Community Service Akseprin Journal
Website : https://jurnal.akseprin.org/index.php/CSAJ/about
e-mail : sac@akseprin.org or akseprin@gmail.com
PUBLISHER: Akademi Sertifikasi Profesi Internasional (AKSEPRIN)

ISSN 3025-0110 (Online)
Pages 13-18, Vol. 02, No. 1, 2024

Received: 2023-09-01 Revised: 2023-09-19 Accepted: 2023-10-25 Published: 2024-01-22

Employing Orange Peel Residue to Produce Eco-Enzymes

Sharif Rahmad Ali [1],
[1,] Chittagong University of Engineering & Technology, Bangladesh

ABSTRACT

Indonesia's substantial population, coupled with a rapid growth rate, has led to a rise in garbage generation, with the capital city producing 3.1 million tons of waste in 2023, predominantly consisting of organic waste. In 2023, East Jakarta generated the highest trash volume, totaling 844,252 tons annually. This is undoubtedly a responsibility for all stakeholders, from the government level to the family level. One initiative to diminish waste volume involves converting it into new goods, such as eco-enzymes. The community empowerment method, implemented through training, constitutes a public education initiative in waste management aimed at addressing the issue of organic waste. The training occurred in May 2023. The service results indicate that the training on eco-enzyme production in Pinang Ranti Village, aimed at utilizing household organic waste, was successful, yielding orange peel eco-enzyme products. The community exhibited considerable enthusiasm throughout the activities, and participants subsequently felt motivated to process organic waste. This activity is anticipated to be conducted continually and consistently by relevant stakeholders, particularly the government at both national and local levels.

Keywords: Eco-Enzyme; Training; Organic Waste

INTRODUCTION

Waste is the solid byproduct of human activity and/or natural processes. Garbage is inherently categorized into organic and inorganic garbage. Inorganic waste comprises synthetic materials that are resistant to microbial degradation or cannot be decomposed by them. Typically, it undergoes recycling, whereas organic waste comprises constituents of carbon, hydrogen, and oxygen (Muktiarni et al., 2022). Microorganisms more readily break down or destroy organic waste. The processing of organic waste often involves the production of compost for organic fertilizers. Data from the Ministry of Environment and Forestry in 2022

Community Service Akseprin Journal
Website : https://jurnal.akseprin.org/index.php/CSAJ/about
e-mail : sac@akseprin.org or akseprin@gmail.com
PUBLISHER: Akademi Sertifikasi Profesi Internasional (AKSEPRIN)
ISSN 3025-0110 (Online)
Pages 13-18, Vol. 02, No. 1, 2024
Received: 2023-09-01 Revised: 2023-09-19 Accepted: 2023-10-25 Published: 2024-01-22

indicated that waste generation totalled 68.7 million tons annually, with organic waste, particularly food waste, being 41.2% of the total composition. Of that total, 38.28% originated from households. A substantial population with a rapid growth rate leads to an escalation in waste production. The capital city, with the highest population, generates 3.1 million tons of waste annually, while the annual recycling rate remains at 464 thousand tons.

The largest accumulation of domestic waste significantly contributes to this overall waste generation. To mitigate household trash generation, several initiatives are undertaken, including the conversion of organic waste into eco-enzyme goods. In practice, the primary impediment to eco-enzyme production, as stated by the party, is improperly sorted organic waste. To produce eco-enzymes, organic waste must be in an unprocessed (uncooked) and non-decomposed state to ensure the quality of the resulting products. The housewife's awareness of waste sorting and recycling remains comparatively inadequate. from the interviews with the involved parties. The interview results indicate that housewives lack the knowledge and skills to recycle organic kitchen trash, particularly into eco-enzyme goods. According to the questionnaire results, 26% of housewives in Pinang Ranti Village are unaware of eco-enzymes, while only 4% have independently created at home.

Eco-enzymes were first introduced over 30 years ago by the founder of the Thai Organic Farming Association. The project's objective is to extract enzymes from organic waste often discarded in trash bins and convert them into organic cleaning products. Eco-enzymes are produced through the fermentation of organic kitchen waste, including fruit and vegetable remnants, combined with sugar substrates (brown sugar or cane sugar) and water. It possesses a dark brown hue and emits a robust acidic fermentation scent. The principle of eco-enzyme generation closely resembles composting, with the addition of water as a medium. The finished product is in liquid form, which is advantageous due to its ease of application. Eco-enzyme serves as a disinfectant and hand sanitizer, and it can alleviate infections and allergies in children while promoting wound healing (Patel et al., 2021). This ecoenzyme serves multiple agricultural purposes, functioning as fertilizer and pesticide while also providing economic savings. Additionally, it can be utilized as a disinfectant, floor cleaner, toilet cleaner, dish or laundry detergent, and for removing grease from surfaces such as tables or stoves (Syakdani et al., 2021). The quality of eco-enzymes is determined by the organic raw materials utilized; greater diversity in these resources results in superior eco-enzyme quality due to the increased variety of enzymes generated. The enzyme is acetic acid (H_3COOH), which eradicates germs, viruses, and bacteria. The enzyme content comprises lipase, trypsin, and amylase and possesses the capability to eliminate or inhibit harmful germs. Furthermore, it generates NO_3 (nitrates) and CO_3 (carbonate), essential for soil nutrients. From an economic perspective, enzyme synthesis diminishes the need to acquire floor cleaning agents or insect repellents.

Community Service Akseprin Journal
Website : https://jurnal.akseprin.org/index.php/CSAJ/about
e-mail : sac@akseprin.org or akseprin@gmail.com
PUBLISHER: Akademi Sertifikasi Profesi Internasional (AKSEPRIN)
ISSN 3025-0110 (Online)
Pages 13-18, Vol. 02, No. 1, 2024
Received: 2023-09-01 Revised: 2023-09-19 Accepted: 2023-10-25 Published: 2024-01-22

The application of eco-enzyme products for household tasks, such as dishwashing or as an additive in floor cleaning solutions, can incorporate orange peel toate eco-enzymes that emit a pleasant and invigorating fragrance. This approach is more environmentally sustainable compared to the use of chemical disinfectants. Recent research has extensively examined the utilization of orange peel waste as an eco-enzyme product, notably a study conducted, which indicated that the fermentation of orange and strawberry peels yields eco-enzyme products that are acidic with a low pH (Kirana et al., 2022). Indeed, eco-enzymes with acidic byproducts and low pH offer advantages compared to household goods with elevated pH levels. The utilization of home goods with elevated pH levels will disrupt the equilibrium between ammonium and ammonia in water. An increase in pH above neutral elevates ammonia content, which is significantly harmful to the organism. The fragrance and advantages of this eco-enzyme are determined by the raw materials employed and the duration of fermentation, with orange peel proving superior to other fruit peels.

RESEARCH ELABORATIONS

Structure and Concept of Activities This community service initiative involved training sessions titled "Training on the Production of Orange Peel Eco-Enzymes to Utilize Orange Peel on a Household Scale." This service is conducted using demonstrative approaches and practical application in the field. This service entails students assisting the Leadership Project Course 2. This service includes the planning process, the hearing and licensing process, the execution of training, and the assessment of activities. Initially, the planning procedure. This planning process includes the development of the concept and structure of the activity, as well as the formulation of the initial product. This phase includes students and the instructors responsible for the course. The outcome of this activity is the committee's eco-enzyme products, which will subsequently be presented to the participants during the execution phase. The hearing and licensing procedure. The hearing and licensing procedure encompasses students, campuses, municipal officials, and the Environmental Service Department. This phase focuses on socializing activities, obtaining authorization from the village, and securing resource personnel from the East Jakarta Environment Agency. The execution of training, which constitutes the fundamental aspect of a series of community service initiatives. The implementation commenced with an introduction, a demonstration of ecoenzyme production by students, soldering conducted by the Environment Department, a question and answer session, practical exercises in ecoenzyme creation by participants, reflection, and conclusion. The outcome of this activity comprises the findings of questionnaires and eco-enzyme products. Following the

Community Service Akseprin Journal
Website : https://jurnal.akseprin.org/index.php/CSAJ/about
e-mail : sac@akseprin.org or akseprin@gmail.com
PUBLISHER: Akademi Sertifikasi Profesi Internasional (AKSEPRIN)
ISSN 3025-0110 (Online)
Pages 13-18, Vol. 02, No. 1, 2024
Received: 2023-09-01 Revised: 2023-09-19 Accepted: 2023-10-25 Published: 2024-01-22

training implementation, an assessment of the chief executive-led activity was conducted to ascertain its effectiveness.

Temporal and Spatial Context of Activity This event is scheduled for May 2023. Method of Implementation Prior to the training, participants were provided with a questionnaire to gauge their initial perceptions regarding the production of eco-enzymes from kitchen organic waste, particularly orange peels. The method utilized in this activity is a participatory demonstration approach. This is a mentoring method with the purpose of empowering partner groups in solving and finding answers to their challenges. Furthermore, soldering was conducted by specialists in the conversion of organic waste into orange peel eco-enzyme, accompanied by a question-and-answer session designed to ensure that participants acquired knowledge and skills in the processing of organic waste, particularly in the production of orange peel eco-enzyme products. 4. Intended Participants The objective of this activity is the cadres.

RESULTS AND DISCUSSIONS

The program execution phase commences with the planning phase. During this planning phase, the activities encompass refining the concept and structure of initiatives, as well as evaluating product manufacture. The objective of this product trial is to provide students with firsthand experience prior to the demonstration conducted during training. The subsequent phase involves auditory processing and licensing. This hearing and licensing phase includes socialization activities for Pinang Ranti Village to get activity permits and submit a request for resource individuals. The third phase involves the execution of training. The execution of training constitutes the fundamental aspect of the community service activities conducted. The implementation commenced with an introduction, a demonstration of eco-enzyme production by students, soldering conducted by the Environment Department, a question-and-answer session, hands-on experience of ezo-enzyme creation by participants, reflection, and conclusion. During practice, participants are categorized into many groups according to reaction time, with each group assigned a student companion to facilitate the smooth execution of the exercise without major impediments (Mavani et al., 2020). Tools and materials are arranged at each group table; however, certain ingredients require participants to measure them alone. The eco-enzyme derived from orange peel will be labeled with the group identity, manufacturing date, and harvest date.

The final phase of this series of service activities involves the evaluation of the initiatives, during which the chief executive conducts an assessment post-training to determine the effectiveness of the activities, identify any shortcomings in implementation, and outline follow-

Community Service Akseprin Journal
Website : https://jurnal.akseprin.org/index.php/CSAJ/about
e-mail : sac@akseprin.org or akseprin@gmail.com
PUBLISHER: Akademi Sertifikasi Profesi Internasional (AKSEPRIN)
ISSN 3025-0110 (Online)
Pages 13-18, Vol. 02, No. 1, 2024
Received: 2023-09-01 Revised: 2023-09-19 Accepted: 2023-10-25 Published: 2024-01-22

up plans. The follow-up plan pertains to the oversight of activities conducted by PPG pre-service Batch 1 students. Upon completion of the instruction, students will oversee the status of the eco-enzymes produced via the WhatsApp group. The questionnaire results indicate that, following the training, participants exhibited increased interest and motivation in processing kitchen organic waste, particularly for the production of eco-enzyme products. Additionally, participants learned from the presenter that the DLH accepts both organic and inorganic waste for processing, catering to individuals who lack the time and opportunity to manage waste independently at home. Consistent processing of organic waste at the household level can effectively mitigate the volume of waste, particularly that generated from domestic sources. Furthermore, the conversion of organic waste into ecoenzyme products can reduce soap consumption, promote environmental sustainability, and serve as a safe natural fertilizer for plants (Rasit et al., 2019).

CONCLUSIONS

The execution of eco-enzyme production training to use organic waste from domestic kitchens is proceeding effectively. Participants exhibited considerable enthusiasm in all rounds of exercises. This activity is expected to be conducted continuously and consistently, necessitating support from relevant stakeholders, particularly from the central government to the citizen level, to ensure that this modest initiative can significantly reduce the volume of waste, especially household waste.

ACKNOWLEDGEMENTS

Please acknowledge collaborators or anyone who has helped with the paper at the end of the text.

REFERENCES

Kirana, K. H., Budianto, M. A., Pranatikta, K. A., Shafaria, M., Agustine, E., Fitriani, D., Susilawati, A., & Hasanah, M. U. (2022). Physical Properties of Orange Peels Eco-enzyme: One way to Reduce and Recycle Waste and Environmental Problem. *Phi: Jurnal Pendidikan Fisika Dan Terapan*, *8*(2), 1–7.

Mavani, H. A. K., Tew, I. M., Wong, L., Yew, H. Z., Mahyuddin, A., Ahmad Ghazali, R., & Pow, E. H. N. (2020). Antimicrobial efficacy of fruit peels eco-enzyme against Enterococcus faecalis: An in vitro study. *International Journal of Environmental Research and Public Health*, *17*(14), 5107.

Community Service Akseprin Journal
Website : https://jurnal.akseprin.org/index.php/CSAJ/about
e-mail : sac@akseprin.org or akseprin@gmail.com
PUBLISHER: Akademi Sertifikasi Profesi Internasional (AKSEPRIN)

ISSN 3025-0110 (Online)
Pages 13-18, Vol. 02, No. 1, 2024

Received: 2023-09-01 Revised: 2023-09-19 Accepted: 2023-10-25 Published: 2024-01-22

Muktiarni, M., Rahayu, N., & Maryanti, R. (2022). Orange and strawberry skins for eco-enzyme: experiment and bibliometric analysis. *Journal of Engineering Science and Technology*, *1*, 195–206.

Patel, B. S., Solanki, B. R., & Mankad, A. U. (2021). Effect of eco-enzymes prepared from selected organic waste on domestic waste water treatment. *World Journal of Advanced Research and Reviews*, *10*(1), 323–333.

Rasit, N., Hwe Fern, L., & Ab Karim Ghani, W. A. W. (2019). Production and characterization of eco enzyme produced from tomato and orange wastes and its influence on the aquaculture sludge. *International Journal of Civil Engineering and Technology*, *10*(3).

Syakdani, A., Zaman, M., Sari, F. F., Nasyta, N. P., & Amalia, R. (2021). Production of disinfectant by utilizing eco-enzyme from fruit peels waste. *International Journal of Research in Vocational Studies (IJRVOCAS)*, *1*(3), 1–7.