

Making of Solid Organic Fertilizer from Organic Waste

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Abstract.

The abundance of leaves waste in the Sukolilo Dian Regency (SDR) Surabaya housing can be utilized as organic fertilizer. In the community service program, making organic fertilizer from leaf waste is implemented in SDR housing. This objective research is to make organic fertilizer from dried leaves by using effective microorganisms (EM4) as bio activator . The condition for producing the fertilizer are 20 ml EM4/5 kg dried leaves. In this research, fermentation process used the aerobic method, and kept the dried leaves stacked on a wooden box with dimension 6 m x 6 m. The results showed that the best levels of C, N, P, K were in aerobic condition with levels of C = 51.76%, N = 3.96%, P = 19.79% and K = 0.49%. And for the anaerobic condition shows levels of C = 73.44%, N = 3.49%, P = 10.38% and K = 0.57%. The organic fertilizer applied to the growth of many plants in the area of Keputih Dian Regency, Surabaya.

Keywords: dried leaves, EM4, organic fertilizer, organic waste

1. Introduction

Nowadays household waste is a problem that needs careful and careful attention, because it is difficult to find household waste that is in accordance with standards, because it has been polluted from various household activities, and the human connection with waste is getting increased in line with increasing population.

Domestic waste or household waste is waste that arises because of human life, environmental and public health problems arise in various areas, both urban and rural. Waste disposed of carelessly can cause various disasters, both on the environment or on humans themselves. All countries on this earth realize that waste or waste is one of the problems that bring discomfort to life in an environment.

The increase in population, changes in consumption patterns, and people's lifestyles have increased the amount of waste generation, type, and diversity of waste characteristics. Increasing the purchasing power of the community towards various types of staples and the results of technology as well as increasing businesses or activities supporting the economic growth of a region also contribute greatly to the quantity and quality of waste produced. Increasing the volume of landfill waste requires management. Waste management or waste that does not use methods and techniques of environmentally friendly waste management can have a negative impact on health and is also disruptive

To realize a clean and green city, the government has designed various programs aimed at encouraging and increasing the capacity of the community in waste and waste management. To foster an awareness within us of the importance of living cleanly and fostering a shared sense of responsibility from the rubbish problem that never ends in our environment (Ali., et.al 2011).

One solution to this problem is to make the municipal waste leaves waste as a basic ingredient of organic fertilizer. Organic fertilizer is fertilizer that contains microbial active ingredients that are able to produce compounds that play a role in the process of providing nutrients in the soil. The group of microbes that are often used in biological fertilizers are microbes that can tether N from the air, microbes that dissolve P and K nutrients with the help of microorganisms EM 4 (Effective Microorganism 4).

One of the wastes produced from municipal waste is municipal waste. The leaves have a high lignin content, and therefore need a long time to degrade the lignin. With the addition of microbes contained in organic fertilizer will be able to help the composting process be faster. The composting process with anaerobic method will be faster, which is between 10-40 days. This method of making organic fertilizer is available in two stages, namely aerobic and anaerobic. Addition of organic material derived from plant residues and animal dung in addition to adding soil organic matter also contributes to the availability of N, P, and K nutrients, and streamlines the use of inorganic fertilizers. Organic matter and types of animal waste (kandang fertilizer) are generally easily decomposed because of the low C / N ratio. In addition, the use of organic material is economically cheap, easily obtained and without a high technological approach so it is relatively easy to reach by farmers (Djuarnani, 2005).

The objectives of the research was to make the organic fertilizer from dried leaves by using EM4 as bioactivator. will be implemented in SDR housing by controlling water content, temperature, pH, humidity, material size, volume of material piles and material selection needs to be done intensively to maintain an optimal composting process. This intensive control is a hallmark of the aerobic composting process. The end result of aerobic composting is in the form of material that resembles black soil and brown, crumbs and friable (Fahey., et.al., 2005).

2. Material and Methods

2.1 Fertilizer Ingredients

All ingredients are mixed together with the accelerator (dried leaves and EM4 solution). The mixture of materials is made layer by layer, according to the variable. Each make a layer, sprinkling on top of the activator solution (EM4). Waste mixture as raw material is made layer by layer up to. Fertilizer material covered with a plastic roof (tarpaulin) and left for 30 days. After undergoing fermentation, the pile is stirred by transferring the pile. Transferring the pile is done by shovelling a fertilizer runway and scattering the new fertilizer runoff. This is done with the aim to provide aeration in the fertilizer pile, so that the inside of the fertilizer that has an oxygen deficit will receive oxygen, resulting in aerobic decomposition. Fermentation is stopped when the results of mature fertilizer have been achieved. New ripe fertilizers are ready for use in the next few weeks.

2. 2 Treatments

For planting, many kind of plant are prepared which are already softened in advance and added water to increase soil moisture. The land to be prepared is approximately 150 cm x 300 cm. Plants to be planted are plants that have been sown first. The steps for using compost are as follows:

- a. Add organic fertilizer from compost above to the plants of corn, chili, tomatoes and mustard with a size of 500 grams for each fertilization.
- b. Plant height and leaf width measurements were carried out once a week.
- c. Harvest the results of the plants when they have reached harvest age and weigh the harvest weight of the test plants.

3. Results

The Making organic fertilizer is done by using as many dried leaves as much as 2 tons of dried leaves waste mixed with EM4 8L with water 20L. The organic fertilizers produced were analyzed content of N, P, K, and C. The fertilizer produced is applied to chilli plants.

3. 1. Organic Fertilizer Process

In the process of making Solid Organic Fertilizer made from, all raw materials are taken from Sukolilo Dian Regency, as it is shown in figure 1. Then all the raw materials are mixed with other materials evenly, and placed in wooden boxes in accordance with the variables that have been determined to be composted. The composting process is carried out in an aerobic manner where the place is protected with a tarpaulin to protect it from direct sun heat and rainfall but still pay attention to the air for circulation (Permentan., 2009).

For the manufacture of solid organic fertilizer using aerobic methods, there are variations in the variables used. The process of making solid organic fertilizer begins by mixing all ingredients made layer by layer and sprinkling the bacterial mixture according to variables. Fertilizers will be stirred once a week to help the aeration process. So that the inside of the fertilizer that has an oxygen deficit will receive oxygen. The composting process is carried out for 30 days. Every 3 days, the temperature, humidity and pH are checked. Humidity is maintained because it affects the temperature of the pile. Humidity is maintained so that it is not too low so that the temperature is kept not too high, so that it stays within the optimal temperature range of bacteria to live well. Aside from temperature, the process of making compost also takes into account the pH being maintained at a vulnerable 6-8. And the process of making compost also takes into account the humidity being maintained at a vulnerable 40-60% (Pratiwi., 2013). The results of the cooked fertilizer are shown in the figure 2.

Figure 1. Process of making organic fertilizer



Figure 2. Organic fertilizer



3. 2. Analysis Results C, N, C/N, P, K Ratio

Table 1 showed the result of analysis of C, N, C / N, P and K Ratios of fertilizer in laboratory scale. These materials are analyzed at Laboratorium Teknologi Air dan Konsultasi Industri ITS, Surabaya.

Table 1. Results C, N, C / N, P, K Ratio of each variable

Parameter	C (%)	N (%)	P ₂ O ₅ (%)	K ₂ O (%)	C/N
Aerob	51,76 %	3,96 %	19,79 %	0,49 %	13,07
Anaerob	73,44 %	3,49 %	10,38 %	0,57 %	21,04

3. 3. Compost Results in The Test Plants

After the compost has been tested for C, N, P, and K levels, the compost will be used as fertilizer in planting test plants. In this test will be seen the growth of test plants. This fertilizer is implemented on chilli plants and is obtained at the time of harvesting fresh chili 5.023 grams per fruit and the total weight in one tree is 45, 207 grams. The number of chili leaves is 38 strands.

4. Conclusion

From this research that has been conducted the following conclusions can be drawn:

1. The content of elements N, P, and K of organic fertilizer in accordance with SNI standards and the compost quality standard by Permentan No. 28 / Permentan / SR / 1305/2009) namely N = <6%, P = <6% and K = <6%.
2. Based on the nutrient content test results, the best organic fertilizer results were found in the aerobic condition with levels of N = 3.96% levels of P = 19,79% and levels of K = 0,49% for 30 days of composting.
3. This chili plant that uses organic fertilizer produces fruit weighing 45,207 grams per tree

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