

Manufacture and Application of Compost Fertilizer from Dried Leaves

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ABSTRACT

Organic waste comes from organic materials that can be decomposed by microorganisms (biodegradable). Handling organic waste and dry leaves concerning the 3R method is to recycle so that it becomes a product that can be useful and even gain added value, namely into compost. Making compost can also be given additional materials from probiotic microorganisms such as EM4. EM4 helps improve soil structure and texture, supplying nutrients and inhibiting the growth of pests, diseases, and others (Nurkhasanah et al., 2021). This composting activity includes collecting and sorting composting materials, preparing composting tools and materials, and composting practices. Adding organic matter to compost is expected to improve soil physical properties, especially soil permeability and aeration, increase water retention and erosion resistance, and reduce surface runoff.



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A. Introduction

Waste is material residue from an activity or a process that is no longer desired (Setyaningsih et al., 2017), whereas according to Law no. 18 of 2008 concerning Waste Management, waste is the residue of daily human activities or natural processes that can be in solid or semi-solid form, organic or inorganic, which has biodegradable or non-biodegradable properties and is considered useless so that it is disposed of into the environment. Garbage can also be referred to as waste. Types of waste can be distinguished based on their form, nature, source, and composition. Waste based on form is divided into 2, namely solid and liquid, while based on its nature is divided into 2, namely organic and inorganic. Based on the source, waste can be defined as a result of waste originating from the community's insensitivity and indifference to their own environment, and based on their composition, waste is divided into 2, namely uniform and non-uniform

waste (Sunarsih, 2017). The largest mass accumulation of waste can come from several public places, such as residential areas, factories, office environments, campus environments, markets, and dormitories. The type of waste produced is mostly organic and inorganic waste, such as rotten vegetables, food scraps, dry waste, plastic, ash, paper, cans, and other waste. This waste can be reduced by applying the 3R method, namely reuse, reduce, and recycle. Reuse is to reuse, reduce is to reduce its use, and recycle is to recycle until the waste becomes a new product or material (Sidabalok et al., 2014).

Organic waste is one of the most common types of waste and the largest source of income is households. Organic waste is waste that comes from organic materials that can be decomposed by microorganisms (biodegradable). Organic waste can be divided into 2, namely wet organic waste, namely organic waste that has a fairly high water content, and dry organic waste, namely waste that has a low or even less water content (Wiryono et al., 2020). Examples of organic waste include food scraps, vegetable residues, fruit residues (fruit skin or seeds), flour, twigs, and leaves. Handling organic waste, especially dry leaves with reference to the 3R method, is to recycle so that it becomes a product that can be useful and even gain added value, namely into compost. Making compost using dry leaf waste by using the concept of zero waste, namely prioritizing recycling and energy and nutrient recovery so that waste disposal is a last resort to increase added value and maintain excessive use of natural resources so as to minimize environmental damage (Marlina et al., 2021)

Compost is a type of solid organic fertilizer that comes from weathering organic materials in the form of dry leaves, reeds, straw, and others. The principle of making compost refers to the process of decaying the remains of living things from plants and animals with the help of microorganisms. Compost fertilizer can be applied to agricultural land or as a source of biogas, because compost contains many nutrients that have many benefits, including accelerating the growth of flowers and fruit in plants, accelerating maturation, saving energy, helping the process of photosynthesis, efficient use of water, forming branches. strong, accelerate rooting, and increase plant resistance to disease. The nutrient content is in the form of macro nutrients (nitrogen, phosphorus, and potassium) and micro nutrients (iron, copper, zinc, chlorine, boron, manganese, and molybdenum). The technique of making compost that is still widely used is the low technology composting technique, namely the composting technique that uses traditional methods, not using modern equipment. Making compost can also be given additional materials in the form of the use of probiotic microorganisms such as

EM4. EM4 is useful in improving soil structure and texture, supplying nutrients, inhibiting the growth of pests and diseases, and others (Nurkhasanah et al., 2021). EM4 also plays a role in accelerating the composting process under aerobic conditions (with oxygen). The process of making compost takes a long time, ranging from 2 weeks to 1 month because the process depends on the activity of existing microorganisms (natural processes). Some things that must be considered in the manufacture of compost are the humidity of the compost heap material, aeration of the pile, the temperature not exceeding 60°C, the reversal of the heap which can result in neutralization of the pH from acid to alkaline, and the provision of fertilizers with a high phosphorus content so that the development of microorganisms becomes more active. fast, as well as the size of the raw material which if the smaller it will accelerate the composting process .

B. Method

This composting activity from dry leaves was carried out in Tajungan Village, Kamal District, Bangkalan Regency, on June 5, 2022. The steps for this composting activity include collecting and sorting composting materials, preparing composting tools and materials, and composting practices. . The tools and materials used for composting



the picture.

Picture 1. Tools and materials used for composting

The tools used in making compost are tubs, buckets, gloves, and used gallons. The ingredients used are dry leaves, EM4, sugar, and water. The composition ratio of EM4: sugar: water is 1:1:50.

C. Result and Discussion

The activity of making compost from dry leaves was initiated because of the large amount of dry leaf waste that was not utilized. The composting was carried out by students of KKN-T 106 UTM. This composting activity is one of the community service activities carried out by utilizing dry leaf waste which is

processed into compost. The first step that must be done is to collect dry leaf waste. A lot of dry leaf waste accumulates in the surrounding environment and is usually only burned without processing so that it can actually cause air pollution and environmental pollution. The next step is sorting dry leaf waste which is separated between dry leaves and dirt such as twigs, soil, stones, and others. The separated leaves are then cut / torn into smaller sizes. The purpose of cutting dry leaves into smaller sizes is so that the compost material is easily decomposed so that the composting time can be faster (Suryawan and Lokantara, 2017). Then, the dried leaves are put into a tub and given a liquid containing microbes, namely EM4. EM4 contains decomposing bacteria that can help in the process of organic decay. Effective microorganism 4 contains about 80 fermenting microorganisms, including photosynthetic bacteria, *Lactobacillus* sp., *Streptomyces* sp., *Actinomycetes* sp., and yeast. EM4 was applied as an inoculant to increase the diversity and population of microorganisms in soil and plants (Aristoteles et al., 2021). EM4 is



first dissolved with water and sugar.

Picture 2. Mixing EM4 with sugar and water

Picture 3. Mixing liquid EM4 to dry leaves

Dried leaves that have been added with EM4 liquid are then mixed until evenly distributed. After that, put in a used gallon / bucket and tightly closed. The cooking process (fermentation) is carried out for 2-3 weeks. Compost will experience changes in color, smell, and texture during the decomposition process.



Good compost is compost that has undergone weathering with different color characteristics from the color of its constituent materials, odorless, low water content, and has the same temperature as room temperature (Andriany et al., 2018). Changes in the physical properties of compost, namely the color of the

compost from brownish yellow to blackish brown, occur due to the decomposition process carried out by microbes. After the cooking process is complete, the compost is dried for approximately 1 day and then put back into the used gallon for 1-2 days. After that, the compost is ready to use.

The addition of organic matter contained in compost is expected to improve soil physical properties, especially soil permeability and aeration, increase water retention and erosion resistance, and reduce surface runoff. In addition, organic matter also improves soil chemical properties by contributing to nutrient supply and efficiency of inorganic fertilization. Another benefit is that it also affects the biological properties of the soil, organic matter increases the activity of microorganisms and helps influence the number and type of microflora. The application of organic fertilizer to the soil can also improve the soil structure to become more loose, so that the root system can develop better and the nutrient absorption process runs more optimally (Roidah, 2013). Compost made from dry leaves is mixed sufficiently with soil in the planting medium and then plants are planted.



Picture 4. Application of compost to plants

Composting activities are expected to provide skills to the community to utilize dry leaf waste into fertilizer that is more economically valuable and efficient. In addition to being easy and inexpensive to make, compost also has a good effect on the soil, namely fertilizing the soil, nourishing plants, maintaining nutrients and improving soil conditions because it comes from organic materials and is certainly more environmentally friendly than chemical fertilizers (Nurkhasanah et al. , 2021). Composting is not only beneficial for soil and plants, but it can also be a solution in overcoming dry leaf waste that has accumulated. If compost is made or started to be produced in large quantities, it can also be sold to increase income (Haryanta et al., 2017).

D. Conclusion

Composting activities from dry leaves were carried out in Tajungan Village, Kamal District, Bangkalan Regency, on June 5, 2022. The steps for this composting activity include collecting and sorting composting materials, preparing composting tools and materials, and composting practices. The purpose of making compost from dry leaves is to provide knowledge and skills to the community regarding how to process dry leaf waste into compost that is beneficial for soil and plants so that it can increase the use value of dry leaf waste. This composting activity is expected to be a solution in overcoming dry leaf waste that accumulates and as a substitute for chemical fertilizers that are more environmentally friendly

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