UTILIZATION OF ORGANIC WASTE INTO LIQUID ORGANIC FERTILIZER

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Abstract -. *As the human population increases, the more waste is generated. Domestic waste is waste generated from the rest of household activities, restaurants, offices, etc. is not dangerous, although it is not dangerous, proper handling is needed so as not to cause new problems. One of the organic waste managements that applies the 3R (Reuse, Reduce, Recycle) principle is the manufacture of liquid organic fertilizer which is carried out using the working principle of fermentation. The organic waste sample used in this study was stale rice that had not been overgrown with mushrooms. The research method used in this research is literature study and qualitative research. This study aims to determine the proper use of domestic waste using the 3R principle and to analyze qualitatively the indicators of successful fermentation of liquid organic fertilizer. Broadly speaking, this research is divided into 3 stages, namely the preparation stage, the fermentation stage and the storage stage. The length of time it takes to make this liquid organic fertilizer is 13 days. The results showed that the fermentation carried out was successfully characterized by liquid organic fertilizer which was cloudy white in color and smelled like tapai.*

Keywords: *organic waste, fermentation, stale rice, go green, countermeasures*

1. INTRODUCTION

The increase in human population is usually directly proportional to the increase in the amount of waste produced. Broadly speaking, waste is divided into two, namely organic waste and inorganic waste. Organic waste is waste that is easily biodegradable because it comes from animals, manure and plants. While inorganic waste is a type of waste that comes from glass, metal or plastic so that it takes a long time to decompose. One of the largest producers of waste is households, usually waste from households is referred to as household waste or domestic waste. Domestic waste is waste generated from the rest of household activities that are not dangerous, such as food scraps, bottles, vegetable waste, etc. Even though domestic waste is not hazardous, it still needs proper handling so as not to cause new problems. The concept of 3R (Reuse*, Reduce, Recycle)* can be applied to overcome domestic waste problems. the concept of *reuse* is to *reuse, reduce* means to reduce use and *recycle* means to recycle unused items into new items with more value. Domestic waste in the form of organic waste can be used as liquid organic fertilizer, so it has more value. Organic fertilizers can come from animals or plants, according to research conducted (Li, et al., 2021) organic fertilizers can affect soil structure, reduce soil pH and bacteria in the soil.

Liquid organic fertilizer is an example of the application of the 3R concept to handle organic waste originating from domestic waste. A lot of domestic waste can be used as liquid organic fertilizer, one of which is stale rice. Stale rice is leftover rice from yesterday that is not used, usually its nutritional value has decreased. Most of the mothers immediately threw stale rice away or some were given to livestock. Even though there are things that are even more useful, which are used as liquid organic fertilizers. Utilization of stale rice into liquid organic fertilizer is carried out by a fermentation process, liquid organic fertilizer is said to be successful if the color of the fertilizer matches the basic ingredients used, has a tapai-like odor and has a pH between 4-5. Liquid organic fertilizer is expected to be one of the alternative options for dealing with organic waste originating from domestic waste which is of higher value, and does not cause new problems.

Research on organic waste processing has been carried out by Nur, et al (2016) with the title "Making liquid organic fertilizer from household organic waste with *EM* $_4$ *(Effective Microorganisms)* bio activator *".* This study uses a fermentation method by adding bioactivation EM $_4$ to organic waste, the parameters tested are the content of nitrogen (N), carbon (C), phosphorus (P) and potassium (K) in liquid organic fertilizer. Based on the research that has been done, it can be concluded that the addition of EM $_4$ has an effect on increasing the content of N (nitrogen), P (phosphorus) and C (carbon).

Another study related to the use of organic waste was conducted by Widiastuti et al (2021) with the title "Utilization of household waste for organic gardens". This study emphasizes how to make liquid organic fertilizer, its application and the 3R go green concept campaign to overcome the problem of sustainable organic waste.

Organic fertilizers have several advantages, including being easily absorbed by plants, easily soluble in water, using little, easy to use and not polluting the environment (Harahap, Gusmeizal, & Erwin, 2020). Liquid organic fertilizer is expected to be one of the solutions to deal with the problem of organic waste in the environment. The ingredients for making liquid organic fertilizer are also relatively easy and cheap to obtain, the main ingredients for making liquid organic fertilizer usually use kitchen waste, such as vegetable waste, stale rice, fruit skins, etc. Liquid organic fertilizer has an important role related to soil structure, namely maintaining soil health in good condition by increasing nitrogen supply and encouraging the growth of microorganisms in the soil (Salam MD, MD Nazirul Islam, & Sajia, 2021).

This study aims to utilize the organic waste produced by household waste to be more valuable and to detect the success rate of fermentation with the parameters of the color and odor of the liquid organic fertilizer produced. The *novelty* in this study is the fermentation stage used.

2. METHOD

This research was conducted qualitatively, the method used in this study was data collection and testing. Tests carried out by paying attention to the color and odor of the liquid organic fertilizer produced. The sample used to make liquid organic fertilizer in this study was stale rice.The tools used in this study were used bottles measuring 1.5L, tablespoons, filters, airtight jars and funnels. The materials used in this study were stale rice that had not been moldy, granulated sugar and clean water. This research was conducted in several stages, the first stage is preparation. The preparation stage is done by forming stale rice into small balls, then put in an airtight jar and stored in a place that is not exposed to sunlight for 5 days.

The fermentation stage, then the moldy rice balls are put into the granulated sugar solution (the ratio of sugar to water is 1:3) while stirring, then the stale rice mixture is put into a used bottle containing 1.5L of clean water using a funnel. After that, shaken for a while to mix well, the bottle containing a mixture of stale rice, sugar and water is then stored for 5 days. After 5 days, open the bottle cap to release the gas in the bottle. Then close and shake again a few times while occasionally opening the bottle cap so that the gas in the bottle can come out. The next stage, the solution is stored again for 3 days so that the fermentation process is complete. After 3 days, if the color changes to cloudy white and the solution smells like tapai, it indicates that the fermentation process is successful.

The storage stage, then the fermented solution is separated using a sieve to separate the solution and residue. Then, the solution is put back into the bottle. Be sure to make a small hole in the top of the bottle cap, to prevent the fermentation process from continuing. Liquid organic fertilizer from stale rice is ready, before using liquid organic fertilizer it needs to be diluted using clean water using a ratio of 1: 5 with 1L liquid organic fertilizer and 5L clean water. Next, the liquid organic fertilizer is ready to use.

3. RESULTS AND DISCUSSION

The research entitled "Utilization of organic waste into liquid organic fertilizer" aims to utilize organic waste produced by household waste to be more valuable and to detect the success rate of fermentation with the parameters of the color and smell of the liquid organic fertilizer produced. This research was conducted qualitatively, the method used in this research is a case study and qualitative testing. The sample used in this study is stale rice, the process of making stale rice into liquid organic fertilizer is carried out in several stages. The first stage, the rice is formed into small rounds and then put in a tightly closed container and left for 3 days. The rice balls are stored for three days to allow the rice to grow with mushrooms. The next stage is the moldy rice mixed with sugar and clean water. The addition of granulated sugar aims to provide nutrients to microorganisms so that the fermentation process can occur. This is in accordance with research conducted by Arifan (2020) which states that granulated sugar serves as the main nutrient provider for microorganisms, while also supplying protein, carbohydrates, vitamins and fiber. Based on the research that has been done, the results are as follows **Table 1**

Table 1. Observation Result

Evaluation	Observation
Color	cloudy white
Smell	Smells like tapai

Based on table 1, it can be seen that the liquid organic fertilizer produced is cloudy white with an odor like tapai. This is in accordance with the statement (Arifan, Wilis Ari, R.TD, & Aprilia Larasati, 2020) that the cloudy white color of liquid organic fertilizer indicates the main ingredients used, in this study the main ingredients used were stale rice and granulated sugar. . So that the cloudy white color in liquid organic fertilizer is obtained from the color of stale rice and granulated sugar, this is one indicator that proves that the fermentation was successful. In addition, the liquid organic fertilizer smells like tapai which indicates that a fermentation process has occurred.

This study also conducted direct trials on plants that were not healthy, after watering 1 time using liquid organic fertilizer from stale rice, the results obtained were immediately visible in the first week, namely the plants became fertile again, the leaves on the plants were wider and the stems were taller than before. . This is in accordance with the statement (Harahap, Gusmeizal, & Erwin, 2020) that liquid organic fertilizer is easily absorbed by plants so that its effects can be seen in a relatively short time. Although the effect is direct on plants, liquid organic fertilizer does not have a negative effect on the environment.

The finished liquid organic fertilizer needs to be stored properly, such as giving a small hole in the lid of the storage bottle so that the fermentation process does not continue. In addition, if the fermentation process continues when the bottle cap is opened, it will cause a small explosion because the gas in the bottle cannot

escape. Storage should also be placed in a place that is protected from sunlight so as not to damage the content of liquid organic fertilizer and in a safe place out of reach of children.

4. CLOSING

Based on the research that has been done, it can be concluded that organic waste originating from domestic waste can be utilized as liquid organic fertilizer. The results of the fermentation were successfully carried out, marked by the color changing to cloudy white and having a tapai-like aroma. This is in accordance with the indicators of successful liquid organic fertilizers. Although liquid organic fertilizer from plants has drawbacks, the use of stale rice into liquid organic fertilizer can reduce the volume of organic waste in the environment.

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