materials used in making eco-enzyme consist of fruit and vegetable scraps.

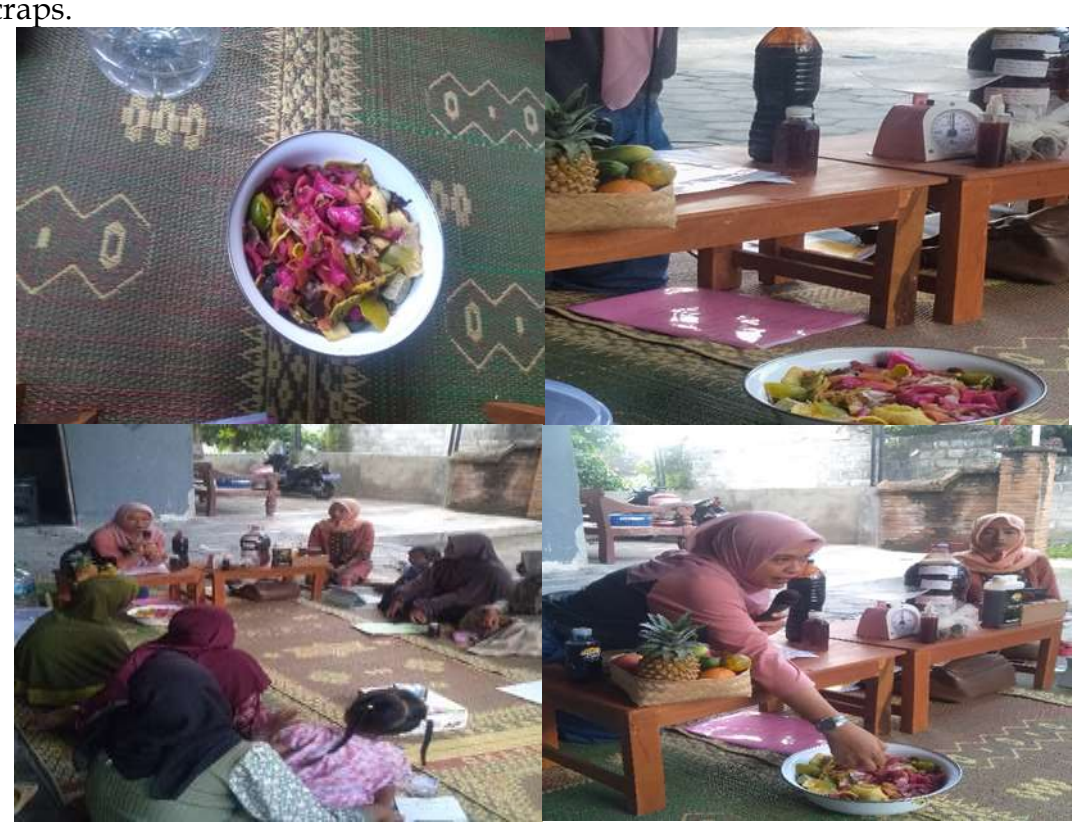

Figure 3. Mrs. Hetty is Showing the Fruit and Vegetable Scraps that Will be Used for Making Eco-Enzyme

Next, the sugar used can be brown sugar, palm sugar, cane sugar, molasses, palm sugar (lontar), or granulated sugar. The recommended maximum amount of water is 60% (sixty percent) of the container's volume. The types of fruits and vegetables that can be used include all fresh scraps, except those that are cooked, rotten/infested/moldy, oily, or dried/hard. The recommended container should have a wide lid and be made of plastic. Metal containers should be avoided as they are prone to rust, and glass containers are not recommended as they are fragile and can easily break. The process of making eco-enzyme begins by adding chopped fruit and vegetable scraps amounting to 30% of the water's weight into

the container, followed by adding sugar at 10% of the water's weight, and then pouring in clean water up to a maximum of 60% of the container's volume. All the ingredients are then tightly sealed in the container and labeled with the production date and the harvest date.

Eco-enzyme does not have an expiration date, and the longer it is fermented, the better its quality becomes (Permadi et al., 2023). Eco-enzyme should be stored in a shaded place, away from direct sunlight, with good air circulation, in a clean environment, and kept away from trash bins, waste-burning areas, toilets, Wi-Fi sources, and chemical substances. Eco-enzyme can be harvested after 90 days by filtering it and storing it in a closed container.

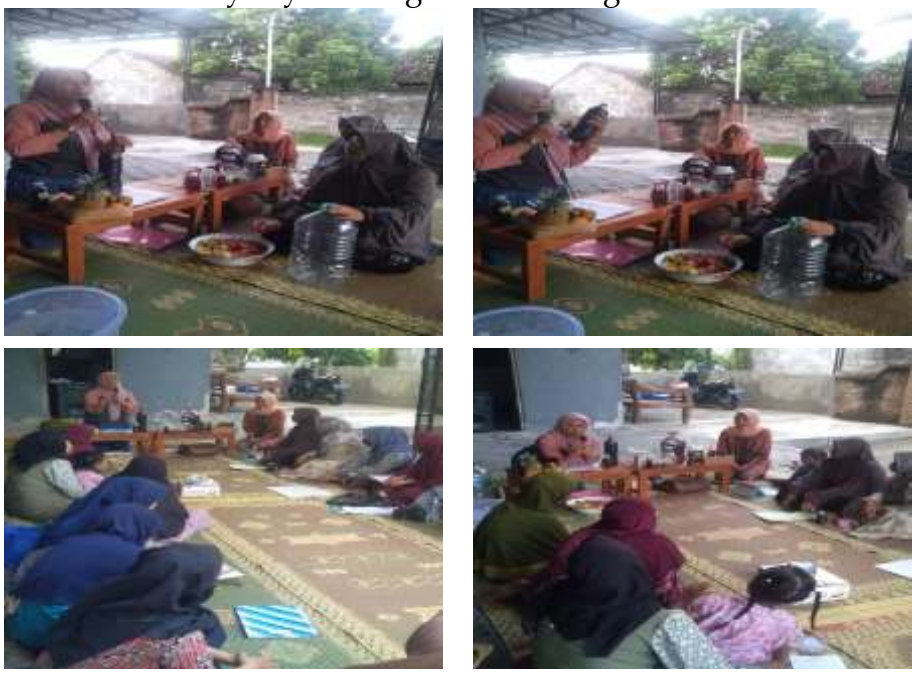

Figure 4. Mrs. Hetty is explaining the stages of making eco-enzyme

After receiving a complete explanation of the eco-enzyme production process, the PKK group members were then invited to practice making eco-enzyme.

Figure 5. The PKK Kembang Group Members are Practicing the Stages of Making Eco-Enzyme

The outcomes of this empowerment activity show that the PKK Kembang group gained knowledge about the right to a good and healthy environment through the processing of organic waste into eco-enzyme. They also acquired an understanding of eco-enzyme, including its definition, benefits, and production process, as well as practical skills in making eco-enzyme. After the empowerment activity was completed, the service team conducted an evaluation through discussions with the PKK Kembang group members regarding their understanding of the right to a good and healthy environment, types of waste, the benefits of eco-enzyme, and their knowledge of how to produce eco-enzyme before and after the activity. The evaluation results indicate that the PKK Kembang members gained a better understanding of their rights related to a good and healthy environment, understood the benefits of eco-enzyme, and acquired skills in making eco-enzyme.

The primary objective of this empowerment activity was to evaluate the effectiveness of eco-enzyme production as a strategic tool for realizing the constitutional right to a healthy environment within the Kembang PKK group. This section presents the empirical results gathered during the implementation phase conducted in RT 05 Kembang, Bangunjiwo Village, from May to June 2025. The analysis is based on data derived from participant observation, hands-on practice performance, and interactive evaluative discussions. By synthesizing these observations with established environmental and legal frameworks, the following findings highlight the progress made in community legal literacy, technical skill acquisition, and the potential for long-term sustainable waste management. The findings are categorized into three thematic areas: community receptivity, technical mastery of organic waste processing, and the practical application of constitutional environmental rights.

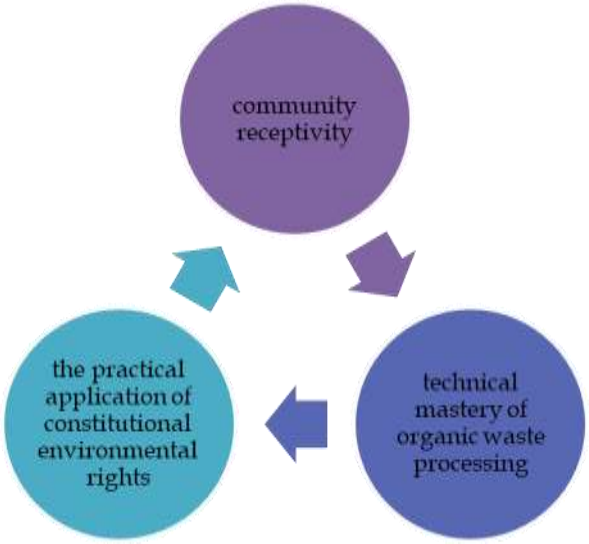

Figure 6. The Categorized into Three Thematic Areas

The activity, achieved significant traction within the RT 05 Kembang area. The consistent and active participation of 27 members of the PKK Kembang group suggests high social capital and a readiness for community-led environmental interventions.

Figure 7. Members of the PKK Kembang Group Listened Attentively to an Interactive Discussion on Organic Waste Management Using Eco-Nzyme

In the context of Indonesian community structures, the PKK (Family Welfare Movement) serves as a strategic entry point for environmental programs because of its established social hierarchy and influence on household consumption patterns. The participants' high engagement, moving from attentive listening to proactive hands-on practice, indicates that the methodology of the "Implementation Stage" successfully aligned with the learning styles of adult community members.

Interactive discussions and hands-on sessions resulted in a measurable increase in local capacity. Participants demonstrated the ability to independently produce eco-enzymes, which effectively transforms domestic organic waste into value-added products such as natural cleaners or fertilizers. This technical mastery is crucial for decentralizing waste management. By processing waste at the source, the Kembang group contributes to reducing the overall burden on landfills. The transition from passive awareness to technical competency ensures that the program moves beyond mere theory into a sustainable, long-term practice within the village.

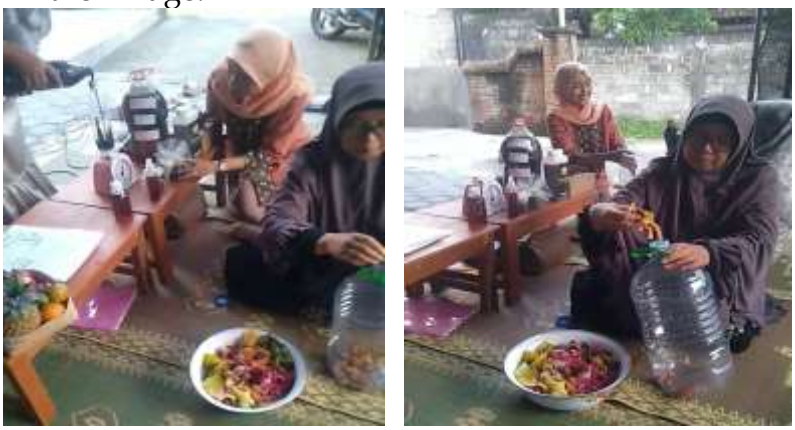

Figure 8. Mastery of Techniques through Direct Practice of Making Eco-Enzymes By Members of the PKK Kembang Group

The program successfully translated the abstract "right to a healthy environment" into a practical household responsibility. By citing Article 28H, paragraph (1) of the 1945 Constitution of the Republic of Indonesia, the activity framed waste management not just as a chore, but as the fulfillment of a constitutional mandate. This legal literacy empowers citizens to recognize their standing in environmental protection. Consequently, the participants developed a sense of agency, viewing the production of eco-enzyme as a concrete action to realize their right to a good and healthy environment.

CONCLUSIONS AND RECOMMENDATIONS

The empowerment activity of the PKK Kembang group in realizing the right to a good and healthy environment through the processing of organic waste into eco-enzyme was carried out from May to June 2025 in RT 05 Kembang, Kalipucang Hamlet, Bangunjiwo Village, Kasihan District, Bantul Regency. The activity received a positive response, with active participation from 27 members of the PKK Kembang group. The participants demonstrated a high level of engagement, from attentively listening to the presentation of the material to actively participating in the hands-on practice of the eco-enzyme production process. The main outcome of this program is the increased awareness of the PKK Kembang group on how to realize the right to a good and healthy environment through simple actions such as processing organic waste. The participants also successfully gained knowledge regarding the definition and benefits of eco-enzyme, as well as practical skills in its production process. The evaluation stage was conducted through interactive discussions with the participants immediately after the practical session was completed. The results of these discussions showed that the PKK Kembang members had a good understanding of their environmental rights, the benefits of eco-enzyme, and had developed the capacity and skills to produce it independently. For follow-up, it is highly recommended that PKK Kembang members begin to implement a conscious and independent waste-sorting culture in their own households. In addition, cadres should be developed within the PKK group to disseminate this knowledge of waste management to the wider surrounding community. Further guidance activities after harvesting are also recommended to ensure product quality and to optimize the economic empowerment potential of the eco-enzyme produced.

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