



THE EFFECT OF ORGANIC LEACHATE AND RICE WASHING WATER ON THE COMPOSTING TIME OF ORGANIC WASTE

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ABSTRACT

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Waste is an integral part of human life. The increase in population is one factor that increases the waste generated. The more the population, the more activities are carried out. Organic leachate and rice washing water are environmentally friendly compost activators and are easily obtained from daily activities. Composting is a waste management strategy. Composting is an organic method through the activity of microorganisms to decompose natural materials into materials, including humus. The purpose of this study was to determine the moisture content, temperature, pH, C/N ratio, and macro nutrients during the composting process. The physical parameters of compost from the three activator concentrations showed that the treatment of P3 (with the addition of leachate formulation 20 ml/kg and rice washing water 15 ml/kg) and P2 (with the formulation adding 20 ml/kg leachate and 10 ml rice washing water), the physical compost were brownish black in color, fine textured and smelled of soil on the 22nd day. The P3 treatment has met the quality criteria of compost according to SNI 19-7030-2004, the moisture content (30%), temperature (27 °C), pH (6,8), C-Organic (32,9%), Nitrogen (1,42%), Phosphor (0,65%) and Potassium (1,63%). For the C/N ratio, the result of all treatments did not meet the quality criteria of compost according to SNI 19-7030-2004. The C/N ratio of all treatments showed that it is still above the maximum standard that has been set at 20.

Keywords:

Organic waste, leachate organic, rice washing water, composting time, compost quality standard

INTRODUCTION

Composting is one of the waste processing strategies and is an organic method through the activities of internal microorganisms breaking down natural materials into materials, including humus (Sutanto, 2002). In the composting cycle, microorganisms can emerge from the rotting waste. The carbohydrate content in rice washing water can be used as a source of food supply for microorganisms. Meanwhile, leachate is added to add microorganisms to the composting cycle (Suwahyono, 2014).

Naturally, organic materials occur as a result of weathering compost, but it takes a long time, about half to 12 months (Suryati, 2014). The composting process can be accelerated with the help of an activator (Suwahyono, 2014). In this research, two types of activators were used, there were leachate and rice-washing water. Leachate is water in the form of water waste technology that dissolves several existing compounds so that it contains a lot of pollutants, especially organic materials (Darmasetiawan, 2004). However, leachate has the potential to be used as an organic fertilizer because it carries many organic substances, which include nitrates, minerals, and organisms (Ali, 2011). This very high content of organic substances will increase the activity of microorganisms in degrading organic waste (Rosariawari, 2012).

MATERIALS AND METHODS

The tools used in this research were a Soil Tester, Thermometer, pH meter, Measuring Cup, Scales, Plastic waste basket, 4 pieces, gloves, and mask. Meanwhile, the materials used include rubbish vegetables and dry leaves with a comparison of the composition of vegetable waste: dry leaves = 1 kg: 0.8 kg (based on calculations by the Ministry of Agriculture and Food, 1998 to obtain a C/N ratio of 25), then wood dust, washing water rice, and leachate. This research had been used the Takakura Method. Composting using the Takakura method was applied in an aerobic process. In experiments, there was no replication. This experiment consisted of four treatments, including control (without adding leachate and rice washing water). For treatment 1 (P1) with the formulation adding 20 ml/kg leachate and rice washing water 5 ml rice, treatment 2 (P2) with the formulation adding 20 ml/kg leachate and 10 ml rice washing water, treatment 3 (P3) with the addition of leachate formulation 20 ml/kg and rice washing water 15 ml/kg (Dewi et al., 2016). The moisture content, pH, and temperature were determined daily for data analysis. Macro nutrients such as C-organics, Nitrogen, Phosphor, Potassium, and C/N ratio were determined after 28 days of composting.

RESULTS AND DISCUSSION

Times of Composting

Composting time is the length of time the organic waste decomposes and changes its texture to soil (Nurullita & Budiyo, 2012). The length of the composting process for each treatment can be seen in Table 1.

Duration/composting time for each of these concentrations is 25 days (P1), 23 days (P2), and 22 days (P3), with physical compost smooth textured. By physical observation, the organic waste began to degrade on day 14. The colour of the waste began to turn blackish, the texture was fine, and it began to smell like soil. Meanwhile, until the 28th day, the texture was still rough in the control container, the leaves and grass were still intact, and the composting process stopped. These results are in accordance with research from Wiryanti (2014), who stated that, fermented organic waste without activators arrived on the 30th day, and the texture is still hard like a leaf.

In this study, the fastest composting process occurred in P3 treatment (by adding leachate formulation 20 ml/kg and rice washing water 15 ml/kg) in organic waste (dried vegetables and leaves) as much as 1: 0.8 kg. This treatment can convert organic waste into compost within 22 days.

This is thought to be because the activator in P3 treatment is more contains many microorganisms that are capable of degrading materials organic. These results are in accordance with the results found by Sriharti and Salim (2010), which state that activators contain microorganisms that can work effectively in the fermentation of organic materials, microorganisms. These are photosynthetic bacteria, lactic acid bacteria (*Lactobacillus* sp), yeast, *Actinomyces* and other types of microorganisms.

During the composting process of organic waste (dried vegetables and leaves), the addition of different organic leachate activators and rice washing water in P1(20:5), P2 (20:10), P3 (20:15) can shorten composting time to 22 days (P1), 23 days (P2) and 25 days (P3). Meanwhile, in the P0 (without adding the organic leachate and rice washing water) container until the 30th day no decomposition process occurs. In accordance with research by Dewi et al. (2016) who stated that the addition of activators was proven to be able to decompose organic ingredients effectively, so that the ripening process takes place quickly.

By data analysis, some parameters of SNI 19-7030-2004, such as pH, temperature, moisture content, and macro nutrients (C-organic, Nitrogen, Phosphor, and Potassium), are in accordance with SNI standards. The temperature reached 40-48 °C (maximum temperature) from the first day until the sixth day. This is due to the active microorganisms that decompose organic matter in waste. Parameters of pH and moisture content are also according to SNI standards. Bacterial activity

Table 1. Data Analysis on Composting Process Duration/Time from Varying Concentrations Activators and Controls

Treatments	Composting Time	The average of			Macro nutrients				
		Temperature (°C)	Moisture content (%)	pH	C-organics (%)	Nitrogen (%)	Phosphor (%)	Potassium (%)	C/N ratio
P0	More than 30 days	27 - 38	30 - 50	6 - 6,9	36,59	1,12	0,32	1,48	32,66
P1	25 days	27 - 38	30 - 50	6,4 - 6,9	35,49	1,29	0,36	1,57	27,51
P2	23 days	27 - 38	30 - 50	6,4 - 6,9	32,86	1,59	0,44	1,60	21,61
P3	22 days	27 - 38	30 - 50	6,2 - 6,9	32,09	1,42	0,65	1,63	22,59
SNI 19-7030-2004	groundwater temperature		Minimum: - Maximum: 50	Minimum: 6,80 Maximum: 7,49	Minimum: 9,80 Maximum: 32	Minimum: 0,40 Maximum: -	Minimum: 0,10 Maximum: -	Minimum: 0,20 Maximum: -	Minimum: 10 Maximum: 20

in the P3 treatment showed that there was good decomposition of organic compounds characterized by decreasing C levels during composting. From Table 1, the treatment of P2 and P3 showed an increase in nitrogen value, P2 (1,59%) and P3 (1,42%). The higher the nitrogen content, the lower the C/N ratio. This research showed that the C/N ratio from all treatments is still above 20. A high C/N ratio in compost can be assumed that decomposing microorganisms are still active in degrading the compost. Biologically, the decomposition process continues until the C/N ratio of the soil is reached (Mirawati & Winarsih, 2019).

Based on SNI 19-7030-2004, to improve the quality of compost can be done by: making granules, drying and sieving. In this study, the drying process was carried out on day 22 to day 25. Sifting was done on the 28th day. We can add the activator for shorten composting time.

CONCLUSION

Organic leachate and rice washing water as activators speeds up composting time and improves compost quality compared to controls without the addition of activator. Duration/composting time for each of these concentrations are 25 days (P1), 23 days (P2) and 22 days (P3), with physical compost smooth textured. The addition of leachate and rice washing water also indicates compost quality better. The P3 treatment has met the quality criteria of compost according to SNI 19-7030-2004, the moisture content (30%), temperature (27°C), pH (6,8), C-Organic (32,9%), Nitrogen (1,42%), Phosphor (0,65%) and Potassium (1,63%). For the C/N ratio, the result of all treatments did not meet the quality criteria of compost according to SNI 19-7030-2004.

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