Asia Pacific Journal of Management and Education (APJME) Vol. 7 No. 2, pp. 213-226, July, 2024
E-ISSN: 2655-2035 P-ISSN: 2685-8835
https://www.ejournal.aibpm.org/index.php/APJME

Increasing the Competence of Jayapura Regency's Famers Through Training in Organic Fertilizer Production to Increase Plant Growth

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ARTICLE INFORMATION

Publication information

Research article

HOW TO CITE
Timisela, S. I., Maga, L., Titalessy, P. B., Antoh, A. E., Mulyono, H. I., & Palloan, A. F. (2024). Increasing the competence of Jayapura Regency's farmers through training in organic fertilizer production to increase plant growth. *Asia Pasific Journal of Management and Education*, *7*(2), 213-226.

DOI:
https://doi.org/10.32535/apjme.v7i2.3140

Received: 14 May 2024
Accepted: 15 June 2024
Published: 20 July 2024

ABSTRACT

The aim of this training is to increase the competence of farmers in Yobeh Village in terms of (1) farmers can utilize agricultural residues and organic waste; (2) farmers can reduce farming costs; and (3) farmers can produce environmentally friendly agricultural commodities. Training is carried out face to face so that farmers can carry out the stages of making organic fertilizer. Training activities were carried out in Yobeh Village, Sentani Kota District, Jayapura Regency. The tools and materials used in composting training consist of EM4 solution, water, forage or straw, husks, buckets, scoops, knives, or scissors. This training activity was carried out using lecture, training, and mentoring methods for participants. Based on the results of the training activities, it can be concluded: (1) The training participants had high enthusiasm and were proactive in asking several questions; (2) Basically, participants have used organic fertilizer in their farming activities, but have not used EM4 solution; and (3) Participants are able to understand the benefits, processes and materials used in making organic fertilizer. Suggestions that can be conveyed by the author include: (1) It is hoped that training participants will be able to utilize organic waste into organic fertilizer; and (2) Local regional governments are expected to provide training to improve farmer competency.

Keywords: Environmental Sustainability; Farmer Competency; Organic Fertilizer; Organic Waste; Plant Growth

INTRODUCTION

One essential entrepreneurial skill is farming, which involves producing and selling agricultural products (Sembiring, 2021). A thriving agricultural sector boosts national and rural economies, raising incomes, food security, and living standards (Pakpahan et al., 2022). However, success in farming hinges on soil fertility. Cultivating crops effectively requires managing various aspects, with soil quality being the most crucial. As stated by Brady et al. (2008), in plant cultivation activities, soil fertility is the main factor that must be considered. Soil fertility is defined as the ability of the soil to provide sufficient and balanced nutrients to support plant growth.

Soil fertility plays a pivotal role in agricultural plant cultivation, dictating both plant growth and agricultural production levels. However, soil fertility varies across regions due to several influencing factors (Taisa et al., 2021), including soil texture, soil organic matter, and soil reaction (pH). Soil texture refers to the relative proportions of sand, silt, and clay fractions, with fertile soil typically possessing favorable physical properties. These properties, including soil structure, water content, and porosity, can reflect soil fertility levels. Soil organic matter, comprising living organisms and decomposing organic materials, contributes significantly to soil biological fertility. Bot and Benites (2005) highlighted the importance of organic matter in soil fertility, as it generates organic acids beneficial for soil health. Additionally, soil reaction, or pH level, indicates soil alkalinity or acidity, directly influencing nutrient availability and thereby affecting soil fertility.

In order for agricultural crop cultivation activities to be carried out sustainably, efforts must be made to maintain or increase soil fertility. According to Taisa et al. (2021), there are three ways that can be done to increase soil fertility, one of which is by applying organic materials. Organic matter has a very important role in maintaining soil fertility. The application of organic material can be in the form of mature organic material such as organic fertilizer (compost, green manure, manure) or in the form of living organic material such as ground cover plants. Compost is organic materials (organic waste) that have undergone a weathering process due to interactions between microorganisms (rotting bacteria) that work in it. These organic materials include leaves, grass, straw, remnants of twigs, and branches (Murbandono, 2014).

Compost can occur by itself through natural processes. However, this process takes a long time, it may take decades. Organic materials cannot be used directly without composting them first because raw organic materials cannot be directly utilized by plants. The organic material must be broken down first so that plants can absorb the nutrients it contains. According to Prihandini and Purwanto (2007), the composting process is the process of reducing the C/N of organic material until it is the same as the C/N of the soil (< 20).

The use of compost fertilizer is highly recommended for use in agricultural plant cultivation activities because compost fertilizer has various important benefits for soil fertility. As stated by Prihmantoro (2017) and Sutedjo (2010), some of the advantages of organic fertilizer are improving soil structure, increasing the soil's water absorption capacity, and improving living conditions in the soil because microorganisms in the soil play a very important role in changing organic matter, as a source of nutrients N, P, K, and S, and microelements and others.

Since compost has important benefits in soil biology, the use of compost can be beneficial for plant growth and production levels. This is proven in the results of research conducted by Supartha et al. (2012) which show that the combination treatment of solid

organic fertilizer and liquid organic fertilizer significantly affects rice crop yields. The use of organic fertilizer can increase plant growth because organic fertilizer has several advantages. As stated by Bot and Benites (2005), as a contributor of nutrients to the soil, organic matter has a key role as (1) organic material originating from plant residues which contain essential nutrients for the soil and then accumulate as a food source for plants, and (2) stable organic material (humus) functions to adsorb and retain nutrients in a form available to plants.

Brady et al. (2008) further explained that the important functions of humus in soil are (1) increasing fertilizer efficiency, (2) extending the N utilization time, (3) increasing plant nutrient uptake, especially P and Ca, (4) reducing the risk of pest attacks and plant diseases by balancing the function of nutrients in the soil, (5) buffer salinity in the soil, and (6) as a catalyst to increase C status in the soil. Considering the benefits of using compost derived from organic materials, this is an important thing for all farmers to implement. Especially farmers in Jayapura Regency, specifically in Sentani District, Yobeh Village City. Apart from providing benefits to plant productivity, the ingredients for making organic fertilizer are also easy to obtain. Organic fertilizer can be made from various types of materials, including plant residues (straw, stover, corn cobs, sugar cane bagasse, coconut husks), sawdust, animal waste, mushroom media waste, market, household, and factory waste as well as green manure.

Apart from the materials being easy to obtain, the process of making compost fertilizer is very easy to do so that people can easily apply it. In addition, using organic fertilizer can reduce the costs of using inorganic fertilizer (Handayani et al., 2019) because the practice of the use of organic fertilizer can be combined with inorganic fertilizer. Hartatik et al. (2015) explain that the nutrient levels in organic fertilizer are relatively low and very variable, so the benefits for plants last in the long term. Therefore, the use of organic fertilizer should be combined with inorganic fertilizer at a lower dose.

The aim of implementing this community service is to increase the competence of farmers in Yobeh Village, Sentani District, Jayapura Regency City through training in making compost fertilizer. Through this training activity, several benefits can be obtained, including the following: (1) Farmers are able to utilize agricultural residues and organic waste produced in the household so that they can provide economic benefits, especially in agricultural cultivation activities; (2) Farmers can reduce farming costs by combining the use of inorganic fertilizers and inorganic fertilizers; (3) Farmers are able to produce agricultural commodities that are more environmentally friendly by using organic fertilizer.

LITERATURE REVIEW

Definition of Fertilizer

In a broad sense, fertilizer is defined as a material used to improve the physical, chemical, and biological properties of soil to make it better for plant growth. In a narrow sense, fertilizer is defined as a material or substance, both organic and inorganic, that contains one or more nutrients which aims to increase the availability of nutrients in the soil. Meanwhile, fertilization is the activity or act of adding nutrients to the soil according to plant needs using certain methods (Taisa et al., 2021).

The definition of organic fertilizer is material that contains carbon and one or more nutrients other than H and O that are essential for plant growth (Assefa & Tadesse, 2019). Meanwhile, all organic fertilizers that do not contain prohibited ingredients and come from natural ingredients, namely from plants or animals, sewage sludge, and non-organic materials are not included. Organic fertilizer is manure or compost that is applied

to plants as a source of nutrients. Compost is organic materials (organic waste) that has undergone a weathering process due to interactions between microorganisms (rotting bacteria) that work in it. These organic materials include leaves, grass, straw, remnants of twigs and branches, animal waste, fallen flowers, urine, etc (Murbandono, 2014).

According to Dewi et al (2020), composting can utilize organic waste such as household waste. The composting process can be accelerated by human treatment, namely by adding decomposing microorganisms so that in a short time good quality compost can be obtained. Microorganisms that can be added in the composting process are EM4 (Effective Microorganism 4) (Simanungkalit et al., 2006). This EM4 solution contains a very large number of fermenting microorganisms (80 genera). Microorganisms are selected so that they can work effectively in the fermentation of organic materials. From the many microorganisms, there are five main groups, namely photosynthetic bacteria, Lactobacillus sp, Saccharomyces sp, Actinomycetes sp, and fermentation fungi (Khartiono, 2020). Before using it, EM4 is activated first because the microorganisms in the EM4 solution are in a dormant state. Activation of microorganisms in EM4 is done by providing water and food (molasses).

Several factors underlie fertilization: (1) The amount of nutrients originating from the parent soil material is small so input of nutrients from fertilizer is needed; (2) Loss of nutrients due to transport at the same time as harvest or loss due to erosion. The amount of nutrients transported and eroded is not balanced with the amount available in the soil, so to balance the number of nutrients transported requires input through fertilization; and (3) There is a desire to increase plant productivity, nutrients are the main factor to support plant growth (Taisa et al., 2021).

Fertilizer Classification

Fertilizers are classified as follows (Taisa et al., 2021): (1) Based on the original material. Based on the source material, fertilizers are divided into (a) natural fertilizers, namely fertilizers whose ingredients come from nature and the manufacturing process is carried out naturally and simply, and (b) artificial fertilizer, namely fertilizer made through a manufacturing process, or chemical process; (2) Based on the amount of nutrient content. Based on the amount of nutrient content, fertilizers are divided into (a) single fertilizers, namely fertilizers that contain one nutrient element, and (b) compound fertilizer, namely fertilizer that contains more than one nutrient; (3) Based on solubility. Based on their solubility, fertilizers are divided into (a) fast-release fertilizers, namely fertilizers that are quickly available to plants, and (b) slow-release fertilizer, namely fertilizer that is slowly available to plants; (4) Based on the phase. Based on the phase, fertilizers are divided into (a) solid fertilizers, namely fertilizers that can be applied in solid form, or dissolved using water, and (b) liquid fertilizer, namely fertilizer whose application must be dissolved using water; (5) Based on the type of nutrient. Based on the types of nutrients contained, fertilizers are divided into (a) macro fertilizers, namely fertilizers that only contain macronutrients, (b) micro fertilizer, namely fertilizer containing micronutrients only, and (c) mixed fertilizer, namely fertilizer containing macro nutrients and micronutrients; (6) Based on application method. Based on the method of application, fertilizer is divided into (a) root fertilizer, namely fertilizer that is applied to the soil and given around the plant roots, and (b) foliar fertilizer, namely fertilizer that is applied by first dissolving it in water, then spraying it onto the leaves; (7) Based on physiological reactions. Based on their physiological reactions, fertilizers are divided into (a) fertilizers that react with acid, namely fertilizers that when applied to the soil can cause a change in soil pH to become acidic, for example, urea fertilizer, and (b) fertilizers that react alkalinely, namely fertilizers that when applied to the soil cause a change in the soil pH to become alkaline, for example, calcium cyanide fertilizer; and (8) Based on their compounds, fertilizers are divided into (a) organic fertilizers, namely fertilizers that

contain organic compounds, fertilizers that are classified as organic fertilizers, for example compost, manure and green manure, and (b) inorganic fertilizer, namely fertilizer derived from inorganic/chemical compounds.

Benefits of Organic Fertilizer

According to Musnamar (2009) and Suriawiria (2002), organic fertilizer has various benefits including the following.

Increasing Soil Fertility

Organic fertilizer contains macro (N, P, K) and micronutrients (Ca, Mg, Fe, Mn, Bo, S, Zn, and Co) which can improve soil structure and porosity. Using organic fertilizer on clay soil will reduce stickiness making it easier to process, while on sandy soil it can increase the soil's binding capacity to water and air. Organic materials can react with metal ions to form complex compounds so that metal ions that are toxic to plants or inhibit the supply of nutrients such as Al, Fe, and Mn can be reduced (Angulo-Bejarano et al., 2021).

Improving the Chemical, Physical, and Biological Conditions of the Soil

The presence of organic fertilizer will cause a system of binding and releasing ions in the soil so that it can support plant growth. The ability of organic fertilizer to bind water can increase soil porosity thereby improving respiration and plant root growth. Organic fertilizer stimulates beneficial soil microorganisms. For example, rhizobium, mycorrhiza, and bacteria.

Safe for Humans and the Environment

The use of organic fertilizer does not cause residue in the harvest so it does not harm humans and the environment.

Increasing Agricultural Production

Various studies show the positive influence of compost on agricultural growth and production. Compost can increase the production of corn, cucumbers, cabbage, carrots, chilies, and watermelon (Roe, 1998). Organic fertilizer also increases the production of peanuts and mustard greens by 25 and 21% respectively (Nurhikmat et al., 2009).

Control Certain Diseases

Root rot disease in flower plants caused by Phytophthora sp can be eradicated with compost that has a high C/N ratio as effectively as using fungicides (Hoitink et al., 1991). Compost also inhibits Fusarium sp. (Hoitink et al., 1996). Compost extract at a concentration of 5-15% can inhibit the growth of pathogenic fungi (R. lignosus, S. rolfsii, C. gloeosporioides, and F. oxysporum).

RESEARCH METHOD

The training is carried out face to face, using materials and equipment that have been provided previously. So that in its implementation, farmers can carry out the stages of making organic fertilizer together. The location for implementing community service was in Yobeh Village, Sentani District, Jayapura Regency City. The objects or targets in training activities are farmers in Yobeh Village. The tools and materials used in training on making compost consist of EM4 solution, water, forage or straw, husks, buckets, scoops, knives, and scissors.

The aim of this community service activity is to increase farmers' competence in farming management through training in making organic fertilizer so that they can reduce the costs of using fertilizer in farming. It is hoped that after farmers take part in this training, they can increase their farming income. To achieve the objectives stated above, this community service activity is carried out using the following method: (1) Lecture method: Before the main training activities are carried out, the first step that needs to be conveyed is the benefits of using organic fertilizer in agricultural plant cultivation activities. Namely providing understanding to farmers about the benefits of using compost fertilizer, for example using organic fertilizer is more environmentally friendly and easier to apply; (2) Training method: Before the practice of making compost is carried out, participants are first given an explanation of the stages in the activity. After explaining the steps that must be carried out, participants will then be given the opportunity, both individually and in groups, to carry out the steps in making organic fertilizer. At this stage, assistance is still provided to farmers so that they are able to carry out their activities well. The choice of this training method is considered appropriate because it will be easier for training participants to apply what has been explained; and (3) After farmers have carried out the stages of making organic fertilizer, the next step is to provide assistance to participants regarding the obstacles they face in making organic fertilizer. At this stage, participants were given the opportunity to ask questions if they experienced difficulties when carrying out the stages of making organic fertilizer.

The choice of alternative using lecture, training, and mentoring methods was based on the characteristics of the participants who belonged to a community group with a relatively low level of education. Thus, the adult education pattern is considered very appropriate to implement. During service activities, a two-way communication method will be implemented. Training participants were given the opportunity to discuss or ask questions regarding what they did not understand about making organic fertilizer.

RESULTS

Community service activities were carried out in several stages. The first stage is the submission of permission letter to carry out training activities in Yobeh Village. The letter was received directly by the Head of Yobeh Village (Figure 1). This is done as a form of administrative order so that activities can obtain permission from the local Jampung government.

Figure 1. Submission of Cover Letter to the Head of Yobeh Village

The second stage, providing the tools and materials needed during the training. The tools used in this training activity consist of scoop, knife, and bucket. Meanwhile, the materials used include market waste in the form of vegetable remains, sugar, water, EM4 solution, and topsoil. These various tools and materials are provided the day before the service activities take place.

The third stage of carrying out training activities, at this stage first explains the tools and materials needed to make organic fertilizer (Figure 2a). At this stage, participants are given an understanding that organic materials that can be used to make organic fertilizer can be kitchen waste, agricultural residues, or litter. After explaining the tools and materials needed in the process of making organic fertilizer, the next step is an explanation of the stages in the process of making organic fertilizer (Figure 2b). The third stage is discussion or question and answer. At this stage, participants were given the opportunity to ask questions about the methods and stages of organic production (Figure 2c). This stage also serves as the closing of the training activities which is combined with a group photo.

Figure 2. Implementation of Training Activities for Making Organic Fertilizer

a

b

c

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DISCUSSION

Activity Preparation

Implementation of community service activities in Yobeh Village, Sentani Kota District, Jayapura Regency is carried out in several stages. The first stage which was carried out is the preparation before PkM activities are carried out including the following.

Coordination with the Yobeh Village Government

As a form of orderly administration, the initial stage of implementing PkM activities in Yobeh Village was carried out by submitting a request for permission to the local government accompanied by a letter of introduction from the Dean of the Uncen Faculty of Economics and Business. An introductory letter to the local village government was submitted on June 8 2023 which was received directly by the Head of Yobeh Village and was given permission to carry out PkM activities based on letter Number: 140/149/KY/2023.

After obtaining permission to carry out PkM from the Head of Kampung Yobeh, the next step is to coordinate with the RT to make an agreement regarding the time for implementing PkM activities. Based on the results of coordination, it was agreed that the PkM activities would be carried out on Saturday 17 June 2023. The community involved in this training activity was a group of housewives.

Preparation of Tools and Materials

Making compost or organic fertilizer can be done using tools and materials that are quite simple, cheap, and easy to obtain. The tools and materials used in training on making compost fertilizer in Yobeh Village consist of buckets, knives, sacks, plastic bottles of mineral water, granulated sugar or white sugar, water, Effective Microorganism 4 (EM4) for agriculture, and forage or litter. Likewise, in the training conducted by Mardwita et al. (2019), the tools and materials used in making organic fertilizer consisted of (1) a simple composter made from a plastic barrel or plastic bucket equipped with a filter, (2) spray bottle, (3) organic waste from household origin, namely leftover vegetables or fruit, and (4) diluted EM4 bioactivator. The organic or wild materials used in this training use market waste in the form of vegetable scraps obtained from vegetable traders at Pasar Baru Sentani. The EM4 activator functions to accelerate the formation of compost fertilizer (Hariatik, 2016).

Implementation of Activities

The implementation of PkM training on making organic fertilizer is carried out in several stages so that participants can clearly understand the method or method of making compost as well as the advantages of using compost. The stages of implementing PkM activities are described as follows.

Providing Participants with an Understanding of the Advantages and Benefits of Using Organic Fertilizer

Based on the name or type of fertilizer, organic fertilizer is fertilizer that uses organic materials as ingredients in its manufacture. In PKM activities, the public is given an understanding that organic fertilizer is a fertilizer that comes from organic materials. For example, kitchen waste, agricultural waste, litter, or dry leaves, as well as market waste such as vegetable scraps. Apart from using several types of organic materials, in making organic fertilizer it can be combined using several other types of materials, such as livestock manure, husk charcoal, and raw husks. At the initial stage of implementing the training, participants were given an understanding that the more diverse the types of materials used in making organic fertilizer, the better the elements contained in the fertilizer. One of the advantages of making organic fertilizer is that the ingredients are

easy to obtain and the process of making it is very easy for participants to understand and carry out themselves.

The benefits that can be obtained by using organic fertilizer are that it is more environmentally friendly, can reduce costs when applied in farming, and can increase soil fertility. Organic materials/fertilizers are very useful for increasing agricultural production both in quality and quantity, reducing environmental pollution, and improving land quality in a sustainable manner. Long-term use of organic fertilizer can increase land productivity and prevent land degradation. In the initial stage, participants were given an understanding that improving soil fertility cannot only be done by using chemical fertilizers. Farmers can use various types of materials found in the surrounding environment. For example, agricultural leftovers, kitchen waste, and market waste in the form of vegetable scraps. If used properly, these various types of materials can increase soil fertility so that it can support plant growth. Apart from increasing soil fertility, using organic fertilizer also provides several other benefits. For example, it can reduce the cost of using fertilizer, reduce the volume of waste in the household and can preserve the environment.

Preparation of Materials for Making Organic Fertilizer

At this stage, participants are given an understanding that making organic fertilizer can be done using organic materials that are easily available. For example, household waste (such as vegetable waste), agricultural waste, or other types of organic waste. Organic materials that can be used as a source of organic fertilizer can come from agricultural and non-agricultural waste/products (municipal waste and industrial waste).

Apart from that, the training activities also provided an understanding to participants that the materials that can be used in making organic fertilizer do not only use household waste or agricultural waste. However, waste in the form of dry leaves or weeds around the house or on agricultural land can also be used as material for making organic fertilizer. This is done to avoid misunderstanding by the public who think that not all organic waste can be used to make organic fertilizer. As stated by Hayati et al. (2013), waste from the weathering of plant tissues or plant materials such as straw, husks, leaves, and grass in the form of biological waste that is easily obtained from the environment around us, recycled, and broken down with the help of decomposer microorganisms such as Bacteria and fungi become nutrients that can be absorbed by plants.

Apart from explaining the types of materials that can be used in making organic fertilizer, the training also explained that organic fertilizer can be made using a combination of several types of materials. For example, livestock manure, charcoal husks, or raw husks. In this training, it was conveyed that the more diverse the materials used in making fertilizer, the better the content contained in the fertilizer. However, this training also explains that when making organic fertilizer you do not have to use a combination of ingredients, you can still use just one type of ingredient. For example, participants only use forage or litter as material for making organic fertilizer.

Specifically, in the training conducted in Yobeh Village, the organic materials used only consisted of two types, namely forage and raw husks. In this training, participants are given the understanding that forage materials should be chopped first to a uniform size. This is done to speed up the process of decomposing organic materials. In this training, forage materials are more dominant than raw husks. After the forage is chopped to a uniform size, the next step is to mix the two ingredients until evenly distributed.

After participants understand the materials that can be used in making organic fertilizer, the next step is to provide EM4 solution as an activator in making fertilizer. Previously explained how to prepare EM4 solution, participants were given knowledge about the types of EM4 available in agricultural shops. The types of EM4 available in agricultural shops generally consist of two types, namely agricultural EM4 and livestock EM4. Thus, it was explained to participants that making organic fertilizer can be done using EM4 agriculture. Furthermore, it was also explained to the participants that activating the activator in EM4 can be done using several ingredients, including water and molasses, granulated sugar, or brown sugar. However, in the training in Yobeh Village, the ingredients used were white sugar or granulated sugar. After explaining the materials that can be used to activate the EM4 solution, the next step is to explain the composition of each material used to activate the EM4 solution. In this training, it was explained to participants that to activate EM4, you can mix one liter of water with one tablespoon of granulated sugar or white sugar and one bottle cap of EM4.

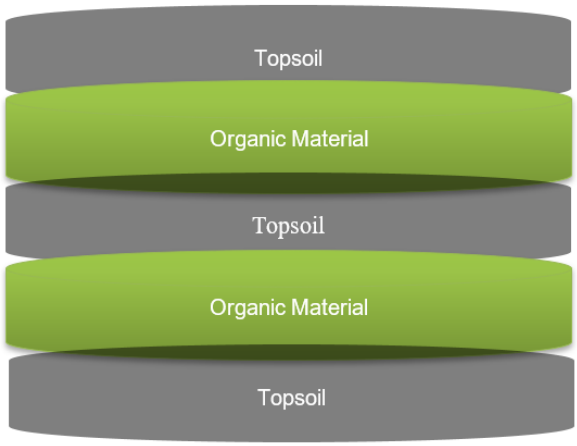
The ingredients consisting of EM4, granulated sugar, and water are mixed in the same container, in the training conducted in Yobeh Village they are mixed in a mineral water bottle. During training activities, the ingredients used are one liter of water, one spoonful of granulated sugar, and one bottle cap of EM4. Before being mixed together, the granulated sugar is dissolved first so that it mixes perfectly with other ingredients such as water and EM4.

The Process of Making Organic Fertilizer

Once the required materials are available, the next step is to provide a container for the composting process. In the training carried out in Yobeh Village, a 10-liter bucket was used as a composting medium. The containers used are dry and do not leak. The next step is to mix the EM4 solution and the organic materials provided. At this stage, participants are given an understanding that when organic material is given EM4 solution, the condition of the organic material is moist and not wet or the water content is only 30-40%. The ideal condition or water content in organic material is said to be sufficient, that is, when the organic material is held, the water will only drip.

After the organic material is mixed with the EM4 solution and is deemed sufficient, the next step is to transfer the organic material to the container that has been provided previously. However, in the training carried out in Yobeh Village, organic fertilizer was made using the method as described in Figure 3, namely the bottom layer is humus soil or topsoil, then the next layer is organic material, after that the soil layer or topsoil, the next layer is organic material. This process or stage is carried out repeatedly until the organic material runs out and the top layer is humus or topsoil.

Figure 3. Layers of Organic Material and Topsoil in the Process of Decomposing Organic Material



Basically, there are several other methods that can be used to make organic fertilizer. The method as described in Figure 3 is used because the process of decomposing organic material is carried out in a container in the form of a bucket. At this stage, participants are given an understanding that the process of decomposing organic materials will be carried out by microorganisms found in the EM4 solution. At the beginning of the training activity, it was explained to participants that EM4 is a liquid material, but in this material there are microorganisms that are very small or not easy on the eye, so to see these microorganisms you need certain tools. For example, a microscope.

After the organic material is put into the container provided, the next step is to explain to the participants the time required for the process of decomposing the organic material. The process of decomposing organic materials ranges from 21-30 days. Apart from that, it was also explained to the participants that the condition of mature organic material is when all the organic material has become soil.

Question and Answer Session or Discussion

After the process of making organic fertilizer has been completed, the next stage of the activity is a discussion or question and answer session with the participants. In this session, there were several questions from participants. First question is regarding the type of livestock manure that can be used as an ingredient in making organic fertilizer. Based on this question, it was explained that all types of dung can be used as ingredients for making organic fertilizer. For example, chicken, cow, goat, or other livestock manure. In this session, it was also explained to the participants that the livestock manure that can be used is livestock manure that has been dried, not wet.

The second question was how to use the EM4 solution. This question was explained again regarding the use or composition of the EM4 solution, even though it had been explained at the beginning of the activity. The EM4 solution in the bottle basically contains microorganisms that will break down organic material. However, the solution is in a sleeping or inactive state. So, to activate the EM4 solution, several other ingredients are needed, namely water and granulated sugar or red pepper. To mix these three types of ingredients, each has its own composition or dosage. For every one liter of water, mix with one spoonful of granulated sugar or brown sugar and one bottle cap of EM4. The three types of ingredients were mixed evenly in one container. During training activities in Yobeh Village, the three ingredients were mixed in a plastic bottle of mineral water. The amount of EM4 material or solution that can be used depends on the amount of organic material used. In this session, it was emphasized again to the participants that

when mixing the EM4 solution with organic materials, the water content in the organic materials should be damp or the organic materials should not be wet.

The third question is about the type of material that can be used, namely whether using raw husks can be used to make organic fertilizer. Regarding this question, it was explained that making organic fertilizer can still be done even if only using one type of organic material. However, in this session it is recommended that participants use a combination of several other types of organic materials found in the surrounding environment. Because trash in the house in the form of dry leaves can be used as material for making organic fertilizer.

CONCLUSION

Based on the results of the training activities described previously, the following conclusions can be outlined: (1) Training participants have very high enthusiasm which is proven by always being proactive in asking several questions to implementers regarding the process of making, materials, and use of organic fertilizer; (2) Basically, participants have used organic fertilizer in their farming activities, but they are not familiar with how to make organic fertilizer using EM4 solution; and (3) Participants are able to understand well the combination of organic fertilizer ingredients, the process of making organic fertilizer and the benefits of using organic fertilizer.

Suggestions that can be conveyed through this PkM report include: (1) After attending training in making organic fertilizer, it is hoped that the community in Yobeh Village can utilize organic waste, whether household waste or agricultural waste, into organic fertilizer to increase soil fertility; and (2) It is hoped that the local regional government will provide training or assistance to the community to improve the competence of farmers by utilizing the various potential natural resources they have.

ACKNOWLEDGMENT
The authors would like to thank the Faculty of Economics and Business, Cenderawasih University for providing financial assistance in carrying out this community service.

DECLARATION OF CONFLICTING INTERESTS
The authors declare no potential conflicts of interest regarding research, authorship, and/or publication of this article.

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