

Dissemination of Household Waste Processing into Eco-Enzyme Products

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Abstract

One of the environmental problems that occur in each region is the problem of waste. The waste produced by every household is certainly something, whether it is organic waste or inorganic waste. Organic waste that is not managed properly will cause global warming (global warming). Besides that, it can also cause potential health hazards such as diarrhea, cholera, typhus, and dengue fever due to viruses, bacteria, or fungi. We are seeing the potential for organic waste in Ganting village, where the livelihoods of the people there are generally vegetable and fruit farmers, such as spinach, kale, corn, and others. Efforts that can be made to reduce the negative impact of residual organic matter in Ganting village are socialization regarding the processing of food waste into more useful products, namely "Eco-enzyme Manufacturing". The method of making Eco-enzyme is by fermenting the remaining organic materials in anaerobic conditions with the help of living organisms derived from organic materials. The methods used in this socialization activity include counseling (education), discussion (question and answer), and demonstration. The results of the manufacture of this Eco-enzyme have met the established indicators, where the Eco-enzyme produced has an acidic pH of 3-4, a distinctive citrus fruit smell and slightly alcohol-scented, a clear brownish color, and is not overgrown with maggots or fungi. This outreach activity has increased the knowledge and skills of the target audience about the manufacture of Eco-enzyme from household organic waste and the importance of Eco-enzyme to preserve the environment and health of the earth.

Keywords: Eco-enzyme, organic waste, global warming, environment.

INTRODUCTION

Indonesia is one of the developing countries that contributes the largest waste in the world. Based on a publication source from one of the national television stations, according to Jambeku in 2015 from the University of Georgia said, Indonesia is the second largest waste contributor with a volume of 187.2 million tons/year, with China in the first position with 262.9 million tons/year and the following followed by the Philippines, Vietnam, and Sri Lanka (Septiani et al., 2021). With this amount, it can be assumed that Indonesia produces around 175 thousand tons/day or 0.7 kg/person per day (Juniartini, 2020). All activities from home encourage the volume of household waste to increase during the Covid-19 pandemic (Sharma et al., 2020).

Garbage is the residue of a business or human activity that is in solid form (both in the form of organic and inorganic substances that are biodegradable or non-biodegradable) and is considered no longer useful (so disposed of into the environment). The average composition of waste in several big cities in Indonesia is organic (25%), paper (10%), plastic (18%), wood (12%), metal (11%), cloth (11%), glass (11%), others (12%). Types of organic waste occupy the largest proportion of the total existing waste production, and the largest contributor to this organic waste is households (Pakki et al., 2021). The type of waste generated from household activities comprises almost 75% organic materials, and the rest is inorganic waste. In addition, groups of organic waste are often found in household environments, such as food scraps, seed shells from fruits and vegetables, and fruit waste. Around 80% of the total amount of waste produced is dominated by organic waste, which is only seen as residual waste with no economic value (Pratiwi, 2020). However, organic waste management has yet to be carried out properly, and many people still throw it into vacant land and waterways or burn it. Organic waste, if managed properly, can

be very useful and have economic value (Budiyanto et al., 2022).

Organic waste or garbage, such as the rest of vegetables and fruits, will rot easily. If it is immediately disposed of without further management, it can pollute the air, soil, water, rivers, and the sea. Furthermore, the waste pile will produce methane gas because organic waste is disposed of without prior management. The gas can trap 21 times more heat than CO₂ produced by motor vehicles. Therefore, organic waste that is not managed properly will worsen the environment causing global warming (global warming). Likewise, if the waste is burned to reduce the accumulation of waste. Burning, besides able to damage ozone (O₃) which functions as a protector of the earth, can also burn the nutrients in the organic waste so that it cannot be used by plants (Prasetio et al., 2021; Septiani et al., 2021). In addition, the negative impacts caused by organic waste are potential health hazards, such as diarrhea, cholera, typhoid, and dengue fever due to viruses, bacteria, or fungi caused by organic waste (Utami et al., 2020).

One solution that can be done to reduce the negative impact of household organic waste is the manufacture of Eco-enzymes. The method of making Eco-enzyme is by fermenting the remaining organic materials in anaerobic conditions with the help of living organisms derived from these organic materials. From the first results of making Eco-enzyme, the process will release Ozone (O₃) gas which can reduce carbon dioxide (CO₂) in the atmosphere, which traps heat in the clouds. So it will reduce the greenhouse effect and global warming. Eco-enzymes convert CO₂ into CO₃, which benefits marine plants and marine life. In addition, the Eco-enzyme liquid can clean the air from toxins, and pollution, remove unpleasant odors and clean polluted water. When we have a drum of Eco-enzyme fluid, it is the same as having a 10-year-old tree. Eco-enzyme liquid can convert ammonia into nitrate (NO₃), natural hormones, and nutrients for plants, so it can be used as liquid organic fertilizer (POC) because it contains macro and micronutrients (Pakki et al., 2021).

This service activity on Eco-enzymes has been carried out by several community service groups, one of which is from Jakarta State University students in 2021. The theme of the activity is utilizing waste or organic waste, namely the skins of fruits and vegetables. (Prasetio et al., 2021) said, "The theme of using organic waste is taken because organic waste in the kitchen when it is disposed of and decomposes, will produce carbon dioxide and methane gas. Can exacerbate the effects of global warming."

Based on these problems and potentials, as well as surveys that have been carried out in Ganting Village where the livelihoods of the people there are generally vegetable and fruit farmers such as spinach, kale, corn, and others. The Riau University Community Service Team attempted to disseminate information on processing food waste into more useful products, namely "Eco-enzyme Manufacturing," carried out with PKK women at the Ganting Village Office. So the purpose of this community service activity is to introduce Eco-enzyme and its use to PKK mothers and explain how to make Eco-enzyme by utilizing household organic waste in the form of citrus fruit peels and vegetable waste.

METHOD

Community service activities will be carried out on August 4, 2022. The activity location is at the Ganting Village office, Salo District, Kampar Riau Regency. The targets of the activities that have been carried out are PKK women in Ganting Village, Salo District, Kampar Riau Regency, with approximately 30 people. The methods used in this socialization activity include the following.

- Counseling (education) At the counseling stage, the material was presented on the meaning of Eco-enzyme, the benefits of Eco-enzyme, the urgency of Eco-enzyme as a liquid that provides benefits while protecting the environment by processing household waste and how to use Eco-enzyme depending on its needs.
- Discussion (question and answer) At the discussion stage, there was a question and answer interaction between the presenter and the participants. The Kukerta team answered and explained in detail every question posed in the discussion.
- Demonstration The demonstration of making Eco-enzyme was carried out in line with the question and answer process. The process of making Eco-enzyme from household waste is

as follows.

- a. Preparation. The materials to be used include molasses, organic waste from vegetables and fruit peels, and water in a ratio of 1:3:10. The tools used in the manufacture of Eco-enzyme include knives, scales, airtight jars, stirrers, and filters.
 - b. Manufacturing process. The procedure for making Eco-enzyme refers to the research conducted by (Dewi et al., 2021) as follows.
- Three hundred grams of organic waste from vegetables, fruit peels, and 100 grams of brown sugar are mixed into a jar. Next, 1000 ml of clean water is poured into the jar, leaving space in the jar for the fermented gas.
 - The mixture is stirred until the sugar is dissolved in the water.
 - After all the ingredients are well mixed, the jar is closed so that air from outside does not enter because the incoming air will interfere with the fermentation process.
 - Eco-enzymes that have been made are stored in a place that is not exposed to direct sunlight.
 - The fermentation process is carried out for 3 months.
 - In the first week after manufacture, the lid of the jar can be opened a maximum of 2 times to remove the gas that is formed.
 - After 3 months of storage, Eco-enzyme is ready to harvest. Filter the dregs from Eco-enzyme, and the liquid can be used.

RESULT

The target location for the socialization of making Eco-enzyme from household waste is the Ganting Village office, with the target participants being PKK women in Ganting Village. The potential in Ganting Village is abundant crop yields seen from the livelihoods of the majority of Ganting Village are vegetable farmers. Waste from households is underutilized so that waste can cause environmental pollution; socialization of making Eco-enzymes from household waste can be a problem solving so that waste from households can be utilized as much as possible. This activity is one of the efforts to educate and educate the public so that this knowledge can be used as initial capital to empower the community (Aisyah et al., 2022; Suryanita et al., 2022).

This activity was attended by 10 members of the UNRI KKN team in Ganting Village and approximately 30 PKK women in Ganting Village. The socialization of making Eco-enzyme from household waste begins with giving material about the difference between organic and inorganic waste, where the material used in making this Eco-enzyme is fresh organic waste that has not gone through the process of decay. Then, the presentation of what an Eco-enzyme is and the benefits and applications of an Eco-enzyme is continued with how to make an Eco-enzyme. This activity resulted in participants, including PKK women from Ganting Village, becoming moved and enthusiastic about making Eco-enzymes. During the socialization, many participants asked questions about how to make Eco-enzymes and the selection of good materials for making products.



Figure 1. Socialization of the Utilization of Household Waste as Eco-enzyme Products

DISCUSSION

Several researchers have reported Eco-enzyme's effectiveness as a waste treatment form. According to Sivashanmugam (2015), Eco-enzymes can reduce total suspended solids and pathogenic microorganisms in household waste. Meera (2017) reports on the success of synthetic wastewater treatment. The use of a 10% eco enzyme solution was able to reduce the total dissolved solids (TDS) by 23.63%, biological oxygen demand (BOD) by 63.28%, chemical oxygen demand (COD) by 25.52%, ammonia nitrogen and phosphate (100%), and the most probable number (MPN) of microbes > 99.9%. Galintin (2021) reported the effectiveness of eco-enzyme solution (10%) in reducing total suspended solids (89%), volatile suspended solids/VSS (78%), COD (88%), total ammonia nitrogen (94%), and total phosphate (97%) in aquaculture solid waste.

Eco-enzyme manufacture is carried out in an 8-liter container using raw materials derived from household waste. The household waste we use to manufacture this Eco-enzyme is kale vegetable waste, orange peel waste, watermelon peel waste, and banana peel waste. According to (Juniartini, 2020), several things to consider in making eco enzymes include the following. First, the fruit or vegetable waste should be fresh and clean. Microbes that are naturally present in these materials can affect the fermentation process. The water used must be clean, from PDAM water or other sources. If mold or maggots appear during incubation, they can be removed by drying the dough in the sun for a few days (2-4 days) until the maggots or fungus are gone, then the fermentation process is continued as usual. If the organic waste produced is small, the addition of organic waste can be done gradually into the previously prepared mixture of sugar and water until a ratio of 1:3:10 is reached for sugar: organic waste: and water. The incubation time is then calculated at 3 months since the last addition of organic matter. In addition, practitioners suggest doing a second fermentation (F2) on the products produced to give a specific and stronger aroma to the eco-enzyme products. The second fermentation is done by adding certain fruit waste or spices into the Eco-enzyme product and fermenting it again for 1 month.

Eco-enzyme products are usually used as disinfectants that can remove germs and dirt and can also be used as pesticides. In addition, because the Eco-enzyme produced emits a sharp sour aroma, it can also be used as a house cleaner. Acetic acid has detected aroma from the acetic acid found in vegetable and fruit waste. Acetic acid is produced by bacterial metabolic processes found in fruit and vegetable residues. The anaerobic metabolism process, commonly referred to as the fermentation process, is an attempt by bacteria to obtain energy from carbohydrates under anaerobic conditions (without oxygen) and with by-products in the form of alcohol or acetic acid.

The results of making this Eco-enzyme have met the established indicators. The Eco-enzyme produced has an acidic pH of 3-4, a distinctive citrus fruit smell, a slightly alcohol-scented, a clear brownish color, and is not overgrown with maggots or fungi. The eco-enzymes that have been produced are packaged into bottles and distributed to the surrounding community as a form of education for people who have not implemented the manufacture of Eco-enzymes so that they can re-educate the knowledge that has been taught. The activity results show that the community has the skills to process household waste into Eco-enzymes.



Figure 2. Eco-enzyme products produced

This socialization program positively impacts the general public, especially students and PKK women in Ganting Village. People's views and behavior about organic waste have developed significantly. People use the waste from the remnants of fruit or vegetables to be processed into more useful products. The processing of household waste into Eco-enzyme products has begun to be processed and has begun to be used as a disinfectant and fertilizer. If this activity is carried out continuously by the community, the environment will positively impact the surrounding environment.

CONCLUSIONS AND RECOMMENDATIONS

This community empowerment activity has increased public awareness and general technical knowledge of the manufacture and use of Eco-enzymes. The socialization provided can improve community skills in processing and converting organic waste into more useful products, namely Eco-enzyme products. Then, through this socialization, people's views on organic waste have changed so that people can better protect the environment and manage waste. Furthermore, the role of the government and the entire community is needed to ensure the sustainability of organic waste management for a better future and environment. The application of processing household waste into Eco-enzyme products should be carried out continuously in order to create a healthy and clean environment.

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