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DIVERSIFICATION OF PINEAPPLE WASTE THROUGH ECO-ENZYME DOING TRAINING AT THE "QUEEN" PINEAPPLE FARMER GROUP KEDIRI

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Abstract

Kediri is the largest honey pineapple-producing area in East Java, so it has pineapple farmer groups. The honey pineapple farmer group called "Queens" is one of the pineapple farmer groups in Kediri that creates processed pineapple products such as fresh pineapple fruit, peeled pineapple, and pineapple drink. However, the group is facing an issue of pineapple skin waste that has yet to be utilized. Therefore, expanding pineapple products by using fruit and pineapple skin waste is crucial. One way to do this is by making eco-enzymes. The method used in this activity is a group-based activity method, carried out jointly between the activity team and the pineapple queens farmer group, starting from the planning, implementation, and mentoring to the monitoring and evaluation stages. Community service activities for the "Queens" pineapple farmer group have succeeded in making eco-enzymes from pineapple skin waste. Based on the results of the activity, this activity was able to increase the knowledge of the "Queens" pineapple farmer group, where 100% of the partners already knew the benefits of eco-enzymes and knew the tools and materials, and procedures used in making eco-enzymes from pineapple peels. This activity was also able to improve the skills of the partners of the "Queens" pineapple farmer group, where partners were able to make eco-enzymes from pineapple peel waste very well, starting from preparing tools and materials, mixing ingredients, to packaging eco-enzymes.

Keywords: Diversification, Eco Enzyme, Pineapple, Waste, Farmer Group

INTRODUCTION

Kediri in East Java Province is well-known for its high-quality products, such as tofu, manga podang, and pineapple. In 2022, pineapple production in East Java was expected to reach 3,574,920 tons, a significant increase of 79.8 percent from the previous year. 81.4 percent of the pineapple yield in East Java is from Kediri Regency, specifically 2,911,212 tons (BPS East Java, 2022). The honey pineapple farmer group called "Queens" is one of the pineapple farmer groups in Kediri that creates processed pineapple products such as fresh pineapple fruit, peeled pineapple, and pineapple drink. However, the group is facing an issue of pineapple skin waste that has yet to be utilized. Therefore, it is crucial to expand pineapple products by using fruit and pineapple skin waste. One way to do this is by making eco-enzymes.

Eco enzyme is produced by fermenting organic waste for three months. They are yellow to brown and have a sweet-sour aroma (Jelita, 2022; Pratamadina et al., 2022). Eco enzyme was discovered by a Thai scientist named Rosukon Poompanvong in 2003. It's fascinating to know that these enzymes can be produced from a mixture of organic waste, sugar, and clean water through a 3-month fermentation process (Septiani, 2021; Nurfajriah, 2021; Viza, 2022). During this process, alcohol is produced in the first month, acetic acid in the second month, and enzymes in the third month (Prasetio et al., 2021). The enzymes in eco-enzymes are amylase, lipase, and protease, which are essential for breaking down organic waste (Galintin et al., 2021).

Eco-enzymes have various benefits as anti-bacterial, anti-fungal, insecticides, and cleaners (Vama and Cherekar, 2020). They benefit the health sector, agriculture, animal husbandry, the environment, and households. In the health sector, eco-enzymes can be used as natural hand sanitizers, relaxation fluids, and disinfectants (Yuliono et al., 2020). In agriculture, eco-enzymes can be used as liquid organic fertilizers (Pakki et al., 2021), fruit preservatives by inhibiting fruit decay (Yanti and Awalina, 2021; Maula et al., 2020), and natural insect repellents (Viza, 2022). In the animal husbandry sector, eco-enzymes can be used for fish health and eliminate fishiness in water (Nurfajriah, 2021). In households, eco-enzymes can be used to clean liquids such as floor and dishwashing soap, eliminate bad breath, and descaling (Septiani, 2021; Maula et al., 2020). Eco-enzymes also produce ozone, which reduces carbon dioxide in the atmosphere and produces CO3 and NO3 gases that make the air healthier. This process shows that eco-enzymes can help improve environmental quality.

Ecoenzymes are produced from the decomposition process of organic and carbon compounds on the substrate (Pratamadina et al., 2022). Carbon compounds are obtained from brown sugar, while organic compounds can come from leftover vegetables, raw fruit, and unused fruit peels (Rambe, 2021). The results of Suprayogi research, et al. (2022) showed that the eco enzyme from waste pineapple and Berastagi orange peels succeeded in producing a cloudy brown eco enzyme on the 90th day of incubation with a characteristic aroma of fermentation according to the concentration of the raw materials used. Rohyani et al. (2020) have also succeeded in making eco-enzymes from pineapple and papaya for wastewater treatment. These results indicate that pineapple skin has the potential to be used as a raw material for making eco-enzymes. On the other hand, the "Queens" Pineapple farmer group has not utilized the potential of pineapple waste as an ingredient for making eco-enzymes.

Based on the background above, certifying eco-enzyme products from pineapple peels in the "Queens" pineapple farmer group is necessary. In the implementation of the “Program Kemitraan Masyarakat”(PKM) grant, three main activities were carried out, namely (a) socialization on how to make eco-enzymes from pineapple peels and the benefits of eco-enzymes, (b) training on making eco-enzymes from pineapple peels and (c) training on packaging eco-enzymes from pineapple peels. This community service activity aims to increase partners' understanding of the benefits of eco-enzymes and improve partners' skills in making eco enzyme products from pineapple peel waste.

METHOD AND PROCEDURES

The method used in this activity is a group-based activity method, carried out jointly between the activity team and the pineapple queens farmer group, starting from the planning, implementation, and mentoring to the monitoring and evaluation stages. The stages of implementing this activity are:

1. Planning

At this stage, permits were carried out in the Sempu sub-district, Ngancar District, as well as a focus group discussion with the Pineapple Queens Farmers Group regarding the work program that would be carried out, in this case, making eco-enzymes from pineapple peel waste.

2. Implementation

At this stage, it is carried out by the method of socialization, training, and mentoring to the Pineapple Queens Farmer group. The socialization was carried out by giving leaflets containing the benefits of eco-enzymes and how to make eco-enzymes from pineapple peel waste. The training was carried out by showing videos on how to make eco-enzymes and pineapple peel waste and practical examples of making eco-enzymes from pineapple peels. Assistance is done by assisting partners in producing and packaging eco-enzymes from pineapple skin waste. In the process of making eco-enzymes, the following tools and materials are needed:

a. Tools: Knife, basin, stirrer, scale, measuring cup, used gallon, filter or cloth, plastic hose
b. Ingredients: pineapple skin waste, brown or palm sugar, clean water
c. Procedure

The procedure for making eco-enzymes from pineapple peels includes:

- Wash the pineapple skin until clean
- Weigh 3 kg of pineapple skin and 1 kg of brown sugar or palm sugar
- Measures clean water up to 10 liters
- Dissolving 1 kg of brown sugar until dissolved
- Prepare all ingredients according to the figure 1. The ratio of pineapple peel waste: brown sugar: clean water is 3: 1: 10)
- Put all the ingredients in a container and then stir (fill the container is not full)
- Close the container and then provide a plastic tube through the end of the bottle and connect it to a container filled with water so that the gas formed can escape
- material fermented for three months
- Harvesting eco-enzymes after three months by filtering the solution with a filter or cloth

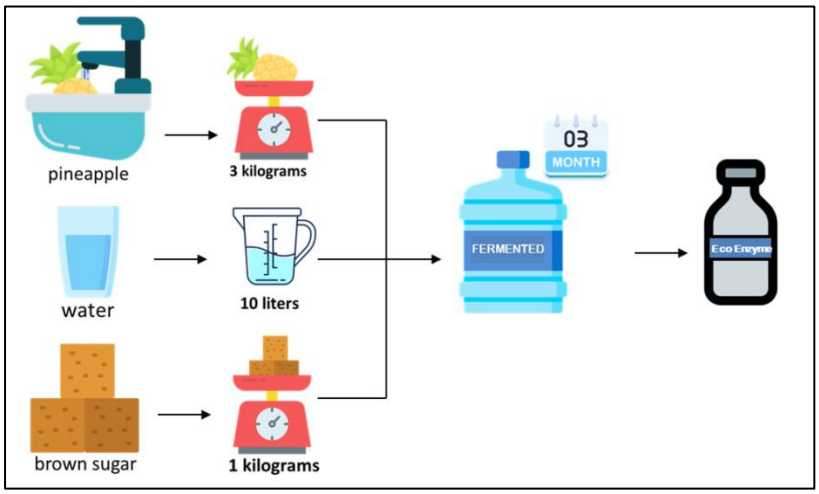

Figure 1. Production Flow of Eco-Enzymes From Pineapple Waste

3. Monitoring and evaluation

At this stage, the partners' understanding of the benefits and methods of making eco-enzymes from pineapple peel waste was assessed through questionnaires before and after the training. Besides that, an assessment of the partners' skills was also carried out when making eco-enzymes from pineapple peel waste.

RESULTS

The results obtained during the implementation of community service activities through "Program Kemitraan Masyarakat"(PKM) include:

1. Socialization of Benefits and Methods of Making Ecoenzymes from Pineapple Peel Waste

Socialization of the benefits and manufacture of eco-enzymes from pineapple peel waste was carried out by distributing leaflets containing benefits, tools, and materials and how to make eco-enzymes from pineapple peel waste. The event continued with a presentation on how to make eco-enzymes from pineapple peel waste, followed by a question and answer with the participants. Evaluation of partners' understanding of the benefits and manufacture of eco-enzymes from pineapple peel waste is carried out by distributing leaflets before and after socialization (Figure 2).

Figure 2. Documentation of Socialization of the Benefits and Manufacture of Eco-Enzymes From Pineapple Peel Waste

The results of evaluating partners' understanding of the benefits and manufacture of eco-enzymes from pineapple peel waste are shown in table 1. The results of the pre-test evaluation of the partners' understanding show that 100% of the partners needed to learn about the benefits of eco-enzymes and had never made eco-enzymes from pineapple peels before. This result shows that the "Queens" pineapple farmer group does not yet know the potential of pineapple peel as a raw material for making eco-enzymes. After socialization, 100% of partners already know the benefits of eco-enzymes. Besides that, 100% of partners already know the tools,

materials, and procedures used in making eco-enzymes from pineapple peels.

Table 1. The results of evaluating partners' understanding of the benefits and manufacture of eco-enzymes from pineapple peel waste

Questions	**Evaluation of partners' understanding (%)**	
	Pre-Test	**Post-Test**
Have you made bio-enzymes before?	0	100
Do you know the benefits of bio-enzymes?	0	100
Do you know the tools needed to make bio-enzymes?	0	100
Do you know the materials needed to make bio-enzymes?	0	100
Do you know the procedure for making bio-enzymes?	0	100

2. Training on making eco-enzymes from pineapple peel waste

Training on making eco-enzymes from pineapple waste peels was conducted directly at the Sempu Village Hall, Ngancar District, Kediri. In this training, the manufacture of eco-enzymes from pineapple peels was carried out by the "Queens" pineapple farmer group under the guidance of the PKM implementing team as well as partner skill assessors. The training started with a video tutorial on making eco-enzymes from pineapple waste, which the team had previously prepared (Figure 3).

Figure 3. Documentation of Video Tutorials and an Explanation of How To Make Eco-Enzymes From Pineapple Waste

The event continued with making eco-enzymes from pineapple waste together. The "Queens" pineapple farmer group was very enthusiastic during the activity. This result is shown

by the activeness of partners in carrying out every step of making eco-enzymes from pineapple peels (Figure 4). Training on making eco-enzymes from waste shells begins with preparing all the tools and materials starting from pineapple peel waste, brown sugar, and clean water. The next step is to put all the ingredients that have been prepared into a used container and stir and close the bottle and connect the bottle to the hose . The results of this training are then fermented for three months to get eco-enzyme products.

Figure 4. Documentation of Training on making eco-enzymes from pineapple waste

During the training process for making eco-enzymes from pineapple waste peels, the PKM team also assessed partner skills (Table 2). Based on the PKM team's assessment results, the "Queens" pineapple farmer group was considered able to make eco-enzymes very well. This result is shown from the assessment of each component observed, namely the preparation of tools, preparation of materials, weighing of materials, mixing of ingredients, and labeling done very well by the "Queens" pineapple farmer group. In this activity, the resulting eco-enzymes are brownish with a characteristic sweet-sour odor from fermentation. These results indicate that eco-enzymes have been successfully prepared by the results of research by Jelita, (2022) and Pratamadina, et al., (2022), which show that eco-enzymes are in the form of a yellow to brownish liquid and have a fermented aroma.

Table 2. The results of the partner's skills assessment in making eco-enzymes by the PKM team

Component	Result	Status
preparation of tools	5	Very Well
preparation of materials	4	Well
weighing of materials	5	Very Well
mixing of ingredients	5	Very Well
labeling done	5	Very Well

3. Training on the packaging of eco enzyme products from pineapple peel waste

The packaging of eco-enzyme products from pineapple peel waste is carried out after

three months of fermentation. Packaging of eco enzyme products is carried out in PET bottles using labeling, as shown in Figure 5.

Figure 5. The Packaging of Eco-Enzyme Products from Pineapple Peel Waste

In this activity, an evaluation and monitoring of the final activities were also carried out, where 100% of partners were very satisfied with the activities carried out, 90% of partners felt the activities carried out were very beneficial for partners, and 95% % of partners want other activities to diversify processed pineapple products (Figure 6).

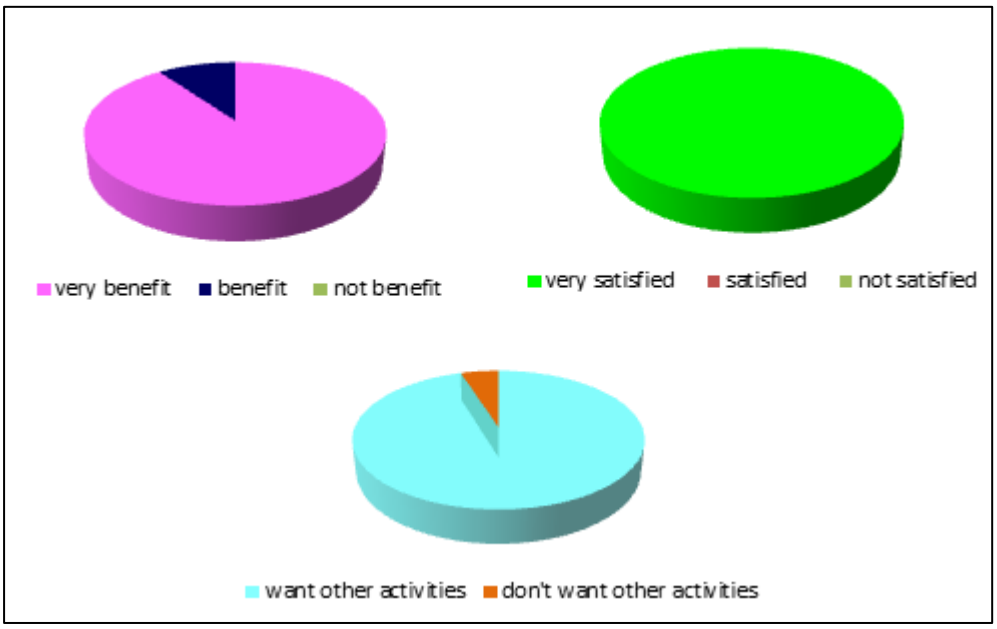

Figure 6. Results of Evaluation and Monitoring of Final Activities

CONCLUSION

Community service activities for the "Queens" pineapple farmer group have succeeded in making eco-enzymes from pineapple skin waste. Based on the results of the activity, this activity was able to increase the knowledge of the "Queens" pineapple farmer group, where 100% of the partners already knew the benefits of eco-enzymes and knew the tools and materials, and procedures used in making eco-enzymes from pineapple peels. This activity was

also able to improve the skills of the partners of the "Queens" pineapple farmer group, where partners were able to make eco-enzymes from pineapple peel waste very well, starting from preparing tools and materials, mixing ingredients, to packaging eco-enzymes.

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