PKM Training on Techniques for Making Ecoenzyme Derivative Products for Community Groups in the Santa Brigida Region, Raja Damai Church, Tikala Baru District, Manado

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ABSTRACT

Waste is still a serious problem that cannot be completely addressed, especially in big cities. The increase in the amount of waste will continue to increase in line with the increase in people's welfare and lifestyle. Ecoenzymes are useful multipurpose liquids that can be made from organic waste resulting from household activities. Community involvement in waste management is still lacking due to the lack of training on processing organic waste into ecoenzymes, and processing ecoenzymes into derivative products in the form of soap. The method used in this PKM is training and mentoring which consists of two stages, namely the practice of making ecoenzymes and the next stage the practice of making soap from ecoenzymes. The results of the evaluation carried out after training by the PKM Team showed that the partner group members were able to absorb the knowledge and information provided so that they were able to make ecoenzymes from organic materials which are household waste, and then the ecoenzymes that had been harvested (after 3 months of fermentation) could be processed into soap products. solid that can be used for family needs. This shows that the PKM activity of training on techniques for making ecoenzyme derived products has succeeded in increasing the knowledge and skills of partner groups in making ecoenzymes and soap derivative products, which are also an alternative for handling organic waste in the environment.

***Keywords**: organic waste, ecoenzymes, fermentation, soap*

1. INTRODUCTION

The daily demand for food in society inevitably generates leftover materials that are no longer used and are simply discarded into the environment. If not managed properly, these waste-producing community activities can affect the quality of the living environment or directly lead to environmental pollution.

Environmental pollution can occur in the air, soil, or water, and this can impact the overall quality of life. Environmental issues are further accelerated by the increase in human activities that pay little attention to the preservation of the surrounding environment (Slamet, 2002). Environmental problems represent a decline in the environment's carrying capacity as a result of low public awareness regarding the importance of environmental management. This is caused by several factors, including: changes in environmental functions and structures, a decline in environmental quality and carrying capacity, a lack of integrated management of human, natural, and artificial resources among various stakeholders, suboptimal utilization of urban space, and environmental pollution generated by waste. Waste is an environmental issue that requires serious handling (Syafrudin, 2004).

Waste remains a serious problem that has not been fully resolved, especially in large cities. On average, each person can produce 1–2 kg of waste per day, a figure that continues to grow alongside increasing prosperity and lifestyle changes. Waste that does not receive serious handling can cause various problems, including environmental pollution, social conflict, and diseases for communities living near Final Disposal Sites (TPA).

Based on data from the Department of Sanitation and Parks (2016), Manado City produces approximately 657 tons of waste per day. Of that amount, only about 80% is transported to the Sumompo Final Disposal Site (Sugiharto, 2021). Many efforts have been made to reduce waste production, such as recycling and composting; however, these efforts have not yet shown positive progress. Other data, based on population assumptions in Manado, suggests that the amount of waste has decreased to 409.7 tons. Furthermore, in 2020, according to the National Waste Management Information System, the volume of waste in Manado City reached 332.89 tons/day and 121,504.81 tons/year (Sasetyaningtyas, 2021).

In Manado, the organic waste produced is approximately 1,300 m^3 per day, mostly originating from household waste. The Manado City Government has attempted to address the waste accumulation problem by utilizing waste transport motorbikes. Nevertheless, the buildup of waste in designated areas still causes issues, such as the unsightly view of garbage during the day and foul odors emanating from the transport vehicles. Therefore, alternative efforts from both the government and the community are needed to maximize waste management.

Household waste management, which generally consists of organic waste such as kitchen vegetable scraps or fruit peels, can be converted into eco-enzyme liquid. Making eco-enzymes from vegetable waste or fruit peels is one of the best alternatives to reduce environmental pollution and transform waste into useful new products (Megah et al., 2018).

Eco-enzyme is a multipurpose liquid produced from the fermentation process of organic waste. First introduced by Dr. Rosukon Poompanvong from Thailand, the goal is to convert the enzymes found in organic waste into an organic cleaning solution. Eco-enzyme is a multifunctional cleaning liquid used for floor mopping, cleaning toilets, kitchen surfaces, and utensils, as well as purifying the air, fertilizing plants, and repelling pests (Rahmayanti, 2021).

Tikala Baru Village, located in the Tikala District of Manado City, North Sulawesi—approximately 7-8 km from the UNSRAT campus—is a strategically functional area for waste management efforts. The community group in the Santa Brigida Region, Queen of Peace Parish in Tikala Baru, plays a vital role in fostering a clean and orderly lifestyle and serves as the key to solving waste problems at the family level.

This target community group can act as a catalyst in implementing waste management steps within the smallest environment: the household. One feasible waste management activity is processing organic kitchen waste into eco-enzymes.

Based on the above, the Unsrat PKM Team conducted training and mentoring for this target group. The activity consisted of two stages: the production of eco-enzyme (3-month fermentation), followed by the creation of derivative products in the form of bar soap. This training activity is expected to provide significant benefits to the Santa Brigida community and will eventually be socialized to the surrounding public to help maintain environmental cleanliness and reduce the volume of wet waste discarded into their living environment.

Partner Problems (Partner Challenges)

Based on the results of meetings and interviews with the community members of the partner group, several problems have been identified and formulated as follows:

1. An increase in waste volume corresponding with population growth.
2. Community consumption patterns and lifestyles that contribute to the rising volume of waste over time.
3. Suboptimal waste management, where waste is sometimes left uncollected for several days, leading to environmental pollution.
4. Limited community participation in waste management, characterized by improper disposal and accumulation of waste, and a lack of efforts to process waste into useful goods (reuse).
5. The community group expresses a desire to be involved and process their own waste into useful materials, but they lack information on how to manage organic waste.

6. A lack of training regarding the processing of organic waste into eco-enzymes and the further processing of eco-enzymes into derivative products, such as soap.

Objectives and Benefits of the Activity

Objectives The Community Service (PKM) activities in Tikala Baru Village aim to:

1. Increase the partner group's knowledge regarding the processing of household organic waste into a multipurpose liquid, namely eco-enzyme.
2. Increase the partner group's knowledge regarding the processing of eco-enzyme into derivative products such as soap.

Benefits

The benefits of the PKM activities in Tikala Baru Village are:

1. Enhancing the partner group's awareness of the importance of managing household organic waste.
2. Providing information and broadening the insights of the partner group on how to transform household organic waste into eco-enzyme and its derivative products, specifically soap.

2. METHOD

This Community Service (PKM) activity employs counseling and training methods, specifically through practical demonstrations of eco-enzyme production and its derivative product, soap.

Target Audience

The target audience for this community service activity is the residents of Tikala Baru Village, Manado, specifically the partner group of the Santa Brigida community.

Location and Timeline

The PKM activities were conducted in Tikala Baru Village, Tikala District, Manado City. The project was carried out over a period of four months.

Implementation Methods

The approach taken by the Unsrat PKM Team to address household organic waste management issues in Tikala Baru Village involves: 1) Training and 2) Demonstrations (Practicum). These methods aim to provide the partner group with:

1. Increased awareness regarding the importance of managing household waste into useful materials.
2. Improved technical skills in processing household waste into eco-enzyme and its derivative product, soap.

The training activities were designed in two stages: 1) material presentation using an LCD projector followed by a group discussion, and 2) practical demonstrations of eco-enzyme and soap production. During implementation, these activities were practiced directly by participants from the partner group. Mentoring was provided to monitor the three-month eco-enzyme fermentation process until completion, after which it was processed into soap products. The training process utilized audio-visual tools and samples of eco-enzyme products to demonstrate their use. Each participant received the material in the form of a handout.

Partner Participation

The partners participated actively in the PKM activities by attending the training sessions provided by the Unsrat PKM Team and engaging in the practical production of eco-enzyme and soap. For the practical demonstration, partners participated by preparing materials consisting of household organic waste (such as vegetable scraps and fruit peels). The partner group is

expected to be able to independently process vegetable and fruit waste into eco-enzyme and soap.

3. RESULTS AND DISCUSSION

The counseling, training, and practical activities conducted with the partner group in Tikala Baru Village, Manado, focusing on processing vegetable and fruit waste, have been successfully implemented. The approach taken by the Unsrat PKM Team to address household organic waste management issues involved: 1) Training and 2) Demonstrations (Practicum), aimed at providing the partner group with the following: a. Increased awareness regarding the importance of managing household waste into other useful materials. b. Improved technical skills in processing household waste into eco-enzyme and its derivative product, soap.

The training activities were designed in two stages: 1) material presentation using an LCD projector and group discussions, and 2) practical demonstrations of eco-enzyme and soap production. Mentoring was provided to monitor the three-month eco-enzyme fermentation process until completion, after which it was processed into soap products. The training process utilized audio-visual tools and samples of eco-enzyme products to demonstrate their use. Each participant received the material in the form of a handout.

Partner participation in this PKM project involved active engagement in the training sessions provided by the Unsrat PKM Team and participation in the practical production of eco-enzyme and soap. In the practical demonstration, partners prepared materials consisting of household organic waste (vegetable scraps and fruit peels). The partner group is expected to be able to independently process vegetable and fruit waste into eco-enzyme and soap.

The programmed activities for the partner group—the Santa Brigida community of the Raja Damai Parish in Tikala Baru Village—were successfully carried out in stages. The implementation of this PKM activity consisted of the following stages:

1. Counseling
   The PKM team provided counseling regarding the types of household organic waste that can be processed into eco-enzyme, the production methods, and the benefits of eco-enzyme (Figure 1).
2. Training and Demonstration (Practicum) The team conducted a practicum on how to make eco-enzyme from organic vegetable scraps and fruit peels (Figure 2). Participants prepared organic materials cut into small pieces (2-3 cm), along with liquid brown sugar, water, and plastic containers provided by the PKM Team. Once all materials and tools were ready, the containers were filled with water, brown sugar, and organic materials. The ratio of brown sugar to organic material to water was 1:3:10. All ingredients were then mixed thoroughly, sealed, and labeled with the production date, harvest date, and the type of organic materials used. The mixture was stored at room temperature for a three-month fermentation process.
3. Follow-up Training After the eco-enzyme was ready, a follow-up training session was held for the production of derivative products, specifically eco-enzyme soap (Figure 3). The soap-making practicum utilized eco-enzyme, coconut oil, NaOH, plastic containers, soap molds, and a hand mixer. All prepared ingredients were mixed in specific proportions and blended using a hand mixer until the mixture thickened. Once thickened, it was poured into the soap molds. The molded eco-enzyme soap was left at room temperature for approximately 48 hours until hardened before being removed from the molds.

Figure 1. Partner group participants attending a counseling session on eco-enzymes, their production methods, and their benefits.

The members of the partner group, as PKM participants, enthusiastically observed the production techniques for eco-enzymes and eco-enzyme soaps, which are easy to make using daily kitchen waste available at home.

Figure 2. Participants attending the process conducted by the PKM Team

Figure 3. The PKM Team demonstrating the process of making soap from eco-enzyme to the participants.

4. CONCLUTION

The Community Service (PKM) activity for the Santa Brigida community group of the Raja Damai Parish in Tikala Baru, Manado, regarding "Training on the Production Techniques of Eco-Enzyme Derivative Products," has been successfully implemented. Based on the Q&A discussions with the partner group and monitoring during the project, results show that the members were highly satisfied and receptive to the information provided. This was evident from the first stage, which involved counseling and training on producing eco-enzymes from household organic waste, followed by the second stage of producing solid soap once the eco-enzyme was harvested. Participants were enthusiastic about making these products at home, realizing the numerous daily benefits of eco-enzyme, such as its use as a cleaner, fertilizer, soap, and more. Following the success of this activity, the partner group proposed further training for other eco-enzyme derivatives, such as liquid soap and hand sanitizer production techniques.

5. SUGGESTION

Follow-up activities are needed to expand the processing of eco-enzymes into other derivative products beyond solid soap, specifically hand sanitizers and liquid soap. This will ensure the community remains informed about the various innovative products that can be created from organic waste, providing a sustainable solution to reduce environmental waste.

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