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PROCESSING ORGANIC WASTE INTO ECO ENZYME THROUGH P5 ACTIVITIES AT JUNIOR HIGH SCHOOL 1 MALEBER

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Abstract:
Organic waste management in schools is an important issue in facing environmental challenges in Indonesia. This study aims to analyze the processing of organic waste into eco enzyme through the activities of the Pancasila Student Profile Strengthening Project (P5) at Junior High School 1 Maleber. This research uses a Participatory Action Research (PAR) approach, involving students in the process of planning, implementing, and evaluating activities. The results showed that this activity succeeded in increasing students' awareness of the importance of organic waste management, as well as strengthening the dimensions of the Pancasila Student Profile, especially in the aspects of mutual cooperation, independence, and critical reasoning. Hands-on practice in organic waste processing not only provides knowledge about fermentation, but also forms a caring attitude towards the environment. Evaluation showed positive changes in students' attitudes and understanding of waste management after participating in this activity.
Keywords: *Eco Enzyme, Pancasila Student Profile Strengthening Project, Organic Waste*

INTRODUCTION

The amount of waste generated by society is one of the environmental issues in Indonesia (Alfaris, 2024; Tathmainnul *et al*., 2024). Waste can become a problem in the environment if it is not managed properly and accumulates around us. According to Fiqih & Muljono in the Law of the Republic of Indonesia Number 18 of 2008, waste is the residue of daily activities of humans and/or natural processes in solid form (Fiqih *et al*., 2023; Muljono *et al*., 2024). As the population increases, so does the amount of waste Generated. Based on data from the Sistem Pengolahan Sampah Nasional (SIPSN) from the Ministry of Environment and Forestry, the amount of waste piles in Indonesia reaches 33,541,0226.18 tons every year and 40.18% of them are unmanaged waste. This shows that there is still a lot of waste that has accumulated and needs further management. Organic waste is one of the main components of waste generated by society, including food waste, leaves, and agricultural waste (Purnomo & Sunarsih, 2023; Azhari *et al*., 2024). Ineffective management of this organic waste can cause various environmental problems, such as soil and water pollution, and greenhouse gas emissions that contribute to climate change (Wandira & Amelia, 2023; Patrisyawati *et al*., 2024). This shows that organic waste management is a very important issue to be addressed, especially in densely populated urban areas.

On the other hand, the potential utilization of organic waste as a valuable resource is often overlooked. One way to process organic waste is to

produce eco enzyme, a fermentation product derived from organic waste (Rosanti, 2023; Sukmawati & Wahyuningtyas, 2024). Eco enzyme is an organic fermentation liquid produced from fruit and vegetable waste, water, and brown sugar in a certain ratio (1:3:10) (Kartikowati *et al*., 2023; Hammado *et al*., 2024). This fermentation process utilizes microorganisms such as bacteria, yeast, and fungi to decompose organic matter into simpler compounds, producing enzyme-rich liquids, amino acids, and other nutrients that are beneficial to the environment (Vestikowati *et al*., 2022; Izzati *et al*., 2024). Eco enzyme has various benefits, such as functioning as a natural cleaner, organic fertilizer, and environmentally friendly pesticide (Dewantari *et al*., 2023; Larasaty *et al*., 2024). In addition to providing benefits to the environment, eco enzyme can also increase public awareness about the importance of waste management (Putranto, 2023; Erika & Gusmira, 2024). Therefore, processing organic waste into eco enzyme can be a sustainable and environmentally friendly solution.

However, despite the huge potential of processing organic waste into eco enzyme, there are still many students who do not understand the process and its benefits (Deviranty & Larassaty, 2024). This is due to the lack of education and direct practice at school (Nanda *et al*., 2023; Amaliyah *et al*., 2024). Therefore, environmental education is one of the important aspects in shaping the younger generation's awareness of environmental issues. P5 (Pancasila Student Profile Strengthening Project) activities in schools, especially at the junior high school level, provide opportunities for students to be directly involved in projects related to the environment (Rahmadia *et al*., 2022). Through these activities, students not only learn about theory, but also gain practical experience in managing organic waste (Nurfadilah *et al*., 2024). P5 activities can be an effective means to improve students' understanding and skills in waste management (Fitriani *et al*., 2024). By involving students in practical activities, it is hoped that they can better understand the importance of organic waste management and contribute to protecting the environment.

Research conducted at Yos Sudarso Sidoarjo Junior High School proved that the practical activity of making eco enzyme can increase students' environmental awareness and skills in managing organic waste. This program is effective as a sustainable environmental learning model that can be adopted by other schools (Deviranty & Larassaty, 2024).

This research aims to dig deeper into the process of processing organic waste into eco enzyme, as well as how P5 activities can contribute to increasing students' understanding and awareness of the importance of environmentally friendly organic waste management. In addition, this research is also expected to provide insight into the effectiveness of environmental education in schools in shaping students' attitudes and behaviors related to waste management.

RESEARCH METHOD

This research uses a community service approach with the Participatory Action Research (PAR) model, which emphasizes the active involvement of participants in all stages of the program, from planning, implementation, to

evaluation (Upsher *et al*., 2023; Kim, 2024).

The activity focused on processing organic waste into eco enzyme in a series of Pancasila Student Profile Strengthening Project (P5) at Junior High School 1 Maleber. The stages of the activity include: 1) Planning, this stage begins with the identification of needs through field observations and interviews with teachers and students related to awareness of organic waste management. Based on the results of the analysis, a simple module on making eco enzyme based on environmentally friendly principles and project-based learning was prepared. The planning was based on collaborative principles between the service team, teachers, and students to ensure the relevance and achievement of learning objectives; 2) Implementation, the implementation of the program was carried out through an eco enzyme making workshop which was integrated into P5 activities with the theme "Sustainable Lifestyle". The activity began with socialization about the importance of waste management, followed by a technical demonstration of making eco enzyme using raw materials from fruit and vegetable scraps. Students were divided into working groups to do hands-on practice; 3) Evaluation, was carried out by including an assessment of the success of eco enzyme products, student reflections through satisfaction questionnaires and in-depth interviews, and analyzing the impact of activities on changes in attitudes in the surrounding environment.

FINDINGS AND DISCUSSION

The activity of processing organic waste into eco enzyme in the Pancasila Student Profile Strengthening Project (P5) program in junior high school is carried out through three main stages, namely planning, implementation, and evaluation. Each stage showed active involvement of students and increased their understanding of organic waste management based on sustainable concepts.

In the planning stage, the author together with teachers and students identified real environmental problems in the school environment, namely the high volume of organic waste that has not been managed properly. Based on the initial observation, it was found that the average organic waste generated from the school canteen and practical learning activities reached 3-4 kilograms per day. Furthermore, the design of an organic waste processing program into eco enzyme was carried out, including the preparation of materials, tools, and the preparation of an activity schedule.

The implementation phase began with educational activities by delivering material to students in grades VII and VIII. Enthusiasm could be seen from the many questions asked and the good response from the students. Next, students were divided into small groups to practice making eco enzyme directly. Each group collected organic materials such as fruit peels and vegetable scraps, then mixed them with brown sugar and water according to a predetermined ratio. The fermentation containers were then labeled and stored in a special location for the fermentation process for three months.

At the evaluation stage, students revealed that this activity increased

their awareness of the importance of managing organic waste, reducing waste, as well as contributing to environmental preservation. In general, the results showed that a hands-on experience-based approach in processing organic waste into eco enzyme effectively improved students' environmental literacy. The program also succeeded in developing the values of the Pancasila learner profile, particularly in the aspects of gotong royong, independence, and critical thinking.

1. Planning

The planning stage began with the identification of environmental problems in schools, namely the high amount of organic waste that has not been managed optimally. National data from SIPSN (2024) shows that organic waste still dominates the composition of household waste in Indonesia at 40.18%, reinforcing the urgency of intervention at the school level (Setiawan *et al*., 2024). In this stage, the school organized P5 activities with the theme "Sustainable Lifestyle" as in the Merdeka Curriculum by preparing eco enzyme materials, materials, and real experience-based learning schemes. Planning is done collaboratively with teachers and students to ensure the active involvement of all parties from the beginning.

2. Implementation

The implementation of PKM activities was carried out on October 11, 2024. this activity was carried out face-to-face at Junior High School 1 Maleber. At this stage, 2 sessions were carried out, namely the delivery of material and the practice of processing organic waste into eco enzyme. Material delivery and education were carried out to VII and VIII grade students to introduce the concept of eco enzyme, the benefits of processing organic waste, and the procedure for making it. This activity aims to build student awareness and understanding. In this stage, students are introduced to the 3R principles (Reduce, Reuse, Recycle) and the basic concepts of organic fermentation.

Figure 1: Material Delivery

Hands-on training was conducted through the practice of making eco enzyme from organic waste available in the school environment, such as fruit peels, vegetables and food waste. Students were divided into small groups, each in charge of preparing the fermentation solution in plastic and large containers. After the materials are collected, the next step is shredding, where the organic waste that has been collected is shredded into small parts. This chopping aims to speed up the fermentation process, so that microorganisms can more easily decompose organic matter.

Figure 2: Eco Enzyme Making Practice

After that, students mix the chopped ingredients with water and sugar, which serves as an energy source for microorganisms. This mixture is then put into a sealed container to start the fermentation process. The container is left at room temperature for 3-4 months, during which time, the microorganisms will ferment the organic material into eco enzyme.

Figure 3: Eco Enzyme Materials to be Fermented

Once the fermentation process is complete, the final step is filtration, where the mixture is filtered to separate the liquid eco enzyme from the remaining solids. This process not only gives students practical experience, but also enhances their understanding of the waste cycle and the importance of waste management.

Figure 4: Eco Enzyme Product Result

Through this practice, students build practical skills, the ability to work together in groups, and understand the importance of treating waste as a resource. This activity also sharpens students' critical thinking skills in solving fermentation problems such as excess bubbles, unpleasant odors, or discoloration.

3. Evaluation

The evaluation stage showed that this activity succeeded in improving students' understanding of organic waste management and building an attitude of environmental care. The reflection session showed that most students felt proud of their work and understood the importance of independent waste management. These results are consistent with (Erika & Gusmira, 2024) which shows that eco enzyme training can increase environmental awareness and

positive behavior change in the community. In addition, this activity also strengthens the six dimensions of the Pancasila Student Profile, especially in the aspects of gotong royong, independence, and critical reasoning.

After doing the activity, students showed positive attitude changes. Before the activity, many students were less concerned about waste management. However, after participating in the activity, they showed a higher awareness of the importance of organic waste management.

CONCLUSION

This research shows that the processing of organic waste into eco enzyme through the activities of the Pancasila Student Profile Strengthening Project (P5) at Junior High School 1 Maleber succeeded in increasing students' awareness of organic waste management and environmental issues in general. The process of processing organic waste into eco enzyme provides practical experience to students about the importance of utilizing waste as a resource that can provide benefits to the environment. In addition, this activity also succeeded in strengthening the values in the Pancasila Student Profile, such as mutual cooperation, independence, and critical reasoning. Students who were initially less concerned about waste management showed a positive change in attitude after being involved in this activity. The evaluation of this activity also shows that direct involvement of students in the process of processing organic waste can form awareness and concern for waste management independently, which ultimately has a positive impact on the surrounding environment.

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