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Education on processing organic waste into compost and eco enzymes in Sawah Lama, Ciputat, South Tangerang

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Abstract
Household waste production, especially organic waste from yards and kitchens, often accumulates, causing disturbances to the surrounding environment. Organic waste can be processed in several ways, such as being processed into compost, eco-enzymes, fish feed pellets, and so on. One of the objectives of this community service program is to enhance community skills in processing yard and kitchen waste into various useful products. Organic waste from household kitchens, such as leftover vegetables and fruit peels, is processed into compost and eco-enzymes, thus reducing the waste burden on the environment. The conclusion obtained is that with the training on organic waste processing, community skills have improved and organic waste that is usually disposed of in the trash can be processed into various more beneficial products.

Keywords: Eco enzym; Compost; Organic waste

Edukasi pengolahan sampah organik menjadi pupuk kompos dan eco enzym di Sawah Lama, Ciputat, Tangerang Selatan

Abstrak
Produksi sampah rumah tangga, utamanya sampah organik dari halaman dan dapur, kerap menumpuk sehingga menyebabkan gangguan pada lingkungan sekitar. Pengolahan sampah organik dapat dilakukan dengan beberapa cara yaitu diolah menjadi pupuk kompos, eco enzym, pelet makanan ikan dan sebagainya. Salah satu tujuan PkM ini adalah meningkatkan keterampilan masyarakat dalam mengolah sampah halaman dan sampah dapur menjadi aneka produk yang bermanfaat. Sampah organik dari dapur rumah tangga berupa sisa sayuran dan kulit buah diolah menjadi pupuk kompos dan eco enzym, sehingga mengurangi beban sampah pada lingkungan. Kesimpulan yang diperoleh adalah dengan adanya pelatihan pengolahan limbah organik, keterampilan masyarakat meningkat dan sampah organik yang biasanya dibuang ke tempat sampah dapat diolah menjadi aneka produk yang lebih bermanfaat.

***Kata Kunci**: Eco enzym; Pupuk kompos; Sampah organik*

1. Introduction

The youth organization (Karang Taruna) of RW 012 Sawah Lama, Ciputat, South Tangerang, Indonesia, demonstrates significant community engagement through active participation in various local initiatives, ranging from street cleaning and beautification projects like the “Gang Cantik RW 12” to facilitating communal spaces for major celebrations such as Eid al-Fitr, Eid al-Adha, and Independence Day. However, suboptimal waste management presents a key challenge. Locally generated waste, including household organic waste, is often disposed of by burning or indiscriminate dumping without processing. The practice of burning waste during field clean-ups for religious holidays generates environmentally and health-damaging smoke. Furthermore, the management of both organic and inorganic kitchen waste remains inadequate, frequently leading to accumulation rather than resource recovery, despite the potential for value-added processing (Syaiful et al., 2023; Zero Waste Indonesia, 2019).

Organic waste can be transformed into valuable products such as compost, eco-enzyme, and fish feed pellets. Eco-enzyme, for instance, is an environmentally friendly active solution derived from the fermentation of organic waste, offering diverse applications from household cleaning to plant fertilization (Junaidi et al., 2021; Kompas, 2021; Prasetio et al., 2021; Rukmini & Herawati, 2023; Zero Waste Indonesia, 2019). Its production is straightforward, requiring water, sugar/molasses, and fruit/vegetable peels in a 10:3:1 ratio (Setiawati et al., 2023).

Compost production can be achieved by shredding organic waste, mixing it with soil, and utilizing biopore holes to accelerate decomposition. Biopore holes also enhance water infiltration, providing environmental benefits (Dinas Lingkungan Hidup Kota Semarang, 2020). Nevertheless, a primary obstacle faced by the community, particularly the Karang Taruna RW 012 youth, is the lack of skills in effective waste management.

To address this issue, targeted training in organic waste management is essential. By developing these skills, it is anticipated that the Karang Taruna youth can convert waste into economically valuable products like eco-enzyme and compost, which can be used domestically or sold to augment family income and organizational funds.

2. Methodology

This community engagement initiative took place in RW 012 Sawah Lama, Ciputat, South Tangerang, during August 2024. To address the partner's issues, the following methods were implemented:

a. Phased socialization of waste management principles, including the categorization of waste (organic, inorganic, hazardous and toxic/B3) and its application within a waste bank management system.
b. Training sessions on the production of compost and eco-enzyme from organic waste, followed by practical field application through the creation of biopore infiltration wells.
c. Ongoing mentorship in compost and eco-enzyme production, coupled with field-based problem evaluation.

3. Results and Discussion

3.1. Eco-enzyme production training

The training commenced with an introductory session on the segregation of organic and non-organic waste (Figure 1). The Karang Taruna youth group members received a phased dissemination of information, starting with the identification of different waste categories (organic, inorganic, hazardous and toxic materials/B3), followed by instructions on eco-enzyme production, compost fertilizer preparation, and the creation of biopore infiltration holes (Ayilara et al., 2020; Benny et al., 2023; Ismail et al., 2024; Kaur & Kaur, 2024; Sil & Kumar, 2016; Varshini & Gayathri, 2023).

Figure 1. Eco-enzyme production education

Following the participants' understanding of organic, inorganic, and hazardous waste sorting, kitchen-derived organic waste, specifically fruit peels and vegetable scraps, was processed into eco-enzyme. The theoretical ratio for eco-enzyme production involves a proportion of 1:3:10 for sugar (1 kg), organic material (3 kg), and water (10 kg), respectively (Figure 2). The material quantities were adjusted based on varying container sizes, with the containers filled to 60% capacity with water, followed by the organic material and sugar according to the aforementioned ratio. This left 20% headspace within the container to facilitate the eco-enzyme fermentation process (Benny et al., 2023; Ismail et al., 2024; Varshini & Gayathri, 2023; Zero Waste Indonesia, 2019). The eco-enzyme production training was conducted through direct hands-on participation with the community partners. The necessary raw materials and equipment were provided to each group.

Figure 2. Raw material measurement process for eco-enzyme production

After one month of fermentation, the resulting eco-enzyme exhibited a dark brown liquid, ready for use as a natural cleaner and plant fertilizer (Figure 3). This product is not only environmentally friendly but also holds economic potential for mass production (Benny et al., 2023; Damayanti et al., 2024).

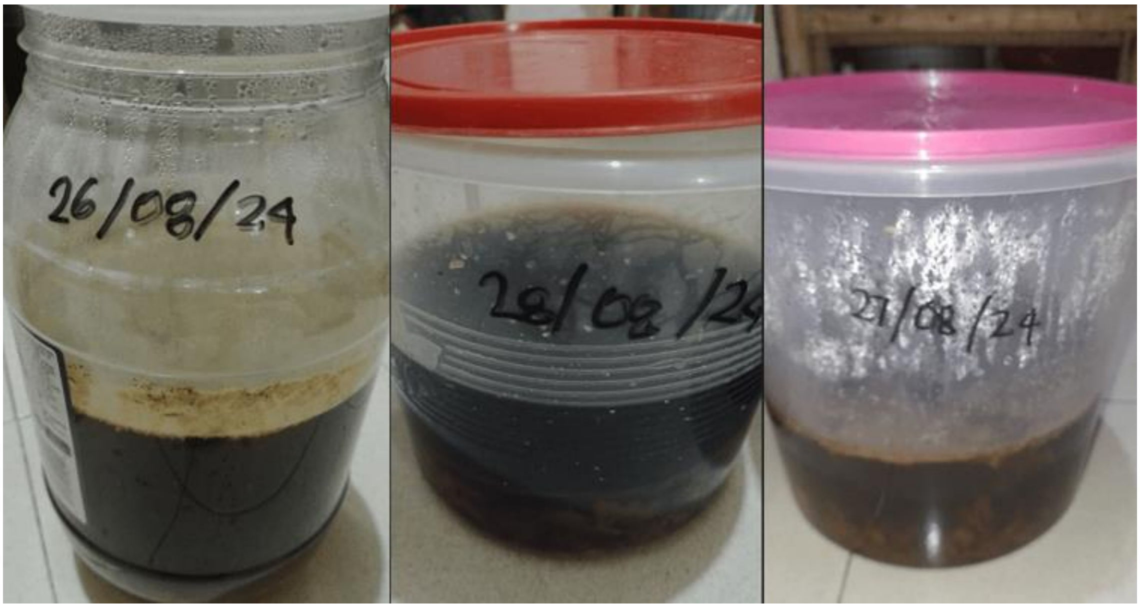

Figure 3. Eco-enzyme production result after 1 month of fermentation

3.2. Compost fertilizer and biopore infiltration hole creation for kitchen waste utilization

In addition to eco-enzyme production, residual kitchen waste such as fruit peels and vegetable scraps were also utilized for compost fertilizer production (Larasati & Puspikawati, 2019; Pratiwi & Setiawan, 2023). Compost fertilizer is produced from organic waste, including vegetable scraps and leaves (Arlofa & Febriasari, 2023). It originates from the decomposition of organic materials like foliage and can be prepared in simple containers readily available in the community environment (Pramono, 2020). Furthermore, the introduction of organic waste into biopore infiltration holes can serve as a solution for groundwater absorption (Setiati et al., 2024).

The materials employed included kitchen waste, soil, water, rice husk charcoal, and an activator to enhance the decomposition process by microorganisms (Guo et al., 2019; Laza et al., 2021). The equipment used was relatively basic, such as knives or other cutting tools, waste containers, stirring tools, gloves, and buckets for dissolving the activator.

The mixture of chopped materials, soil, rice husk charcoal, and activator solution in the composting container was tightly closed and stirred weekly to ensure proper aeration. The composting process was completed after 7-8 weeks. The resulting compost was sieved and ready for immediate use. Figure 4 illustrates the compost production process in sequential steps:

1. Raw materials consisting of vegetable waste, grass, and unusable shrubs.
2. Chop the raw materials into small pieces to facilitate fermentation.
3. Prepare the compost container.
4. Add a small amount of soil to the bottom of the compost container.
5. Add the chopped raw materials into the compost container.
6. Add a little more soil on top of the chopped raw materials, alternating layers until the container is full.
7. Water/moisten with rice washing water/plain water to maintain humidity.

8. Cover the container with plastic or other material to keep it closed for the first month.
9. Open the compost container, stir thoroughly, and add more water if dry to maintain moisture.
10. After 1.5 – 2 months, the compost is ready for use as plant fertilizer.

Figure 4. Compost production process from grass and wild shrubs

Prior to the compost production practice (Figure 5), the participants were also trained in creating biopore infiltration holes (Figure 6). Biopores are vertical holes with a diameter of 10 to 30 cm drilled into the soil. They serve as a disposal method for vegetable scraps and fruit peels (organic waste). Filling biopores with organic waste aims to provide nourishment for soil organisms such as earthworms, small soil animals, and even plant roots. Thus, besides being a means of organic waste disposal, biopores also function as a food source for these organisms (Dinas Lingkungan Hidup Kota Semarang, 2020).

Figure 5. Outreach and practical composting activity

With the biopore creation training, these holes can also function as composting containers. Once a biopore is ready, a portion of soil and organic waste (vegetable scraps) can be introduced, watered to maintain moisture, and then covered and left for 1–2 months until the contents are ready to become compost fertilizer. The compost within the biopore can then be harvested for use on plants. Alternatively, if left within the biopore, it can enrich the surrounding soil. Nutrients from the compost can be carried by water flowing out of the biopore holes into the adjacent soil through the holes in the biopore pipe.

Figure 6. Direct practice in biopore creation

The community-based direct training on processing organic waste into compost and eco-enzyme effectively enhanced the knowledge and skills of community members in utilizing organic waste from household and surrounding yard activities. No portion of this waste was left unused. These organic wastes were transformed into various valuable products, offering benefits beyond mere disposal.

4. Conclusion

This initiative effectively improved the skills of Karang Taruna RW 012 youth in transforming organic waste into value-added products, specifically eco-enzyme and compost. The training addressed environmental challenges and created potential for supplementary community income. Sustained training and the development of a waste bank can further unlock the community's capacity to utilize household waste, thereby bolstering the local economy and enhancing environmental consciousness.

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Authors Contribution

Project implementation: RS, QABP, WS, CM, DP, RO, PFP, RA, MFHB, RPK; Manuscript preparation: RS, QABP, WS, WY; Impact analysis: RS, WY; Results presentation: WS, QABP, CM, DP; Manuscript revision: RS, WY.

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