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The Production of Liquid Organic Fertilizer (POC) from Household Waste Based on Rice Washing Water and Vegetable Waste in Mangepong Village, Turatea District, Jeneponto Regency.

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A R T I C L E I N F O

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A B S T R A C T

Plants need sufficient nutrients to maintain productivity and land sustainability. Therefore, farmers need additional fertilizer in their cultivation activities. Currently, many farmers use organic fertilizer in their cultivation because it is considered practical. However, its continuous use can result in soil degradation. One effort that can be made is to use organic fertilizer. There are two forms of organic fertilizer, namely solid and liquid fertilizer. Liquid organic fertilizer (POC) is a fertilizer that comes from the decomposition of organic materials due to the activity of microorganisms which can be useful in maintaining soil health and increasing plant productivity. The purpose of this training is to create healthy agriculture and environment. The implementation method used is to provide material and direct training to the community. The implementation of this activity is expected to provide an understanding to the community about the importance of maintaining a healthy and sustainable environment.

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INTRODUCTION

Mangepong Village is located in the Turatea District, Jeneponto Regency, which is a highland area. Mangepong Village is divided into seven hamlets, which include Pallantikang Hamlet, Parang-Parang Hamlet, Aung Hamlet, Bontoa Hamlet, Biringjene Hamlet, Pammanjengang Hamlet, and Mangepong Hamlet. In terms of topography, Mangepong Village has high agricultural potential, but the climate in the area is not conducive to agricultural activities, so the community only plants crops once a year. The main agricultural commodities produced in Mangepong Village include rice, corn, and chili.Generally, agricultural land contains the necessary nutrients for plant growth. However, the availability of these nutrients can diminish over time due to several factors. Sufficient nutrient availability in the soil is essential for maintaining land productivity and the sustainability of cultivated crops. Plants continuously absorb nutrients from the soil to grow and develop, which requires farmers to add nutrients during cultivation. One way to replenish nutrients is through fertilization. According to Gunawan et al. (2023), fertilizer is a material added to the soil to improve its fertility, both chemically, physically, and biologically. Fertilizers are categorized into two types: inorganic fertilizers and organic fertilizers.

Organic fertilizer is one type of fertilizer that can be used to add nutrients to the soil, as it helps increase microbial activity in the soil. Organic fertilizers cannot replace the role of inorganic fertilizers in supplying nutrients to the soil because the nutrient content in inorganic fertilizers is higher than that in organic fertilizers. However, organic fertilizers can improve the efficiency of inorganic fertilizer use because they contain several essential nutrients that are gradually available for plants to absorb according to their needs.Organic fertilizers play a role in enhancing the physical, chemical, and biological properties of the soil. During the fermentation process, microorganisms are used as energy sources. Organic fertilizers come from plant residues, animal waste, and other environmentally friendly materials, though their effects are slower than inorganic fertilizers and are easier to use. There are two forms of organic fertilizers: solid and liquid. Liquid Organic Fertilizer (POC) is a fertilizer resulting from a fermentation process carried out by microorganisms and made from organic materials.

Most household waste can be used as materials for making liquid organic fertilizers, such as rice washing water, eggshells, banana peels, tofu dregs, and vegetable waste. Rice washing water is one of the most commonly found types of waste because people consume rice daily. However, many people are still unaware of the benefits of rice washing water. Rice washing water contains many nutrients that can help improve soil quality. The benefits of rice washing water include stimulating leaf fertilizer growth, aiding in the formation and development of flowers, facilitating nutrient absorption into leaf cells, and reducing plant stress. In addition, vegetable waste can also be used as a material in the production of POC because it contains both micro and macro nutrients.Liquid organic fertilizers help improve soil fertility, structure, porosity, and stimulate the growth of soil microorganisms. For plants, liquid organic fertilizers can enhance chlorophyll formation in leaves and root nodules, improve plant vigor, help plants withstand weather and pest stress, stimulate branch production, and support flower and fruit development. The production process of liquid organic fertilizer involves fermentation, which is the breakdown or decomposition of organic materials through either aerobic or anaerobic respiration. This process is designed to speed up nutrient absorption in plants, making the organic material easier to decompose. Fermentation is accelerated by adding EM4, a microbial solution that helps break down organic materials.

The application of liquid organic fertilizer can be done by drenching it around the root area or spraying it directly onto plant leaves. The harvesting of POC is done after about 2-3 weeks, and the success of the fermentation process can be determined by its color, which should be yellowish-brown, and its smell, which should resemble fermented rice or be odorless. The recommendation to use organic fertilizers aims to reduce the problems caused by chemical fertilizers, which have been proven to harm the soil and environment.Based on the explanation above, it is necessary to conduct socialization and training on the production of liquid organic fertilizer to reduce the use of inorganic fertilizers and reduce household waste that is discarded without further processing.

LITERATURE REVIEW

A literature review provides an overview of existing research, theories, and practices related to the topic of interest, offering insights into the key issues, challenges, and advancements in the field. In the context of this study, the literature review focuses on the use of organic liquid fertilizers (POC), the utilization of household waste in fertilizer production, and the agricultural practices in Mangepong Village, as well as the environmental and economic benefits of such initiatives.Organic fertilizers are substances derived from plant, animal, or mineral sources that are used to enhance soil fertility and support plant growth. Unlike inorganic fertilizers, organic fertilizers improve soil health by replenishing the soil's nutrient levels and enhancing its structure and microbial activity. According to Gunawan et al. (2023), organic fertilizers provide a sustainable solution for long-term soil health as they help to preserve soil texture, improve moisture retention, and increase the diversity of soil microorganisms. This is in contrast to synthetic or chemical fertilizers, which may lead to soil degradation over time due to the lack of organic matter.

Organic fertilizers can be applied in various forms, such as solid or liquid, with liquid organic fertilizers (POC) being particularly popular due to their ease of application and fast nutrient uptake by plants. As noted by Alami et al. (2022), liquid organic fertilizers are typically produced through fermentation processes, where microorganisms break down organic materials such as vegetable waste, rice washing water, or animal waste, turning them into nutrient-rich solutions that plants can absorb more readily.The fermentation process is crucial for the production of organic liquid fertilizers. During fermentation, microorganisms such as bacteria and fungi decompose organic waste into simpler compounds, which are then converted into plant-available nutrients. This process not only accelerates the breakdown of organic materials but also adds beneficial microorganisms to the soil, which play a key role in nutrient cycling and soil health (Yusuf et al., 2020).EM4 (Effective Microorganisms), a popular microbial inoculant, is commonly used to accelerate the fermentation process. According to Suryani et al. (2021), the addition of EM4 helps enhance microbial activity, breaking down organic materials more efficiently and producing a liquid fertilizer that is rich in essential nutrients like nitrogen, phosphorus, and potassium.

The application of liquid organic fertilizers has numerous benefits for both soil and plant health. One of the primary advantages is their ability to improve soil fertility by replenishing essential nutrients that are lost over time due to continuous cropping. Liquid organic fertilizers also improve soil structure by enhancing soil porosity, which allows for better water retention and aeration (Ardianto et al., 2020). Furthermore, they stimulate the growth of soil microorganisms, which help break

down organic matter and contribute to nutrient cycling.In terms of plant growth, liquid organic fertilizers promote the formation of chlorophyll, which is essential for photosynthesis, and encourage the development of root nodules that aid in nitrogen fixation. They also enhance plant vigor, enabling crops to better withstand environmental stresses such as drought, pests, and diseases. Additionally, organic fertilizers help improve the quality of produce, resulting in healthier and more resilient plants (Supriyadi et al., 2022).

The use of household waste for organic fertilizer production has gained attention as a sustainable way to manage waste and reduce environmental pollution. Household waste, including vegetable scraps, rice washing water, eggshells, and banana peels, can be repurposed to produce nutrient-rich liquid fertilizers. According to Nurdin et al. (2023), rice washing water is particularly valuable as it contains essential nutrients such as nitrogen, phosphorus, and potassium, which are beneficial for plant growth. In many rural areas, where agricultural resources are limited, this practice not only helps reduce waste but also provides an affordable and accessible source of fertilizer for farmers.Furthermore, the use of vegetable waste in fertilizer production has been shown to be effective in improving soil fertility. Vegetable scraps are rich in organic matter and provide a diverse range of nutrients that can enhance soil structure and microbial activity (Prasetyo et al., 2021). This practice aligns with the principles of circular agriculture, where waste products are reused to promote sustainability and reduce dependence on chemical fertilizers.In Mangepong Village, the primary agricultural activities include rice, corn, and chili cultivation. However, as noted in the introduction, the climate conditions in this highland area are not optimal for year-round farming, which limits the productivity of the land. As a result, farmers in Mangepong are faced with the challenge of maintaining soil fertility while relying on a single cropping cycle per year.

Studies conducted in similar highland areas show that the use of organic fertilizers can significantly improve soil fertility, especially in regions where the soil is prone to nutrient depletion. The application of liquid organic fertilizers, such as POC, can help address nutrient deficiencies and improve the overall health of the soil, thereby increasing agricultural productivity (Setiawati et al., 2022). In Mangepong, where traditional farming methods are still prevalent, introducing the practice of making and using liquid organic fertilizers could offer a sustainable solution to enhance soil health and support local agriculture.The environmental benefits of using organic fertilizers are clear, as they reduce the dependence on chemical fertilizers, which are known to contribute to soil and water pollution. By using organic waste to produce fertilizers, farmers can reduce their ecological footprint while improving soil health and increasing crop yields.Economically, the production of liquid organic fertilizers from household waste is a cost-effective solution for farmers in Mangepong Village, who may otherwise struggle to afford commercial fertilizers. Additionally, the practice of recycling waste materials helps reduce the volume of waste disposed of in landfills, providing both environmental and economic advantages (Haryanto et al., 2021).

METHOD

The liquid organic fertilizer production program was carried out on January 15, 2025, in Mangepong Village, Turatea District, Jeneponto Regency, at the Baruga of Mangepong Village. This activity aimed to teach local farmers and community members how to produce organic liquid fertilizers using household waste, particularly vegetable scraps and rice washing water. The session, held from 09:00 AM to completion, provided a hands-on demonstration of the entire process, allowing

participants to understand the practical steps involved and the benefits of such an initiative for both agriculture and the environment.The primary target audience for this program included farmers, farmer groups, and the general community of Mangepong Village. The goal was to equip participants with the knowledge and skills to create organic liquid fertilizers from readily available organic waste. This initiative not only aimed at promoting sustainable agricultural practices but also sought to raise awareness about waste management, turning unused household waste into valuable and beneficial products that can help reduce environmental pollution.

The program utilized a direct engagement method, where participants were actively involved in both theoretical and practical aspects of making liquid organic fertilizers. The process started with a survey to understand the local conditions and identify unused household waste in the community. Afterward, discussions were held with village officials and residents to plan the event's logistics, including the sourcing of materials. The actual training involved an explanation of the benefits of liquid fertilizers followed by a step-by-step demonstration on how to prepare the fertilizer using organic materials like vegetable waste and rice washing water.The success of the program was measured by the successful execution of the training session and the positive feedback from participants. Indicators of success included active participation, interest in the material, and the community's ability to grasp the concept of utilizing household waste for agricultural benefits. Pre-training experiments conducted by KKN students ensured that the process was optimized for success. The evaluation also focused on identifying key factors that influence the effectiveness of the fertilizer, ensuring that participants left with a clear understanding of how to replicate the process in their own homes or farms.

RESULT AND DISCUSSION

The community service activity in the form of socialization and training was successfully implemented with the active participation of local residents and the collaboration that is expected to help the community find solutions to the existing problems in the village. Household waste has become a significant issue faced by the community of Mangepong Village due to the lack of proper processing and utilization of organic waste. One of the best solutions provided was the implementation of socialization and training on the production of liquid organic fertilizers (POC) to address the problem of organic waste. In addition to solving the issue of organic waste, the production of POC also helped increase the knowledge and awareness of residents about the importance of maintaining their environment. The success of the training was evident from the enthusiasm shown by the community.

The training started with the delivery of material, followed by discussions and hands-on training. The material delivery aimed to introduce the benefits of liquid organic fertilizers. After the presentation, a discussion or Q&A session was held to address any unclear points. The next step was a hands-on demonstration of the process of making liquid organic fertilizer so that participants could observe the process firsthand. The process of making the liquid organic fertilizer is as follows:

1. Prepare the necessary tools and materials, including chopped vegetable waste, rice washing water, coconut water, EM4, sugar solution (either white or brown sugar), a basin, a jerrycan, and a funnel.
2. Mix all the ingredients into the basin, starting with the chopped vegetable waste, rice washing water, and coconut water, then stir well.

3. Add 2 to 3 bottle caps of EM4 and sugar solution, and stir again until the mixture is well combined.
4. Pour the mixed ingredients into the jerrycan using a funnel and securely close the jerrycan lid.
5. Store the jerrycan in a shaded area, away from direct sunlight, for two weeks. Stir the mixture every two days to release gases inside the jerrycan and ensure the fermentation process is progressing well.
6. The successful production of liquid organic fertilizer can be identified by its yellow-brown color, neutral pH, and lack of odor. The application of POC can be done in two ways: by pouring it directly around the roots (called "kocor") or by spraying it directly onto the leaves of the plants.

Figure 1. Work Program for the Production of Liquid Organic Fertilizer (a) Preparation (b) Material Presentation (c) Practical Implementation of POC Production

CONCLUSION

The conclusion of the implementation of this KKN (Community Service Program) activity is as follows:

1. Utilizing organic waste as a material for the production of liquid organic fertilizer is an innovation that helps in developing the skills and knowledge of the community. Through this activity, the community can make use of organic waste that would otherwise be discarded.
2. This activity provides the community with an understanding of the importance of maintaining a healthy environment for the future.
3. Furthermore, it is expected that the community will be able to create products that have value and raise awareness about the benefits of the resources available around them.
4. The success of this activity can be seen from the community's enthusiasm to participate, and the smooth execution of the program.

Suggestions

The suggestion that can be made is that with this socialization and training activity, it is hoped that the community will see the potential in the organic waste around them and utilize it effectively, turning it into an alternative way to maintain a clean and healthy environment.

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