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Composting of Dry Leaves and Household Kitchen Wastes using Rotary Drum Biocomposter

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Abstract

According to data from the National Waste Management Information System (SIPSN) for 2020, the largest pile of waste according to waste sources in Lampung Province comes from household waste, namely 42%. Along the Dusun II road in Way Hui Village, almost every day the community burns leaves litter in their yards, which causes pollution. In addition, according to data from the Central Statistics Agency (BPS) for 2020, agriculture in Lampung is the 15th highest, namely 90.48%. However, in its management, the majority of agriculture and plantations in Lampung use inorganic fertilizers to increase the quality and quantity of crops. This problem can be overcome by using organic waste as compost to gradually improve soil quality and reduce the volume of household kitchen waste. The Rotary Drum Biocomposter is a simple and inexpensive composter for processing kitchen and household organic waste in a sustainable manner. To speed up the composting process, a bioactivator is added as a decomposer. Bioactivators can be made by utilizing rice washing water waste and papaya fruit waste, which are rich in nutrients and can increase the macronutrients of the compost. The composting method used in this research is aerobic composting. This tool aims to educate the surrounding community that waste can be turned into valuable goods with good management, thereby creating a healthy environment and profitable business opportunities.

Keywords: aerob, bioactivators, compost, rotary drum biocomposter

INTRODUCTION

One of the important environmental issues in Lampung province today is environmental pollution caused by the large amount of garbage heaps. Based on data from the National Waste Management Information System (SIPSN) for Lampung province in 2020, household waste contributes the largest percentage, namely 42% (Sistem Informasi Pengelolaan Sampah Nasional (SIPSN), 2021). Population growth and economic activity are thought to be the drivers of the increase in the rate of waste generation (Indartik et al., 2018). The majority of waste piles, 51%, come from the city of Bandar Lampung, but waste management facilities in the form of compost houses in Lampung province are still very limited, namely 8 compost houses spread across West Lampung and Pesawaran (Sistem Informasi Perencanaan dan Penganggaran, 2012). The majority of waste management in Lampung province is in the form of final collection at TPA in the form of open dumping. This of course raises other environmental problems such as air pollution caused by bad smells, the decline in people's health, water pollution, and so on. Almost every day, people burn leaves litter in the yards in front of and behind the house, which causes air pollution by generating dust and black smoke.

The combustion results also release carbon dioxide gas, which contributes to global warming. In addition, the majority of Lampung people's livelihoods are in the agricultural sector. According to data from the Central Statistics Agency (BPS) for 2020, agriculture in Lampung is in the 15th highest at 90.48% and ranks 6th in the productivity of rice plants, namely 48.62 ku/ Ha (Badan Pusat Statistik, 2021). However, in its management, the majority of agriculture and plantations in Lampung use inorganic fertilizers to increase the quality and quantity of crop yields. Inorganic fertilizers have a negative impact when used continuously, because they can reduce the quality of soil nutrients and contaminate water. In addition, almost every resident's house along

the way of Dusun II Way Hui grows avocado trees and other fruit trees such as mango, guava, and banana. Based on interviews with the head of Hamlet II, Way Hui, Mr. Indra, almost every day the villagers burn leaves litter so that the air pollution resulting from burning has a negative impact on the community. Burning garbage causes environmental pollution, resulting in the greenhouse gas effect and thereby increasing global warming. One form of processing organic waste is to turn it into compost or organic fertilizer (Indriyanti et al., 2015).

Based on partners' problems, this can be overcome by using organic waste (dry leaves and household kitchen waste) as compost to gradually improve soil quality and reduce the volume of household kitchen waste. Rotary drum biocomposter is a simple and inexpensive composter for processing kitchen/household organic waste in a sustainable manner. Natural compost usually takes a long time to decompose (Priyambada & Wardana, 2018). To speed up the composting process, a bioactivator is added as a decomposer. Bioactivators can be made by utilizing rice washing water and papaya fruit waste. Waste water from washing rice and papaya fruit is rich in nutrients that can increase the macronutrients of the compost. The tool scheme is designed to make composting more effective and efficient, both in terms of time and results. This tool can be an alternative solution for dealing with household kitchen waste, and its product, compost, can reduce the use of inorganic fertilizers.

METHOD

Based on the background of the problem and the solutions offered, the following steps will be taken to realize solutions to partner problems that it can be described in **Figure 1.**

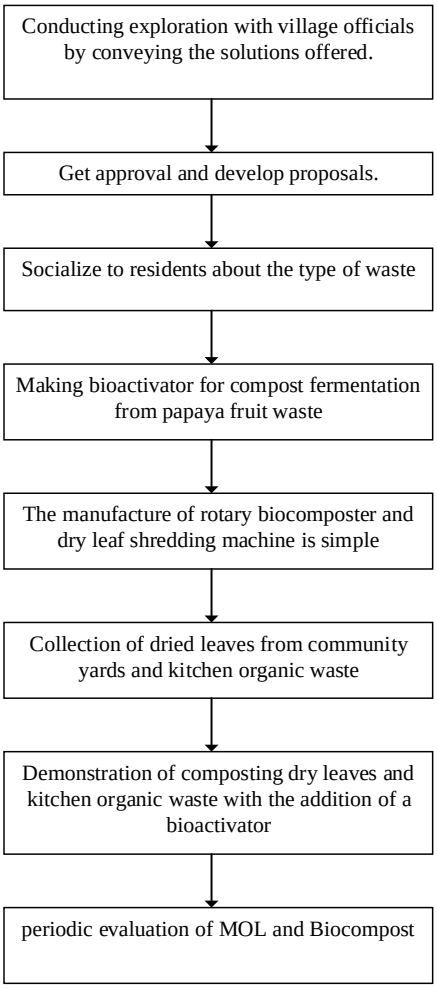

Figure 1. Flow chart of the implementation method

Partners actively participate in this activity, which includes increasing their understanding of problems and jointly formulating solutions. Then partners are active in making MOL at home and collecting dry leaves waste and kitchen organic waste. It is hoped that partners can also invite

other partners, both in person and online. The implementation of program is evaluated periodically by asking village officials or direct residents. Their help provide solutions if there are problems. The following description technology of cross sectional of rotary drum biocomposter can be showed in **Figure 2.**

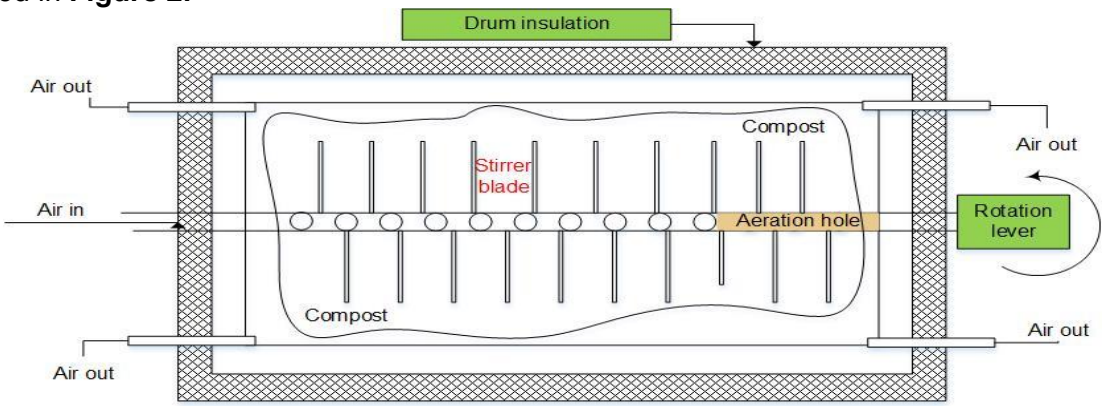

Figure 2. Rotary drum biocomposter cross section (Alkoaik et al., 2018; Kalamdhad & Kazmi, 2009)

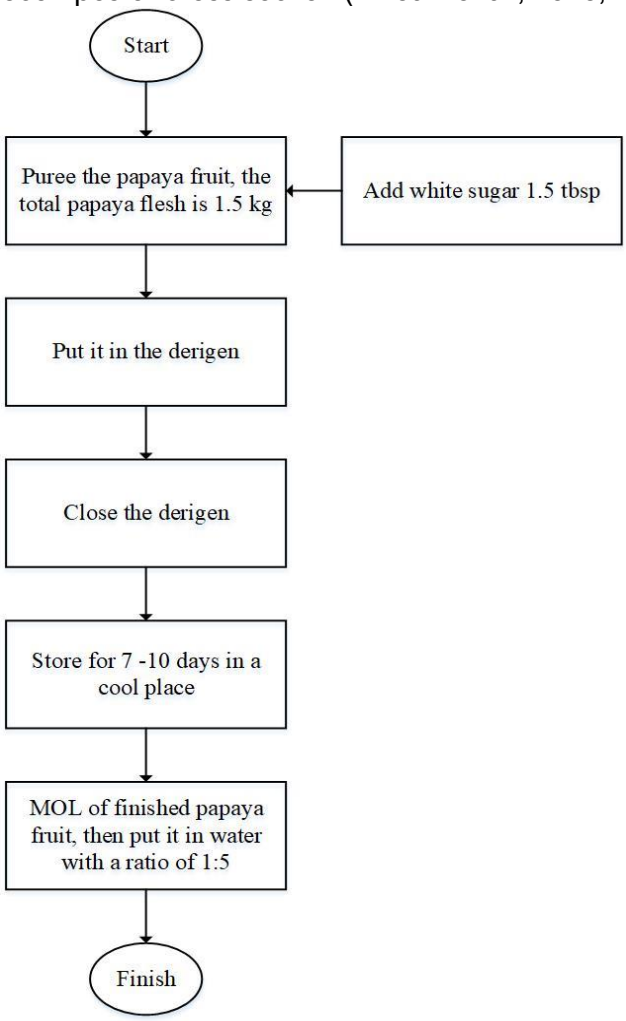

Figure 3. Diagram of making mol/bioactivator from papaya

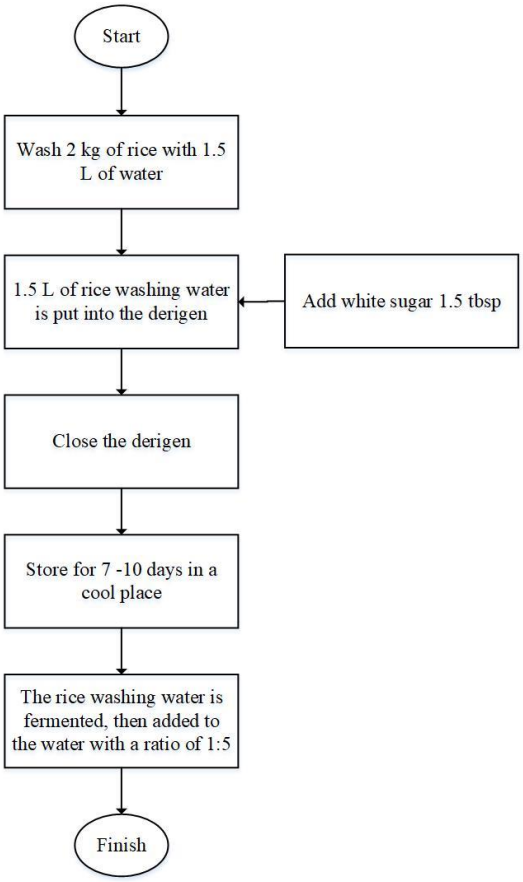

Figure 4. Diagram of making mol/bioactivator from rice washing water waste

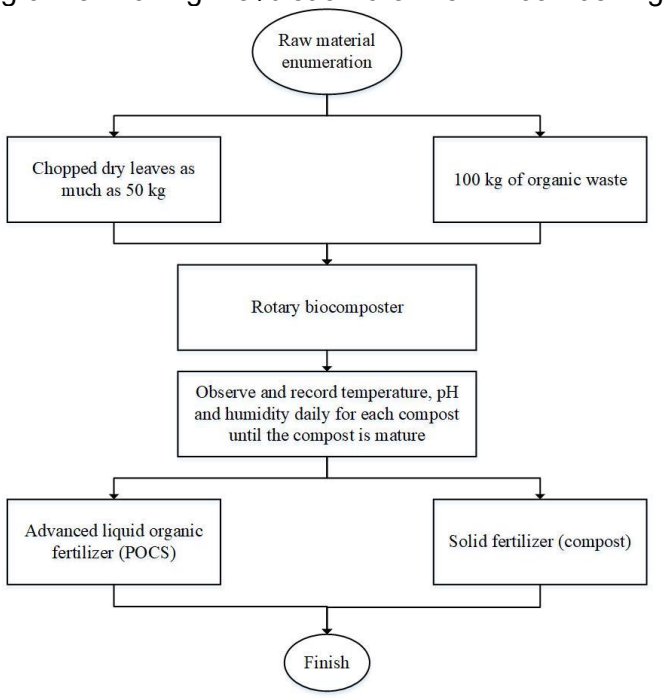

Figure 5. Diagram of Organic Waste Composting

The steps to make mol/bioactivator from papaya, rice washing water waste and about organic waste composting can be seen in **Figure 3, 4 and 5**. The composting process takes about one month. Compost obtained from a rotary drum biocomposter that is reversed will be more evenly distributed than compost obtained without stirring.

Two useful products will be obtained from the fermentation process, namely liquid organic fertilizer (POCS) and solid organic fertilizer (compost). Liquid fertilizer is excreted through the

faucet at the bottom of the composter and can be directly used as plant fertilizer by sprinkling it on the soil around the plants, not on the plant stems, while the solid fertilizer (compost) obtained needs to be air- dried before use. Stir once a week for good aeration (airflow) in the container. During the composting process, the temperature in the container will rise, indicating that microorganisms are working. As we enter the 7th or 8th week of composting, the temperature in the container returns to normal. The finished compost is ready to use. Sieving and packaging can be done on a business scale. The finished compost is ready to use. Sieving and packaging can be done for business scale.

RESULTS AD DISCUSSION

Community service program in the form of demonstrations on the manufacture of mol/bioactivators, the use of rotary drum biocomposters, and socialization on the use of dry leaves and kitchen organic waste into compost were carried out on October 2nd, 2022, in the courtyard of the Al-Furqon Mosque Dusun II, Way Hui Village, Jati Agung, South Lampung. The dry leaves chopper was made by CV. Sumber Makmur Mekanik, East Java. Meanwhile, the rotary drum biocomposter was made by Berkah Jaya Las Bandar Lampung Welding Services. PKM program began with the distribution of pre-test questionnaires to test residents' understanding. From the results of the pre-test, 96% of residents burned dry leaves waste and inorganic waste in their yards. some residents did not know that dry leaves could be used as compost, and 73% of residents had never participated in composting training.

After the pre-test, socialization was carried out first through presentations on sorting organic and inorganic waste, good waste processing methods, the impact of burning waste on health and the environment, methods for making local microorganisms (MOL), and procedures for using a rotary drum biocomposter. The activity was followed by a question-and-answer session. To further increase the understanding of the residents, a demonstration was held on processing dry leaves and kitchen organic waste into compost. Starting from the chopping of dry leaves and kitchen organic waste in the form of fruit and vegetable peels. Then, after the size is smaller, the dry leaves and kitchen waste are put into the rotary drum of the biocomposter. Next, the mol/bioactivator is sprayed into the drum and stirred so that the mol is evenly mixed. The rotary drum biocomposter is equipped with aeration holes along the drum and automatic spray for regular addition of mol. The activity was continued with a post-test. According to the results of the post-test, the community will no longer burn dry leaves litter and other waste in their yards, and the community hopes that this activity will be sustainable. The society activities could be showed in **Figure 6** and **7.**

(a) (b)

Figure 6. (a) and (b) Documentation of program

Figure 7. Handover of two rotary drum biocomposters and a dry leaves chopper

CONCLUSIONS AND SUGGESTIONS

The conclusions from PKM program for composting dry leaves and household kitchen waste using a rotary drum biocomposter are:

- The activity went well, and the community was enthusiastic about this activity. From the results of the post-test, the community will apply the technology and no longer burn garbage in their yards.
- Utilization of rice washing water and fruit waste as local microorganisms (MOL) or bioactivators can increase the useful value of household kitchen waste and can be easily applied by residents.
- Biocomposter rotary drum technology can be a solution for dry organic waste and kitchen waste on narrow land.

Suggestions from the activity are that this activity can be sustainable so that the community can increase their income through the sale of compost. Special land is needed for large-scale composting and the labeling and testing of compost so that it is marketable.

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