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Eco-Enzym Based on Household Organic Waste as Multi-Purpose Liquid

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Abstract
Waste is the residue of human daily activities or natural processes in the form of solid or semi-solid organic or inorganic substances that are biodegradable or non-biodegradable which are considered no longer useful and are disposed of into the environment. Sorting according to nature is divided into two types: organic and inorganic waste. In addition, the trash cans are also sorted based on the classification of household waste, commercial waste, building waste, and waste from public facilities. The literature review is carried out on the awareness that knowledge is constantly increasing (accumulating), that our research topic, society, and area of research have been explored by people before, and that we can learn from what these people have done. So, we are not the first to research the topic, society, and area. Eco-enzyme was first developed by Dr. Rosukon Poompanvong, a founder of the Thai Organic Farming Association who has been researching since the 1980s. Eco-enzymes were introduced more widely by Dr. Joean Oon, a Naturopathy researcher from Penang, Malaysia. In the socialization material for the Nusantara Eco Enzyme Community (KEEN), 70% of the waste that is disposed of in Final Disposal Sites (TPA) is organic waste that causes unpleasant odors in the environment, reduces the level of plastic recycling, and poses the risk of explosions and decomposition of organic waste as well. produce methane gas. The advantages of this product are: it has antibacterial and antifungal activity, can release residual deposits on water pipes to prevent clogging of water pipes, can absorb pollutants caused by cigarette smoke, motor vehicle fumes, and the like, can release ozone during the fermentation process. , as well as eco enzyme residue that flows underground will be able to clean underground water, and most importantly, this product is very easy to make, the ingredients needed are also quite cheap so it is very practical to apply.

Keyword: *Eco-enzyme, household organic, fermentation.*

1. Introduction

Waste is the residue of human daily activities or natural processes in the form of solid or semi-solid organic or inorganic substances that are biodegradable or non-biodegradable which are considered no longer useful and are disposed of into the environment. Organic waste is goods/materials that are considered unused and discarded by the previous owner/user but can still be used if managed with the right procedures [1]. Based on Slamet [2], sorting according to nature is divided into two types: organic and inorganic waste. In addition, the trash cans are also sorted based on the classification of household waste, commercial waste, building waste, and waste from public facilities.

The government hopes that the handling of waste management based on Law No. 18 of 2008 can be implemented. In addition, Law Number 32 of 2009 concerning Environmental Protection and Management can also be used as a basis for waste management. Waste Management which mentions waste management is an effort to handle waste in changing the characteristics, composition, and amount of waste. Organic waste can also be said as waste that can undergo weathering (decomposition) and decomposes into smaller and odorless materials (often referred to as compost). [2]. Compost is the result of weathering of organic materials such as leaves, straw, reeds, garbage, grass, and other similar materials whose weathering process is accelerated by human assistance.

Garbage originating from settlements is generally very diverse, but in general, at least 75% consists of organic waste and the rest is inorganic. Garbage that is often found in the environment around us, such as food scraps, seed shells from fruit vegetables, fruit waste, fish bones, and leaves rotting from trees. This group belongs to the group of organic waste because of its recyclable nature. One of the steps to utilize and treat organic waste is to convert it into eco-enzymes [3]. Eco-Enzyme is a kind of organic compound. It is a complex solution produced by fermenting fresh kitchen waste such as vegetable and fruit peels. This type of homemade vinegar, reduced from alcohol by fermentation of kitchen waste as a substrate with sugar [4].

Eco-enzyme a complex solution produced from the fermentation of fresh kitchen waste (fruit and vegetable peels), sugar (brown sugar, jaggery, or molasses), and water. It is dark brown and has a strong sweet and sour fermented aroma. Brown sugar, fruit or vegetable rind, and water are mixed in a 1:3:10 ratio to make eco-enzymes. During the first month, gas is released during the fermentation process. The pressure built into the container is released daily to avoid breaking. Fruit or vegetable skins are pushed down occasionally. Both containers are placed in a cool, dry, and well-ventilated place. They are left to ferment for 3 months to produce the enzyme. The fermentation results in a brownish liquid that is separated from the solid. Both solutions were filtered after 3 months to obtain enzyme solutions. A white mold formation was observed on the top surface of the solution. This may be Yeast B complex and Yeast vitamin C. The enzyme solution obtained is light brownish yellow. It is transferred to a plastic bottle. Enzyme never expires. The longer you keep it, the stronger it will become. The Enzyme strength will increase when water is added to it. Eco-enzyme for external use only [5].

Eco-enzyme was first developed by Dr. Rosukon Poompanvong, a founder of the Thai Organic Farming Association who has been researching since the 1980s. Eco-enzymes were introduced more widely by Dr. Joean Oon, a Naturopathy researcher from Penang, Malaysia. In the socialization material for the Nusantara Eco Enzyme Community (KEEN), 70% of the waste that is disposed of in Final Disposal Sites (TPA) is organic waste that causes unpleasant odors in the environment, reduces the level of plastic recycling, and poses the risk of explosions and decomposition of organic waste as well. produce methane gas. Reprocessing organic waste from household consumption into eco-enzymes is very important when knowing the results of the Sustainable Waste Indonesia study that 60 percent of the total waste generated in Indonesia is an organic waste [6].

The utilization of organic waste for the manufacture of eco-enzymes is very suitable to reduce the amount of household waste because the type of household organic waste occupies the largest proportion of total waste production. The average composition of waste in several big cities in Indonesia is organic (25%), paper (10%), plastic (18%), wood (12%), metal (11%), cloth (11%), glass (11%), others (12%) (Anonymous, 2009). Household waste production alone is around 70-90% of the total waste production in Indonesia [7]. The manufacture of this enzyme also has a broad impact on the environment globally and in terms of the economy. In terms of benefits for the environment, during the enzyme fermentation process, O3 gas is produced which is a gas known as ozone [8]. As is known, one ingredient in Eco Enzyme is Acetic Acid (H3COOH), which can kill germs, viruses, and bacteria. While the content of the enzyme itself is lipase, trypsin, amylase, and can kill/prevent pathogenic bacteria. It also produces NO3 (Nitrate) and CO3 (Carbon trioxide) which are needed by the soil as nutrients. From an economic point of view, the manufacture of enzymes can reduce consumption to buy floor cleaning fluid or insect repellent [9].

2. Materials and Methods

The study used in writing this paper is a literature review through data collection collected from various scientific journals. A literature review is an important tool as a context review because literature is very useful and very helpful in providing context and meaning in the writing that is being carried out and through this literature review, researchers can also state explicitly and the reader knows why this thing you want to study is a problem. which must be investigated, both in terms of the subject to be studied and any environment in terms of the relationship between

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the research and other relevant research. [10]. The literature review is carried out on the awareness that knowledge is continuously increasing (accumulating), that research topics, our communities, and research areas have been invaded by people before, and we can learn from what these people have done. So, we are not the first to research the topic, society, and area [11].

According to Berg & Lune [12], there are two main objectives of the literature review. First, a literature review is carried out to write a paper to introduce new studies on certain topics that need to be known by those who are active in the topic of science. This study may be published at any time for the public interest. Examples of such studies can be seen, for example, in the Annual Review of Anthropology, Annual Review of Sociology, and so on. Those who are just beginning researchers in certain topics can use this annual review issue as initial reading. The second purpose of the literature review is for the benefit of the research project itself. In this case, making a literature review is to enrich our insight about our research topic, help us in formulating research problems, and help us in determining the appropriate theories and methods to be used in our research. By studying other people's studies, we can determine whether to imitate, repeat, or criticize a particular study.

3. Results and Discussion

Eco-enzyme made from fruit or vegetable waste, water, sugar (brown sugar, molasses). Its manufacture requires containers in the form of containers made of plastic, the use of materials made of glass is highly avoided because it can cause the container to break due to microbial activity of fermentation. Add 10 parts of water to the container (fill 60% of the contents of the container). Then add 1 part sugar (10% of the total water) and add 3 parts of vegetable or fruit waste until it reaches 80% of the container. After that, close the container for 3 months and open it every day to release gas for the first month [13].

In the fermentation process alone, O3 gas (ozone) is continuously produced, which is needed by the earth's atmosphere. The eco-enzyme solution when mixed with water will react and can be used as a cleaning fluid ranging from dishes, floors, clothes, toilets, to hair washes and bath soaps. In addition, a mixture with water when used for watering plants will give better fruit, flower, or harvest yields. Reportedly can also repel annoying insects. Fermented organic waste dregs can be used as a good organic fertilizer [14]. According to Atika Luthfiyyah, et.al. [14]. Here's how to make eco enzymes:

The method of making eco-enzyme is not so difficult to implement because it uses ingredients that we are very familiar with. To make eco-enzyme we must prepare the following ingredients:

a. Clean water
b. Java sugar/palm sugar
c. Organic waste (fruit/vegetable skin)
d. Plastic bottles/jerricans (don't use glass)
e. Comparison of water: sugar: organic waste = 10: 1: 3

Steps:

The steps that we have to do are as follows;

a. Put the water in a bottle that has a tight lid. Water must not fill the bottle, there must be room in the bottle for the fermented gas.
b. Cut the sugar into small pieces, put it in a bottle, then shake it for a while.
c. Put the pieces of organic waste into the bottle, then close the lid tightly.
d. Let stands for 3 months so that the fermentation process is complete and produces the eco enzyme.

   With a note that during the first month, open the bottle cap every day for a maximum of 5 seconds, to release fermented gas.

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Eco-enzyme using raw materials that are easily available and inexpensive. The fermentation process, which takes months, does require patience. However, the resulting solution has very many properties. In the fermentation process alone, 03 gas (ozone) is continuously produced, which is needed by the earth's atmosphere. The eco-enzyme solution when mixed with water will react and can be used as a cleaning fluid ranging from dishes, floors, clothes, toilets, to hair wash and bath soap. If needed, it can also launch clogged drains. When used for watering plants, it will produce more fruit, flowers, or crops. Besides, it can also repel annoying insects.

In the next three months, the liquid in these jerry cans can be used for various functions, and the fruit waste dregs can be used as organic fertilizer. In addition to fertilizer, it can also be used to mop the floor of the house, the result is that the floor is not slippery even though you don't use soap. Even though children or family members often use the floor. By only using 2 enzyme bottle caps mixed with 1 bucket of water. In addition, eco-enzyme can be made very easily [14].

The specialty of this eco-enzyme is that it does not require a large area for the fermentation process as in the composting process, even this product does not require a composter tub with certain specifications. Bottles of mineral water and other products that are not used can be reused as eco-enzyme fermentation tanks. It also supports the concept of reuse in saving the environment. Eco-enzyme only requires media the size of a bottle so it can save processing space and can be applied at home. In addition, eco-enzyme has many benefits such as being used as plant growth factors, a mixture of floor cleaning detergents, cleaning pesticide residues, descaling, and reducing car radiator temperatures [15].

The problem of developing eco-enzyme can be addressed by providing socialization of the use of kitchen waste, as well as pilot efforts by the local government in collaboration with youth organizations and similar organizations. This is suspected to be due to the lack of benefits that people get if they process their waste. Therefore, it is necessary to implement an effort to integrate the role of the government, community leaders, youth organizations, and most importantly the community as the main actor, as well as an effort to increase the added value of household waste products that have undergone processing, both in terms of economic and economic added value. from a usability point of view.

Eco-enzyme itself is a product in the form of a liquid containing the results of fermentation of lactic acid bacteria in fruits and vegetables. In simple terms, this product can be made on a household scale by utilizing left-over fruits and vegetables from kitchen waste that is no longer used as food products. The rest of the vegetables and fruit are then mixed with water and palm sugar with the ratio of organic waste: palm sugar: water = 3: 1: 10. Next, this mixture is fermented anaerobically for three months. This fermentation process does take a long time so that the resulting product is in line with expectations [16, 17, 19]

This product can be used as a natural pesticide, organic fertilizer, floor cleaner, water purifier, and dishwasher (mixed with a small amount of detergent), and can lower the temperature of the car if mixed in the radiator. The use of eco-enzymes as organic fertilizers that are easy to make and use can support the Ministry of Agriculture program which plans the use of organic fertilizers in Indonesia to reaching 50% of the total use of fertilizers. The advantages of this product are: it has antibacterial and antifungal activity, can release residual deposits on water pipes to prevent clogging of water pipes, can absorb pollutants caused by cigarette smoke, motor vehicle fumes, and the like, can release ozone during the fermentation process [16, 19, 20]. So Eco-enzyme is called a multipurpose liquid because of the many benefits contained in it and can be used for many things [21].

4. Conclusion

From the many references, it can be stated that *Eco-enzyme* is a complex solution produced from the fermentation of fresh kitchen waste (fruit and vegetable peels), sugar (brown sugar, jaggery, or molasses), and water. It is dark brown and has a strong sweet and sour fermented aroma. Brown sugar, fruit/vegetable rind, and water are mixed in a 1:3:10 ratio to make eco-enzyme. Eco-enzyme also does not require a large area for the fermentation process as in the composting process, even this product does not require a composter bath with certain

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Efforts to develop eco-enzyme by providing socialization of the use of kitchen waste for, as well as pilot efforts by the local government in collaboration with youth organizations and similar organizations. This is suspected to be due to the lack of benefits that the community gets if they process their waste. Therefore, it is necessary to implement an effort to integrate the role of the government, community leaders, youth organizations, and most importantly the community as the main actor, as well as an effort to increase the added value of household waste products that have undergone processing, both in terms of economic and economic added value. from a usability point of view. It also helps to reduce the accumulation of waste in the landfill.

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