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The Making of Local Microorganisms (LMO) Liquid Fertilizer from Banana Corm in Talang Mulya Village, Pesawaran Regency, Lampung Province

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ABSTRACT

Local microorganisms (LMO) liquid fertilizer made from banana corm is an alternative fertilizer that is considered more affordable and safer because it utilizes natural substances that are easy to obtain. This article was written based on the community services activity that had been conducted in Talang Mulya Village Hall, Teluk Pandan Subdistrict, Pesawaran Regency, Lampung Province. This activity aimed to provide an overview of the implementation program in making LMO liquid fertilizer from banana tree corm, comprising the making practice and material presentation. The method used was a qualitative approach with a descriptive-explanatory model. This activity was carried out through socialization by targeting farmers as the participants. The results show that the community of Talang Mulya Village, especially those who work as farmers, has acquired new understanding and insights regarding natural substances-based liquid fertilizer that has the ability to fertilize the agricultural land. Through implementation of this community services activity, the village community can make their own liquid fertilizer from natural substances so that they can reduce their expenses amidst the cultivation process of their agricultural plants. After the implementation of this activity, the farmers can easily make liquid fertilizer to be applied directly to their cultivated plants.

1. Introduction

Talang Mulya Village is one of the villages in Teluk Pandan Subdistrict, Pesawaran Regency, Lampung Province. About 75% of Talang Mulya residents work as farmers, especially coffee farmers. In this village, there are many banana trees that grow wildly and are cultivated by the local community. So far, fruit is the only utilized part of these banana plants, namely to be consumed, while the other tree parts are discarded, whereas the tree corm can actually be processed into liquid fertilizer. Therefore, a socialization activity of making liquid fertilizer by utilizing banana corm waste is considered necessary so that later it can be applied to local agricultural plants in this village. Moreover, by acknowledging the existence of banana corm waste as the alternative natural resources for making the liquid fertilizer, it is hoped that the necessity to purchase chemical fertilizers can be reduced, especially considering that the market price of chemical fertilizers nowadays has been increasing every time. As the obvious benefits, the farmers will be more independent and do not rely on the supplies of chemical fertilizer, and they are able to apply natural substances-based liquid fertilizer to their cultivated plants, thus minimizing environmental pollution due to the excessive use of chemical fertilizers (Pangaribuan, 2018). Fertilizers are basically indispensable for the development of cultivated plants. However, many farmers still use expensive chemical fertilizers, which the supplies are still available far from where they live, whereas many alternative natural resources are actually available in their disposal. These resources can be utilized to fertilize agricultural plants. One of the natural resources that can be used for making liquid fertilizer is banana corm (Hakim, 2022).

Local microorganisms (LMO) are a group of microorganisms that specifically inhabit certain natural substances. They play a role in in fertilizing the soil and breaking down organic waste into compost, thus functioning as a useful nutrient for maintaining soil fertility. LMO is said to be a set of microorganisms that are useful as the starters in decomposing and fermenting organic matters into solid or liquid organic fertilizers. There are several natural substances that can be used as the source of LMO, one of which is banana corm. Several types of bacteria commonly identified in banana corm are *Bacillus* sp., *Aeromonas* sp., and *Aspergillus nigger*. They are the bacteria that usually decompose organic matters. Therefore, the LMO of banana corm serve as a plant growth stimulant and are also useful as the decomposer in compost making. Banana tree waste, such as the corm, has not been largely utilized so far due to the lack of technical knowledge of the village community in processing this natural substance into liquid fertilizer. Banana corm uses the help of local microorganisms inside of it to break down solid organic matters into liquid matters (Suryati, 2019).

The making of LMO liquid fertilizer from banana corm has several aims: 1) as an alternative to scarcely subsidized chemical fertilizers, which are increasingly expensive, 2) enabling the farmers in Talang Mulya Village to be creative, innovative, and independent so that they do not always rely on fertilizer supplies from the government, 3) increasing the fertility of agricultural land, agricultural productivity, and the profits percentage of Talang Mulya Village farmers by reducing production costs (Ashlihah, 2020).

Therefore, based on the aforementioned background, a community services activity is conducted to introduce LMO liquid fertilizer made from natural substance that is easy to obtain, namely banana corm. By utilizing banana corm, the farmers can easily make their own liquid fertilizer at home so as to produce liquid fertilizer that much more affordable than that of commonly used chemical fertilizers. In addition, LMO liquid fertilizer can be an alternative organic fertilizer that is much safer and environmentally friendly because it is made from natural substances.

2. Methods

The method used in this community services activity was a qualitative approach with a descriptive-explanatory model, aiming to provide a detailed description of the work program for making LMO liquid fertilizer while explaining the initial steps, the making process, and the expected output and

outcome of this activity. The socialization stage of making LMO liquid fertilizer was conducted by making several LMO liquid fertilizer in advance to be stored in plastic bottle containers and allowed to stand aside for a few days. Later, at the socialization day, the fertilizer samples were given to the participants as the model to be applied to the cultivated plants around the village. In this activity, the primary data were obtained through direct observation on the field by the community services team, while secondary data were obtained by reviewing of a number of literatures and previous studies related to the making of LMO liquid fertilizer from banana corm and other natural substances.

The socialization activity was carried out on June 18, 2023 at Talang Mulya Village Hall, Teluk Pandan Subdistrict, Pesawaran Regency. The village Hall was chosen based on the ground that it is a gathering place for the local community when attending various events organized by the village officials. This activity aimed to provide an initial understanding to all village communities, especially farmers, about LMO liquid fertilizer in general, from how to make it to the various the benefits that can be reaped from it. Then, the village community were encouraged to be actively involved in this activity. The main measure of the success of this activity was the number of questions from the farmers and their enthusiasm in applying the fertilizer they made to the surrounding cultivated plants.

In this activity, the materials used in making LMO liquid fertilizer were 1 kg of banana corm, 2 ounces of brown sugar, 2 liters of rice washing water, and plastic bottle containers. The making of LMO liquid fertilizer consisted of several stages. First, the banana corms were cut into small pieces and mashed. Next, the nutrients were prepared, namely brown sugar was sliced and put into rice washing water, then stirred until it dissolved. The nutrients were then mixed with the banana corms in the plastic bottle containers. The containers were then closed tightly. The container lid was opened every two days or if the container appeared to be bulging. Finally, the resulting LMO liquid fertilizer was harvested after 14 days.

3. Results and Discussion

The initial step of this community services activity, namely making LMO liquid fertilizer from banana corm, was carried out on February 18, 2023. The activity began with observation to determine the problems faced by the targeted farmers and the local potential that can be raised into work programs. The observation was conducted mainly by analyzing the empirical situation around Talang Mulya Village. From the observation results, it was revealed that many banana corms in the surrounding area of the village are only left damaged and thrown away without appropriate processing.

After that, the team conducted the next steps, namely making initial preparations, determining the target participants, preparing the tools and materials needed, and implementing the socialization activity itself. The activity was carried out at the Talang Mulya Village Hall. As the participants, the villagers who work as farmers were present in the socialization and making practice of LMO liquid fertilizer.

3.1. Socialization of LMO liquid fertilizer and its making technique

The socialization activity was carried out on June 18, 2023 at Talang Mulya Village Hall, Teluk Pandan Subdistrict, Pesawaran Regency. This activity aimed to provide an initial understanding to the participants, namely the farmers, about LMO liquid fertilizer in general, from how to make it to the various benefits that can be reaped from it. Then, the village community were encouraged to be actively involved in this activity.

The socialization began with the material presentation displayed through Power Point (PPT) slides. The community services team delivered the fundamental information about LMO liquid fertilizer, from its definition, its uses, to the tools and materials commonly used to make it. In the next step, the team practiced directly in the making of LMO fertilizer, through assistance from several participants. Then,

the team explained to the participants that the fertilizer must be stored appropriately for approximately 14 days before considered ready to be applied to the agricultural plants in Talang Mulya Village.

Figure 1. Material presentation by the team using Power Point slides

This socialization activity resulted in the knowledge addition of the participants about how to make LMO fertilizer, how to use it, and its benefits. This was clearly indicated by the high enthusiasm of the participants in listening and understanding the delivered material from the team and during the making practice of this LMO fertilizer.

3.2. The making practice of LMO liquid fertilizer

The practice activity of making LMO liquid fertilizer from banana corm began with selecting banana corm that had been harvested and providing the necessary ingredients, namely brown sugar, water, and rice washing water. Banana corm as the main ingredient has a high cellulose (fiber) content, beside also contains water and several nutrients, such as potassium (N), calcium (Ca), phosphorus (P), and iron (Fe).

LMO in banana corm are regarded as the alternative that plays a role in plants' vegetative growth period to increase plants' resistance to disease. The high phenolic acid content serves to bind Fe, K, and Ca ions so that it helps in providing the sufficient availability of soil P content, thus helping the formation process of flower and fruit (Fadillah, 2019). Banana corm also contains two plant growth regulators, namely giberalin and cytokinin, as well as 7 microbes that are very useful for supporting plants' growth when applied as liquid fertilizer, namely *Azospirillium*, *Azotobacter*, *Bacillus*, *Aeromonas*, *Aspergillus*, cellulotic microbes, and phosphate solvent microbes. Furthermore, banana corm also contains carbohydrates, in which dry banana corm contains 66.2 gr of carbohydrates and fresh banana corm contains 11.6 gr of carbohydrates. The high carbohydrate content in banana corm will boost the development of local microorganisms. Therefore, based on the overall content in the LMO liquid fertilizer made from banana corm, this fertilizer is considered very beneficial as a decomposer, biological fertilizer, and organic pesticide, especially as a fungicide (Dalungi, 2021).

Brown sugar is used as a source of glucose so that it can be used as an energy source for microorganisms in their spontaneous reproduction (Nursayuti & Mariana, 2020). Rice washing water is used as a source of carbohydrates and additional nutrients because it contains various nutrients needed by plants to produce better root growth. Rice washing water contains 0.015% of nitrogen, 16.306% of phosphorus, 0.02% of potassium, 2.944% of calcium, 14.252% of magnesium, 0.027% of sulfur, 0.0427% of iron, and 0.043% of vitamine B1 (Jumriani, 2017).

The practice of making LMO liquid fertilizer from banana corm began with demonstrating the chopping of banana corm that had been washed and weighed as much as 1 kg. Then, 2 ounces of brown sugar was dissolved. Next, the chopped banana corms were mixed with the sugar solution in the

plastic bottle containers that had been prepared, and 2 liters of rice washing water was added to the mixture. Then, the mixture was fermented for 14 days in a tightly closed bottle. The basic principle of this fermentation is to activate the activity of microorganisms that have already existed in the banana corm to mix with the ingredient solution so as to generate a useful fermentation product, namely the liquid fertilizer (Kusuma, 2020).

The activity of making LMO liquid fertilizer from banana corm was intended to increase plants' growth, yield, and soil fertility. In a broader sense, this activity also aimed to help provide the necessary soil nutrients needed by farmers in increasing their crop production so that it will lead to an increase in the welfare of farmers in Talang Mulya Village in a sustainable manner. During the making practice, many participants asked about the reaction occurred in this liquid fertilizer so that it can create microorganisms that can later be useful for plants, also about the function of adding brown sugar and rice washing water. Making LMO liquid fertilizer from banana corm is a new thing for many residents of Talang Mulya Village, especially those who work as farmers. This is mainly thought to be due to the lack of information sources and low quality human resources caused by slow diffusion of technology, resulting in people in this village still not thoroughly understanding the concept of LMO, even though it is already known by the wider community in urban areas.

Figure 2. The process of making LMO liquid fertilizer from banana corm

Figure 3. The results of making LMO liquid fertilizer from banana corm by the community service team and the participants in Talang Mulya Village

After this community services activity, it is expected that the farmers can make their own LMO fertilizer easily at home. In this activity, the team also gave the previously made LMO fertilizer to the

farmers in Talang Mulya Village, which can later be applied directly to their cultivated plants that require the fertilizer.

4. Conclusions

Based on the results of this community services activity, it can be concluded that the socialization of making local microorganisms (LMO) liquid fertilizer from banana tree corm to the community in Talang Mulya Village has provided valuable information to the villagers who are mostly farmers to be able to utilize natural susbtances that are available in their disposal to make environmentally friendly fertilizers. Natural substances, which have been usually just thrown away by local residents and do not generate benefits, now can be properly utilized for making LMO liquid fertilizer, because owing to this community services activity, they now understand how to make it, how to apply it to their cultivated plants, and how they can reap various benefits from it. Through this activity, it is also hoped that in the future, many farmers can save more money from buying fertilizer because they can make their own fertilizer by utilizing easily obtained—even free—natural substances. Besides being highly affordable, the use of LMO liquid fertilizer can also bring an positive impact on the health of the human body and animals as the consumers of agricultural products. This is because if the plant fertilizer used is healthy and free from hazardous chemicals, the consumers of agricultural products will also certainly be healthier.

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