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The Implementation of Rotary POC Technology for Organic Fertilizer Production in Tarahan Village, South Lampung

Yunita Fahni[b)], Andri Sanjaya[c)], Mustafa[a)], Desi Riana Saputri, Aldillah Herlambang, Vezi Fernando, Yoga Aditama, Bagus Robianto, Aji Hafidz Talaga , Andini Gustia Putri

Chemical Engineering Department, Institut Teknologi Sumatera, Lampung Selatan, Indonesia

[a)]Corresponding author: mustafa@tk.itera.ac.id
[b)]yunita.fahni@tk.itera.ac.id
[c)]andri.sanjaya@tk.itera.ac.id

Abstract

Tarahan Village is one of the larger villages in Katibung District, South Lampung. Despite not being classified as an agricultural region, Tarahan Village exhibits remarkable productivity in cultivating vegetables and fruits. So far, organic waste from fruits and vegetables has been discarded and burned or used only for animal feed. The large volume of unprocessed fruit and vegetable waste causes various problems for village residents, both directly and indirectly. Besides that, the village's intensive horticultural farming activities have encouraged the increased use of inorganic fertilizers. This pollutes the environment and harms the soil, organisms that live in the soil, and humans who consume these horticultural products. The application of liquid organic fertilizer, specifically POC, is deemed necessary to effectively address the issue of fruit and vegetable waste management while ensuring the quality of organic horticultural products. A composter is a suitable technology employed for the production of liquid fertilizer. Since oxygen is crucial for microorganisms in decomposing organic matter, the POC produced through the aerobic composting process will mature more quickly and not produce offensive odors. The goal of implementing this technology is to spread the word that garbage can be turned into something valuable if managed properly, leading to a cleaner community and more economic opportunities. The rotary POC technology scheme consists of a plastic drum that is supported by an iron structure. The drum is furnished with a rotating lever designed for the purpose of stirring, thereby facilitating the uniform mixing of organic material upon the addition of the bioactivator. The agitation of the solution facilitates the efficient execution of the aeration process. The equipment scheme has been developed with the aim of enhancing the effectiveness and efficiency of composting with regard to both time management and the quality of the final outcomes. This technology has the potential to be an alternative solution for dealing with household waste, and the product in the form of POC has the potential to reduce the use of inorganic fertilizers.

Keywords: Organic waste, Rotary POC, Fertilizer, Bioactivator, Tarahan.

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INTRODUCTION

Katibung District is part of the South Lampung Regency area, and it oversees 12 villages covering an area of 212.88 km^2, or 8.94 percent of the South Lampung Regency's land area. The area varies greatly depending on the subdistrict. Tarahan Village has the most village area (18.88%) in Katibung sub-district. In addition to the aforementioned region, Tarahan Village is inhabited by a total of 7,686 individuals, as reported by the BPS in 2021 (Badan Pusat Statistik, 2021). Despite not being classified as an agricultural region, Tarahan Village exhibits remarkable productivity in cultivating vegetables and fruits.

Fruits and vegetables are essential necessities in human life. Fruits are rich sources of essential vitamins and minerals that are necessary for bodily functions, as the human body lacks the ability to synthesize these nutrients. The consumption of fruit has the potential to enhance the body's endurance (Lestari et al., 2022). The consumption of fruits and vegetables inevitably generates waste in the form of discarded peels and residual plant matter that is no longer utilized, thereby resulting in waste accumulation. The typical practice in Tarahan Village involves the unregulated disposal of organic waste through open dumping, without subsequent management measures. Waste will gradually cause a variety of negative effects if this issue is not dealt with seriously and intelligently (Basriyanta, 2007). Household waste is a challenge that must always be sought for good management solutions in the future (Agustriyana et al., 2022). Besides that, the village's intensive horticultural farming activities have encouraged the increased use of inorganic fertilizers. The overutilization of inorganic fertilizers leads to environmental contamination and adversely affects both the soil and the organisms residing within it, as well as the individuals who consume the resulting horticultural produce (Sardiana & Adnyana, 2014). To effectively address the issue of fruit and vegetable waste management while ensuring the quality of organic horticultural products, the application of liquid organic fertilizer (POC) becomes imperative.

Liquid organic fertilizer can be made from liquid organic waste by composting it and adding a composting activator to produce stable liquid organic fertilizer with complete nutrients (Ulfa et al., 2018). These various ingredients are beneficial for stimulating plant growth. The production of liquid organic fertilizer occurs through anaerobic processes, specifically fermentation, which does not rely on oxygen or sunlight. According to Prihandarini (Prihandarini, 2004), the process of producing organic fertilizer typically involves the introduction of a solution containing microorganisms in order to accelerate the degradation process. The EM4 solution is commonly employed as an activator to facilitate the decomposition of natural ingredients into nutrients, thereby accelerating the fermentation process. Bioactivators also can be made by utilizing rice washing water and papaya fruit waste. Waste water from washing rice and papaya fruit is rich in nutrients that can increase the macronutrients of the compost (Auriyani et al., 2021).

A composter is a suitable technology employed for the production of liquid fertilizer. Common materials that can be utilized for constructing a composter include repurposed paint buckets or blue barrels, as well as readily available paralon pipes that can be found in the market. Based on the background, it is imperative to emphasize the necessity of active engagement from both upstream and downstream stakeholders, encompassing agricultural sector entrepreneurs, in order to effectively harness agricultural waste for the production of organic fertilizer. The implementation of agricultural waste composting activities is expected to address environmental pollution caused by the utilization of chemical fertilizers, by providing an ecologically sustainable substitute in the form of organic fertilizer.

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METHOD

The following describes the steps that will be taken to implement solutions to partner problems in light of the problem's context and proposed solutions:

Figure 1. Method of implementation flow chart

This activity involves partners actively participating, which includes increasing partners' understanding of problems and jointly formulating solutions. Subsequently, the involved parties engage in the proactive acquisition of agricultural waste with the intention of transforming it into a substance known as liquid organic fertilizer (POC). It is anticipated that partners will have the opportunity to extend invitations to additional partners, either through direct means or via online platforms. Periodically, the implementation of activities is evaluated by directly asking village officials or residents. Then, assist in providing solutions if problems arise. Hopefully, partners will be able to keep doing this activity after the program is over, with regular checks in on them.

The production of liquid organic fertilizer is aerobic. This technique is depicted in the following diagram:

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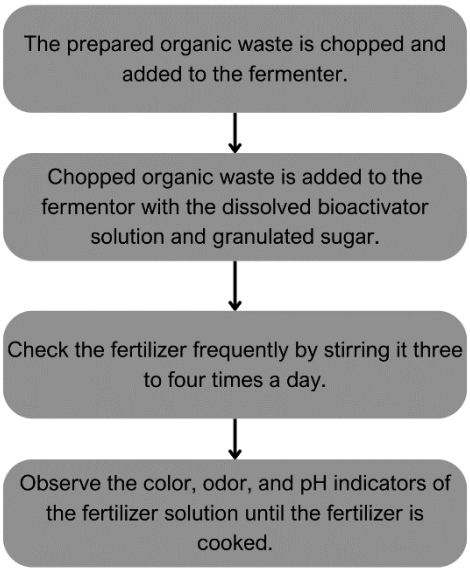
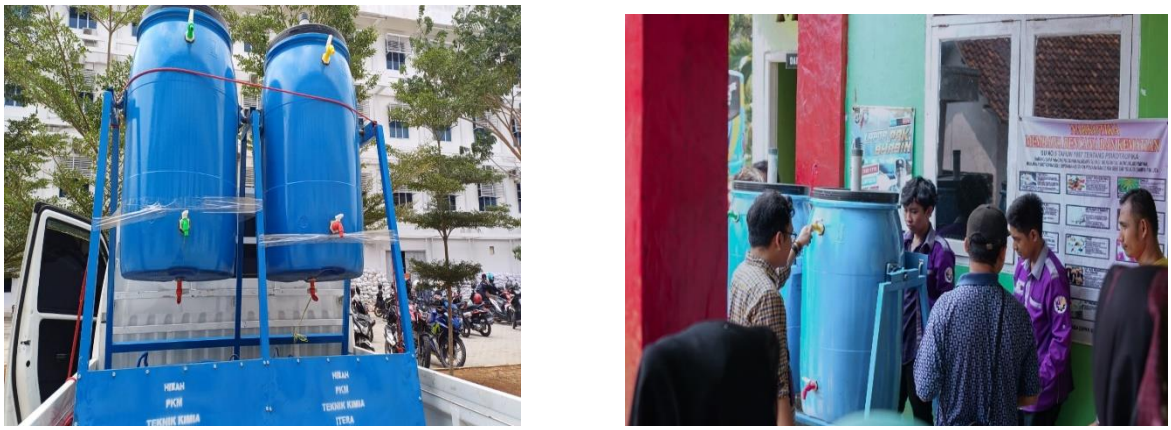


Figure 2. Diagram of liquid organic fertilizer production

The materials needed to make liquid organic fertilizer include used EM4, molasses, vegetable and fruit waste. The first step is to prepare organic waste from leftover vegetables and fruit. The prepared organic waste is chopped and added to the fermenter. Chopped organic waste is added to the fermenter with the dissolved bioactivator (MOL) solution and granulated sugar in a ratio of 1:1 per 200ml (Nuroini & Istanti, 2022)nuron. MOL serves as a composer to facilitate the production of decomposing bacteria, thereby accelerating the fertilizer formation process (Fatma et al., 2021). Stir the ingredients until evenly mixed then close the composter tightly. Check the fertilizer frequently by stirring it three to four times a day. Observe the color, odor, and pH indicators of the fertilizer solution until the fertilizer is cooked. Open the lid and smell the dough to determine the level of doneness. The dough is ready if it smells like tape.

RESULT AND DISCUSSION

Rotary POC was established, and it has since been distributed to the residents of Tarahan Village, South Lampung Regency.



(a) (b)

Figure 3. The POC Rotary Machine

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The community service program was initiated on September 8, 2023, at the Katibung Village Office, Tarahan District, South Lampung. It aims to promote the utilization of fruit and vegetable waste by producing Liquid Organic Fertilizers (POC) using a rotary POC method. This instrument of rotary POC is manufactured by CV. HWC in Slusuban, Central Lampung. The program commences by administering pre-test questionnaires to assess the participants' comprehension. According to the results of the preliminary test, it was observed that none of the residents engaged in the management of household waste generated from domestic activities. Additionally, a significant majority of 76% of participants had never participated in POC training.

Following the pre-test, socialization was conducted concerning the introduction of organic waste as a source of organic fertilizer, the impact of environmental pollution caused by waste burning, procedures for processing organic waste with rotary POC, and the production of organic bioactivators for organic waste in POC production. A question-and-answer period followed the previous activity. In order to enhance participants' comprehension, a practical exercise was conducted involving the production of liquid organic fertilizer derived from vegetable and fruit waste. The first step is to prepare organic waste from leftover vegetables and fruit. The prepared organic waste is chopped and added to the fermenter. Chopped organic waste is added to the fermenter with the dissolved bioactivator solution and granulated sugar in a ratio of 1:1 per 200ml (Nuroini, 2022). Stir the ingredients until evenly mixed, then close the composter tightly. Check the fertilizer frequently by stirring it three to four times a day. The activity proceeded with a post-test assessment. According to the findings of the post-test, participants demonstrated a keen interest in the conversion of vegetable and fruit waste into POC. Additionally, using POC technology was found to be highly beneficial in facilitating the efficient production of POC. Figures 4 and 5 depict the societal activities.

Figure 4. Socialization of fruit and vegetable waste liquid organic fertilizer production

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(a)

(b)

Figure 5. Handover of rotary POC and documentation PKM team with participants

CONCLUSION

The PKM Rotary POC activities encompassed all stages, including preparation, implementation, and evaluation. The activity was executed efficiently, and the community displayed a high level of enthusiasm in its reception. Based on the findings derived from the questionnaire, it can be observed that the participants exhibit a keen interest in the conversion of vegetable and fruit waste into POC. This initiative aims to address the issue of environmental pollution caused by the buildup of organic waste and to replace synthetic fertilizers with environmentally sustainable alternatives, such as organic fertilizers, within the community.

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