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Comparison of JAKABA (Eternal Luck Fungus) Fertilizer Production Methods and Fermentation Success

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Abstract

Sustainable agriculture requires innovations in environmentally friendly organic fertilizers to maintain soil fertility and reduce dependence on inorganic fertilizers. One such innovation is Jakaba (Jamur Keberuntungan Abadi), a liquid organic fertilizer produced through the fermentation of organic materials involving microbial activity. This study aims to compare three methods of Jakaba production, namely the firewood method, gas stove method, and rice water method, in terms of fermentation success. This research was conducted on April 06 at the Biology Laboratory yard of STAIN Mandailing Natal using a simple experimental method through direct observation. The observed parameters included growth rate, mycelium thickness, Jakaba quality, production cost, material availability, and processing procedure. The results showed that the firewood method produced the most optimal Jakaba growth, reaching approximately ±11 cm in height with thick mycelium and the best quality, while the gas stove method did not produce any growth, and the rice water method resulted in slow growth of about ±3 cm after three weeks of fermentation. Therefore, the firewood method is considered the most effective method for Jakaba production.

Keywords: Jakaba, Fermentation, Microorganisms, Organic Fertilizer, Sustainable Agriculture.

INTRODUCTION

Agriculture is a vital sector for meeting human food needs; however, in practice, increasing production still relies heavily on inorganic fertilizers, which are favored for their ability to deliver rapid results. Yet, the continuous use of inorganic fertilizers can lead to soil degradation, reduced soil microbial activity, and higher production costs for farmers. These conditions highlight the need for a more environmentally friendly and sustainable agricultural system to ensure long-term land productivity. Agriculture is a vital sector for meeting human food needs; however, in practice, increasing production still relies heavily on inorganic fertilizers, which are favored for their ability to deliver rapid results. Yet, the continuous use of inorganic fertilizers can lead to soil degradation, reduced soil microbial activity, and higher production costs for farmers. These conditions highlight the need for a more environmentally friendly and sustainable agricultural system to ensure long-term land productivity.

Sustainable agriculture serves as a crucial approach for balancing increased agricultural yields with environmental sustainability (Gulo et al., 2024). This system emphasizes the prudent use of natural resources, including the use of organic materials that are safer for the soil and the environment (Nurlaelah et al., 2023). In this context, the utilization of organic waste represents a key solution, as it can reduce pollution while enhancing the utility of previously unused materials.

Furthermore, microorganisms play a vital role in soil ecosystems by accelerating the decomposition of organic matter and increasing nutrient availability for plants (Nurlaelah et al., 2023; Gulo et al., 2024). The application of these microorganisms has been widely developed in the form of biofertilizers capable of improving soil quality in a natural and sustainable manner (Gulo et al., 2024). This serves as the foundation for developing various fermentation-based organic fertilizer innovations (Hamzah & Siswanto, 2023).

One emerging organic fertilizer innovation is Jakaba (Jamur Keberuntungan Abadi), a liquid organic fertilizer produced through the fermentation of organic materials driven by the activity of beneficial microorganisms. Jakaba is known to enhance soil fertility and support plant growth through its internal biological processes. Studies indicate that Jakaba can positively influence the growth of crops such as lettuce and mustard greens, although its effectiveness depends on environmental conditions and the application methods employed (Ibnusina et al., 2024; Ramadita et al., 2024).

The production of Jakaba utilizes organic materials—such as rice bran, palm sugar, shrimp paste, banana stems, and rice-washing water—sourced from household or agricultural waste. Using these materials not only helps reduce organic waste but also creates added value by producing a fertilizer beneficial to agriculture (Azhar et al., 2024; Nursaida et al., 2025). Beyond the ingredients, the production method is also a crucial factor; variations in treatment—such as the use of firewood, stoves, or natural fermentation of rice water—are believed to influence the growth processes of the microorganisms within Jakaba.

Differences in these methods are thought to influence fermentation success, particularly regarding growth rate, mycelium thickness, and the quality of the resulting Jakaba. Therefore, this study aims to compare three Jakaba production methods—the firewood method, the gas stove method, and the rice water method—in terms of fermentation success. Furthermore, this study aims to analyze the impact of each method on growth rate, mycelium thickness, and Jakaba quality, thereby identifying the most effective and efficient method for supporting sustainable agriculture.

RESEARCH METHODS

This study employed a simple experimental method involving three different treatments for producing Jakaba (Jamur Keberuntungan Abadi) fertilizer: the firewood method, the gas stove method, and the rice-washing water method. The research was conducted on April 6th in the yard of the Biology Laboratory at STAIN Mandailing Natal.

The equipment used in this study included a large cooking pot or pan, firewood, a gas stove, a bucket, a stirring implement, a cloth cover, and binding cord. The materials utilized consisted of rice bran, palm sugar, shrimp paste, bamboo roots, bean sprouts, banana stems, clean water, and rice-washing water (used specifically for the natural fermentation method).

Figure 1. Ingredients for making Jakaba fertilizer: (a) Rice bran, (b) Bean sprouts, (c) Palm sugar, (d) Shrimp paste, (e) Bamboo roots, (f) Banana stem.

To produce Jakaba using the firewood method, 1 liter of water is heated to a boil, and rice bran, palm sugar, and shrimp paste are added while stirring until dissolved. Once the solution has cooled completely, it is mixed into 9 liters of water in a bucket containing organic materials—such as bamboo roots, bean sprouts, and chopped banana stems—and stirred thoroughly. The mixture is then covered with a clean cloth and stored in a shaded area for the fermentation process.

Figure 2. Work procedure: (a) Heating, (b) Mixing, (c) Stirring.

In the gas stove method, all steps are carried out in the same manner, except that the heating process utilizes a gas stove as the heat source. Meanwhile, the rice-washing water method involves collecting the water used to wash rice and allowing it to undergo natural fermentation for approximately three weeks, without any boiling step.

Research data were obtained through direct observation of the fermentation process, covering growth rate, mycelium thickness, and the quality of the resulting Jakaba. Additionally, records were kept regarding production costs, material availability, and the ease of the process for each method.

RESULTS AND DISCUSSION

The results of the study showed differences in Jakaba growth across three production methods: the firewood, stove, and rice water methods. The differences in results obtained with each method were influenced by several key factors, namely the production process conditions, including temperature stability, cooling time before inoculation, nutrient availability for the microorganisms, and environmental conditions during fermentation. Furthermore, the sterility of the equipment and materials, the tightness of the container lid, and the quality of the Jakaba starter culture also determined the success of the process, as they can affect the risk of contamination and the sustainability of fermentation (Purwanta et al., 2023).

Table 1. Results Observation Comparison Manufacturing Method

No	Parameter	Wood Burn	Gas stove	Rice Water
1.	Growth rate	 Results 20 April, Fermentation takes place rapidly. Changes beginning seen on 20 April in the form of solution white milk Then growing growth stable on 08 June 2026.	 Results 20 April, There is no growth of Jakaba. The solution only changes. become white milk without development further development into mycelium.	 Results 3 Sunday, Growth is slow, Jakaba began to form after ±3 weeks fermentation.
2.	Mycelium thickness	 Results End, Mycelium reach ±11 cm is very well formed, thick, dense, and spread evenly on media fermentation.	 Results End, No mycelium is formed because there is no Jakaba development.	 Results End, The mycelium reaches about ±3 cm, still thin, less dense, and not evenly.
3.	Jakaba Quality	Very good quality, stable, colored pure white, and shows fermentation conditions which is healthy And active.	Does not produce Jakaba so quaty assessment cannot be carried out.	Quality currently, the structure is still weak and not yet stable as a whole
4.	Manufacturing costs	Relatively tall that is ±Rp. 47,000 because the bucket is new.	Around ±Rp. 30,000 because it's a used bucket.	It does not require additional costs (Rp0) because it only uses water laundry rice.
5.	Availability of materials	Ingredients are easily obtained in the surrounding environment, such as bran, brown sugar, shrimp paste, banana stems, and bamboo roots.	Ingredients are easy to obtain in the sulirrounding environment, such as bran, brown sugar, shrimp paste, banana stems, and bamboo roots.	Very easy obtained by only utilizing household waste in the form of rice washing water.

The firewood method produces the most optimal growth of Jakaba with tall around ±11 cm, mycelium thick, congested, And seen Healthy. This success is due to the gradual heating process and the solution being allowed to cool completely before being mixed with the fermentation ingredients.

a b

Figure 3. Results Jakaba wood method burn: a. View on, b. Side view

Furthermore, the fermentation product is stored in a shaded area, ensuring a more stable ambient temperature and avoiding direct heat exposure. This condition supports the optimal activity of microorganisms in decomposing organic matter (Wiyatiningsih, 2020). Maintaining a higher level of sterility in the equipment and containers is also thought to reduce the risk of contamination by other microorganisms, allowing the microorganisms involved in the fermentation process to thrive.

Figure 4. Results fertilizer Jakaba method stove gas

Jakaba growth did not occur with the gas stove method. Although there was an initial change in the milky white solution, indicating early fermentation activity, the process did not progress to mycelium formation. This was due to several factors, including mixing the solution while it was still hot, which caused thermal stress or even death of the microorganisms. Furthermore, unstable storage conditions, including the possibility of a loosely closed container, allowed the ingress of bacteria. air and contaminants such as insect, as well as exposure hot advanced also worsen the fermentation process (Purwanta et al., 2023). Other factors such as the possibility of pH imbalance due to high and low heating level of sterility during the mixing process, which is characterized by the presence of Contamination by external organisms, such as dark-colored insect larvae, can also cause contamination by unwanted microorganisms, so that Jakaba growth does not occur (Gulo & Lase, 2025).

Using the rice water method, Jakaba can still grow, but at a slow rate, approximately 3 cm after three weeks of fermentation. This is due to the low nutrient content in the rice washing water, which limits the energy source for the microorganisms. Furthermore, the lack of preheating prevents the organic matter from decomposing optimally. Other factors such as unbalanced nutrient levels, possibly suboptimal pH, and limited aeration can also contribute to the slow growth of microorganisms (Nursaida et al., 2025). Standard sterility levels without special treatment also allow for mild contamination, which can slow the fermentation process.

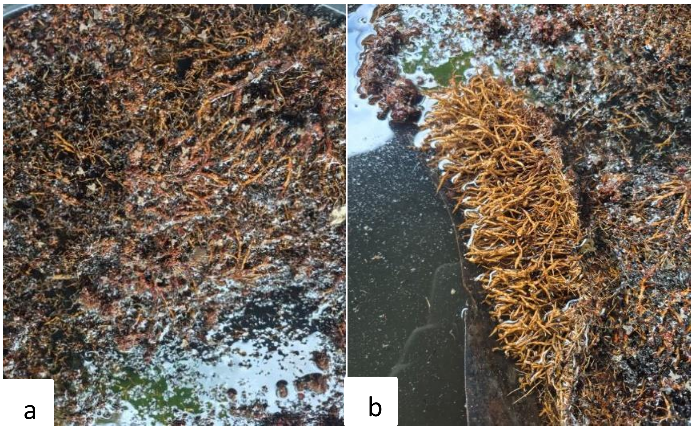

Figure 5. Results fertilizer jakaba method rice water: a. View on, b. Side view

Overall, the success of Jakaba fermentation is influenced by a combination of several important factors, namely temperature stability during mixing, cooling time before inoculation, nutrient availability, storage environmental conditions (temperature and shade), pH, water content, aeration, and the level of sterility of tools and materials. The firewood method provides the most ideal conditions because it meets most of these factors in a balanced manner, including the use of a new, more sterile bucket, thus minimizing the risk of contamination. The gas stove method fails due to exposure to high temperatures, mixing before it has cooled, the use of used buckets that could potentially contain microorganisms previously, the container closure is not tight enough to allow air to enter and contaminants, as well as less than optimal sterility which is characterized by the presence of contamination organism other like larvae insect colored dark, whereas the rice water method has limited nutrients resulting in slower growth.

CONCLUSION

Significant differences were observed in JAKABA growth among the three fertilizer preparation methods: the firewood method, the gas stove method, and the rice water method. The firewood method yielded the most favorable results, producing JAKABA with a height of approximately 11 cm, dense mycelial development, and superior overall quality. Conversely, no JAKABA growth was observed in the gas stove treatment, indicating that this method was ineffective under the conditions of the study. The rice water method resulted in slower growth, with JAKABA reaching only approximately 3 cm after three weeks of fermentation. These findings suggest that the firewood method is the most effective technique for JAKABA production among the methods evaluated.

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