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ORGANIC (C) CONTENT ANALYSIS OF (MOLE) BAMBOO SHOOTS WITH DIFFERENT EM4 DOSES

ANALISIS KANDUNGAN (C) ORGANIK DARI (MOL) REBUNG BAMBU DENGAN PEMBERIAN DOSIS EM4 YANG BERBEDA

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Abstract

This study aims to determine the effect of em4 dosing on the amount of carbon contained in bamboo shoot liquid organic fertilizer (LOF). This research was carried out in the laboratory of the Plantation Management Study program of the Politeknik Indonesia Venezuela and the Laboratory of the Standardization and Industrial Service Policy Agency of the Banda Aceh Industrial Service Standardization and Service Center. With 5 treatments namely M1 (without the addition of EM4), M2 (with the addition of EM4 20ml), M3 (with the addition of EM4 40 ml), M4 (with the addition of EM4 60 ml), M5 (with the addition of EM4 80ml). The results showed that adding EM4 did not affect bamboo shoot liquid organic fertilizer ranging from temperature, pH, aroma, color, and C-organic content elements. Based on the results of further tests in the treatment of M1 (without giving EM4) M5 (giving 80 ml EM4) has different results.

Keywords: *C-organic, EM4, Liquid Organic Fertilizer, Bamboo Shoots.*

Abstrak

Penelitian ini bertujuan untuk mengetahui pengaruh pemberian dosis EM4 terhadap jumlah karbon yang terkandung dalam Pupuk Organik Cair (POC) rebung bambu. Penelitian ini dilaksanakan di labolatorium program studi Pengelolaan Perkebunan Politeknik Indonesia Venezuela dan Laboratorium badan standardisasi dan kebijakan jasa industri balai standarisasi dan pelayanan jasa industri Banda Aceh. Dengan 5 perlakuan yaitu M1 (tanpa pemberian EM4), M2 (dengan penambahan EM4 20 ml), M3 (dengan penambahan EM4 40 ml), M4 (dengan penambahan EM4 60 ml), M5 (dengan penambahan EM4 80 ml). Hasil penelitian mununjukkan bahwa pemberian EM4 tidak berpengaruh terhadap pupuk organik cair rebung bambu mulai dari suhu, pH, aroma, warna dan unsur kandungan C-organik. Bedasarkan hasil uji lanjut dalam perlakuan M1 (tanpa pemberian EM4) M5 (pemberian EM4 80 ml) memiliki hasil yang berbeda.

kata kunci : C-organik, EM4, Pupuk Organik Cair, Rebung Bambu.

INTRODUCTION

Bamboo shoots are young bamboo and one of the non-timber forest products that are conical, sturdy, and wrapped in tight leaf petals at the beginning of their growth. Bamboo shoots are young shoots that come from bamboo plants. These young shoots usually grow between

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mature bamboo stems with a dark black skin color and have fine, itchy hairs. Bamboo shoots can be a basic ingredient in making local microorganism solutions (Lindung, 2015).

Liquid organic fertilizer is an organic fertilizer fermented from various organic waste wastes. In addition to improving the physical, chemical, and biological properties of soil, the use of liquid organic fertilizer can help increase crop yields, improve the quality of crop yields, and reduce the use of organic fertilizers (Khairunisa, 2015). Liquid fertilizer or liquid organic fertilizer contains a solution of decomposed organic matter from crop residues, and animal and human waste, which contains more than one nutrient (Hadisuwito, 2012).

Another plant that can be used as an ingredient to make organic fertilizer is bamboo shoots. The population of bamboo is quite large, but its utilization is less than optimal. Bamboo shoots are generally consumed as vegetables. As a plant, bamboo shoots can be used as a basic ingredient for making organic fertilizer (Gustomi *et al.*, 2018).

Bamboo shoot LOF contains nitrogen and potassium nutrients which are quite high. In addition, this bamboo shoot LOF has a high content of C-Organic and Gibberellin which also stimulates the growth of sorghum plants. The *gibberellin* content derived from bamboo shoots has the advantage of helping the flowering process quickly and can encourage stem and leaf elongation. The addition of bamboo shoot material for making liquid organic fertilizer has significant results for plant growth. Because young bamboo shoots contain various minerals needed by plants for the vegetative growth process (Fahmi, 2018).

Bamboo shoot liquid organic fertilizer contains organisms that are important to help plant growth, namely *Azotobacter* and *Azospirillum*. *Azotobacter* and *Azospirillum* are non-symbiotic N-fixing bacteria that produce nitrogenase enzymes, and growth hormones, and can be used for all types of plants (Sufianto, 2014).

The use of Microorganisms such as Microorganism Effectiveness (EM4) is a stater material to build environmentally friendly agriculture by utilizing decomposing microorganisms that are beneficial to soil fertility, by making manure compost using EM4 or the like, by the correct dosage or usage based on instructions for use. Based on the above, the organisms in the soil will thrive again, so that the physical soil, namely texture, and structure, will be better, and plants will grow fertile, with high productivity (Ekawandani, 2019).

The benefits of EM4 according to (Indriani, 2011) in the fermentation process of organic materials, microorganisms will work well if the conditions are appropriate. The fermentation process will take place under anaerobic conditions, low pH (3-4), high salt and sugar content, moderate water content of 30-40%, antioxidant content of spices and medicinal plants, the presence of fermentation microorganisms, and favorable temperatures (40-50 ℃). Based on the content in bamboo shoots, researchers are interested in researching and analyzing the organic (C) content of bamboo shoots with different doses of EM4, to know the effect of EM4 dosing on the amount of carbon contained in bamboo shoot LOF.

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RESEARCH METHODS

Place and Time of Research

This research was conducted in July-August 2024 at the Laboratory of the Plantation Management Study Program of the Politeknik Indonesia Venezuela and the Laboratory of the Industrial Services Standardization and Policy Agency of the Banda Aceh Industrial Services Standardization and Services Center.

Tools and Materials

The tools and materials used in the research were buckets, knives, blenders, stirrers, jars, filters, cameras, books, pens, brown sugar, EM4, rice washing water, and bamboo shoots.

Research Method

The research method used is experimental laboratory which consists of 5 test treatments as follows:

M1 : Without EM4 application
M2 : 20 mL EM4 application
M3 : 40 mL EM4 application
M4 : 60 mL EM4 application
M5 : 80 mL EM4 application

Research Implementation

The method of making liquid organic fertilizer from bamboo shoots involves several steps that can be followed as follows:

1. Preparation of bamboo shoots: the bamboo shoots used should be clean and cut into small pieces. Then, the bamboo shoots should be mashed so that they can be easily mixed with rice-washing water.
2. Addition of rice washing water: after the bamboo shoots are mashed, add 5 liters of rice washing water to 1.5 kg of bamboo shoots in a suitable container.
3. Addition of brown sugar: after the bamboo shoots and rice washing water has been mixed. Then add brown sugar about 250 grams for each treatment.
4. Addition of EM4: then add EM4 in the amount of 20 mL, 40 mL, 60 mL, and 80 mL, each treatment.
5. Stirring: after all the ingredients are mixed, stirring is done regularly to ensure that all parts of the bamboo shoot are mixed with other ingredients. This helps to increase the effectiveness of the resulting liquid organic fertilizer.
6. Putting it in jerry cans: then put it in jerry cans that have lids. The storage process is carried out for 10-15 days until the aroma of tape, and bamboo shoot liquid organic fertilizer is ready for use.

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Observed Parameters

Observations made in this study include the characteristics of bamboo shoot LOF both color and aroma, pH, temperature, and C-Organic (Carbon) content carried out by the Walkley-Black Titration method with each sample as much as one plastic bottle (600 ml).

RESULTS AND DISCUSSION

The temperature of Bamboo Shoot LOF

Temperature is the most important environmental factor in the life and growth of organisms. Temperature can also affect other aspects of microbes. The temperature of bamboo shoots liquid organic fertilizer with the addition of effective microorganisms. This can be seen in Figure 1.

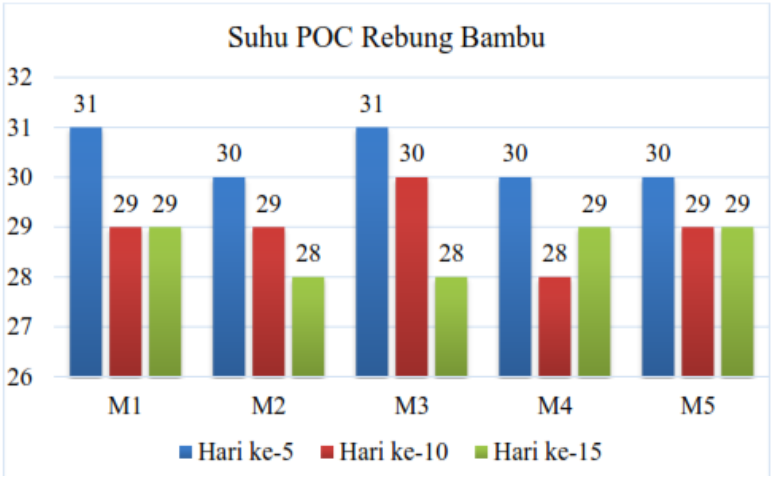

Figure 1. Temperature Chart of Bamboo Shoot LOF

In this observation, it shows that the temperature of bamboo shoot liquid organic fertilizer has decreased, it can be seen from Figure 1 that the temperature of bamboo shoot liquid organic fertilizer ranges from 28-31°C. The longer the fermentation process, the temperature decreases, the increase and decrease in temperature during the fermentation process can be caused by the activity of microorganisms involved during the fermentation process to produce additional products in the form of heat/steam derived from the metabolism of microorganisms (Stanto, 2014).

This shows that the temperature range of bamboo shoot liquid organic fertilizer in this study is still in the normal category. Temperature measurements are taken every five days at 17.00 in the afternoon using an alcohol thermometer before stirring, after which insert an alcohol thermometer and let stand until the temperature figure stabilizes.

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pH value of Bamboo Shoot LOF

pH is one of the factors that affect the activity of microorganisms in the media for decomposing organic matter. The results of pH measurements on bamboo shoot liquid organic fertilizer can be seen in Figure 2.

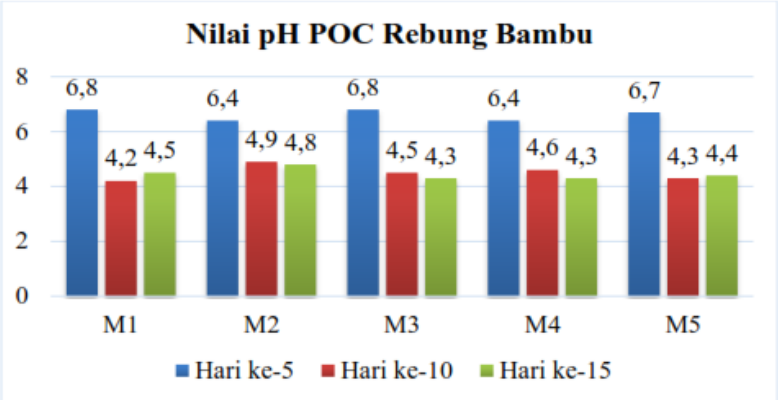

Figure 2. pH Chart of Bamboo Shoot LOF

The observation results show that the pH obtained from the beginning of the bamboo shoot Liquid Organic Fertilizer (LOF) fermentation process produces a pH value of 6, and decreases after a few days in the fermentation process to a pH value of 4. This shows that the results obtained from the sensory observations can be said that the fertilizer has good quality because it has a pH range of 4-9. This is by the quality standards used, namely the Decree of the Minister of Agriculture of the Republic of Indonesia No. 261 of 2019, the allowable pH of liquid organic fertilizer is between 4-9.

In addition, if observed in the research conducted, the initial pH and final pH experienced a process of decreasing and the pH stabilized at 4. This can occur because microorganisms have divided quickly and work constantly, besides that it can also be influenced by several factors, namely the place where bacteria grow, nutrient intake, and also environmental conditions. This is by Prasetio (2020), who states that in anaerobic fermentation conditions, there can be a decrease in pH which can be caused by several things, among others, a decrease in pH during fermentation is also caused by the carbohydrate content of the feed being available in sufficient quantities, so that the activity of lactic acid bacteria will run well and produce organic amino acids that reduce the degree of acidity.

The aroma of Bamboo Shoot LOF

Aroma is also a determining factor for the maturity of liquid organic fertilizer. In general, changes in aroma occur from the fermentation process of liquid organic fertilizer made from bamboo shoots with the addition of effective microorganisms. In this study as follows :

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Table 1. Observation of the Aroma of Bamboo Shoot LOF during the Fermentation Process.

Treatment	Aroma Observation Day-		
	5	10	15
M1	1	3	3
M2	2	3	3
M3	2	3	4
M4	3	3	4
M5	3	4	4

Description: 1 = Not Pungent, 2 = Slightly Pungent, 3 = Pungent, 4 = Very Pungent, 5 = Foul Odor

Table 1 the observation results showing that the aroma obtained is bamboo shoot liquid organic fertilizer that has been made to produce the aroma of tape. At the beginning of the process, the aroma produced is the dominant aroma of the smell of bamboo shoots and the effective mixing of microorganisms. On observation day 5 the fertilizer has a slightly pungent aroma while on days 10 and 15 the fertilizer has a very pungent tape-like smell. Tape aroma is produced because microbes process organic matter so that it decomposes perfectly and the aroma can be used that the bamboo shoot Liquid Organic Fertilizer (LOF) is successful and has good quality. By Hastuti Hastuti & Husnaeni's research (2019), state that the signs of success of this LOF are that the resulting aroma is tape-smelling, while if it is not successful, the resulting odor is foul-smelling.

Color of Bamboo Shoot LOF

Color is one of the factors determining the quality of liquid organic fertilizer and determining the maturity of the liquid organic fertilizer. Changes in the color of liquid organic fertilizer can occur ranging from brownish yellow to yellow/brown. The color of liquid organic fertilizer with the addition of EM4 (effective microorganism) in this study is as follows.

Table 2. Observation of the Color of Bamboo Shoot LOF during the Fermentation Process.

Treatment	Color Observation Day-		
	5	10	15
M1	1	1	1
M2	1	2	2
M3	2	2	4
M4	2	4	4
M5	2	4	4

Description: 1 = Yellow, 2 = Brownish Yellow, 3 = Brown, 4 = Light Brown, 5 = Blackish Brown

Table 2 shows that after undergoing a fermentation process for 15 days, liquid organic fertilizer made from bamboo shoots with the addition of EM-4 has changed color from brownish yellow to yellow/brown color. Treatment M1 produces a yellow color as much as 100%. This is because M1 is a liquid organic fertilizer without the addition of EM-4. Furthermore, M2 experienced a color change from yellow to brownish yellow, while M3 from the beginning of observation to the end of observation was brownish yellow. M4 and M5 experienced a color change from brownish yellow to light brown. This shows that the higher the addition of EM-4,

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the liquid organic fertilizer is no longer brownish yellow but only light brown, so the addition of EM-4 can affect the success of making liquid organic fertilizer.

The color change that occurs in each treatment is thought to be due to the activity of microorganisms from the addition of EM-4 as a starter to accelerate the process of color change in liquid organic fertilizer from each treatment. This is the opinion of Situmorang (2018), that the addition of EM-4 in making liquid organic fertilizer can cause color changes from brownish yellow to brown color caused by the activity of microorganisms during the fermentation process.

C-Organic Content of Bamboo Shoot LOF

The test results of C-Organic content in bamboo shoot liquid organic fertilizer. Two treatments, namely M1 (Without EM4), and M5 (80ml EM4) after fermentation are found in Figure 3.

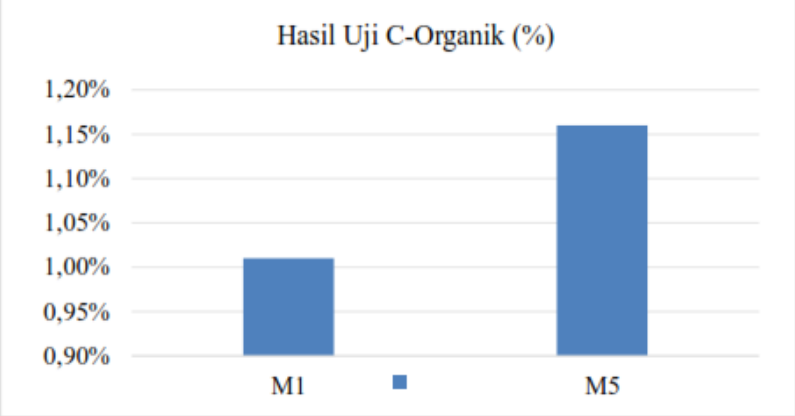

Figure 3. Graph of Laboratory Test Results

Figure 3. shows that the lowest C-organic content is found in liquid organic fertilizer with M1 treatment, which is 1.01%. The lowest C-organic content is found in liquid organic fertilizer with M1 treatment, which is 1.01%. The low C-organic content is due to the non-use of EM4 which is a source of microorganisms. The M5 treatment shows that the highest C-organic content is 1.16% due to the use of EM4 as much as 80. Based on the results of the analysis, it can be seen that the provision of EM4 does not affect bamboo shoot liquid organic fertilizer. Based on the POC Quality Standards of the Minister of Agriculture number 70/Permentan/SR.140/10/2011 the minimum technical requirements for bamboo shoot liquid organic fertilizer on C-Organic content is at least 1.27%, based on these requirements it can be seen that the two LOF treatments made from bamboo shoots do not meet the minimum requirements for organic fertilizer content.

These microorganisms use carbon as an energy source in decomposing organic materials during the fermentation process. According to Yulipriyanto (2010), during the fermentation or composting process, organic materials undergo great decomposition by heterotropic microorganisms, namely *bacteria*, *fungi*, *actinomycetes*, and *protozoa* where carbon is an energy source for microorganisms.

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CONCLUSION

Liquid organic fertilizer made from bamboo shoots with the addition of EM4 (effective microorganisms) at a dose of 20-80 ml (treatment m1-m5) has no significant effect on bamboo shoot liquid organic fertilizer ranging from temperature, pH value, aroma, color, and C-organic content elements. The results of laboratory tests of samples M1 (without giving EM4) and M5 (giving 80 ml EM4) have different results, namely, M1 (1.01%) while the M5 sample has results (1.16%). The addition of EM4 affects the amount of c-organic but not yet on the rental that provides higher benefits.

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