NPK NUTRIENT ANALYSIS OF PALM OIL WASTE

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Abstract

This study aims (1) to make liquid organic fertilizer from fruit, vegetable and midrib waste (2) to determine the best composition and nutrient content in liquid organic fertilizer (3) to determine the effect of adding oil palm fronds to liquid organic fertilizer. This study used a non-factorial completely randomized design (CRD) method consisting of 3 treatments with 3 replications, so that the total sample was 9 samples. The parameters observed were the nutrient levels of N, P, and K fertilizers contained in the POC. The data obtained were analyzed statistically by analysis of variance (ANOVA). The results showed that the administration of oil palm midrib bone extract had no effect on all observation indicators.

Keywords: ***Waste, POC, Palm Oil, Vegetables, Fruits.***

1. INTRODUCTION

Waste accumulation will increase along with the increase in population. On the other hand, the current condition of existing solid waste processing has not been fully resolved. Ratnawati et al (2018) stated that solid waste that is not processed properly can contain various germs that are dangerous to human health and disrupt aesthetics. Accumulation of solid waste that is not balanced with processing causes water, groundwater, soil and air pollution (Safirul et al, 2012). Fruit and vegetable waste can be used as liquid organic fertilizer because the waste contains Nitrogen (N), Phosphorus (P), Potassium (K), Vitamins, Calcium (Ca), Iron (Fe), Sodium (Na), Magnesium (Mg) and so on. This content is really beneficial for soil fertility which can ultimately be used as liquid organic fertilizer or local microorganisms Nur (2019). According to Nisa (2016), POC can also be used as another option which is an effort to free plants from bad effects, namely chemical residues that people usually use to fertilize plants.

The Waste Utilization Processing School (SP2S) is an entity/business based on waste utilization processing, the SP2S supervisor is named Mr. Bakhtiar. SP2S School has been established since 2012 and is located in Hamlet III, Selemak Village, Hamparan Perak District, Deli Serdang Regency, North Sumatra Province. This school manages organic waste from leftover household materials into liquid organic fertilizer which goes through fermentation stages. Based on the research results of Yanto (2016), giving POC has a real influence on the parameters of plant height, tuber diameter, root volume, wet weight and dry weight of oil palm seedlings. Apart from that, oil palm fronds are used as an additional ingredient in making POC because the leftover fronds from harvesting are just piled up in piles or bushes and are no longer used, while other than that, young fronds still have a fairly high nutrient content such as cellulose and lignin which are useful for plants so that the author is interested in making a new breakthrough in handling oil palm frond waste left over from harvesting. Various research results show that the use of organic fertilizers on agricultural land has a positive impact on the availability of nutrients for plant growth and production and is able to reduce the use of chemical fertilizers which can cause environmental damage. For this reason, I want to research more deeply into the process of making liquid organic fertilizer from fruit and vegetable waste and the addition of palm frond waste.

2. IMPLEMENTATION METHOD

Place and time of research

The research was carried out at the Waste Utilization Processing School (SP2S) and laboratory tests were carried out at the Medan Center for Agricultural Research and Technology (BPTP) Laboratory. When the research was carried out in June - July 2021.

Tool

The tools used in this research were containers in the form of 35 liter plastic buckets and scales and cutting tools for all ingredients, equipped with filters and scales.

Material

The materials used in this research were rotting fruit and vegetable waste taken from traditional markets with the addition of molasses, sugar cane juice, and also coconut water and ground palm fronds taken from a goat feed workshop located in Galang.

Analysis Method

The method used inThis research was an experimental design using a Completely Randomized Design (CRD) consisting of 3 (three) treatments and repeated 3 (three) times, for a total of 9 experimental units. And if the research results have a real effect, Duncan's Multiple Range Test (DMRT) will be carried out further. With the following treatment mechanism:

P1: 500 ml POC Fertilizer and 500 ml midrib extract (1:1)
P2: 500 ml POC Fertilizer and 375 ml midrib extract (1:3/4)
P3: 500 ml POC Fertilizer and 250 ml midrib extract (1: ½)

3. RESULTS AND DISCUSSION

Liquid Organic Fertilizer from Fruit and Vegetable Waste

The measure of success in making liquid organic fertilizer (POC) from fermenting fruit and vegetable waste is characterized by a change in aroma to a sour smell and a change in color from yellow-brown to blackish brown. Sundari (2012) also added that the success of making liquid organic fertilizer using the fermentation process was indicated by the presence of a white layer on the surface, a distinctive smell, and the color changed from green to brown and the resulting fertilizer was brownish yellow. Fermentation of liquid organic fertilizer from fruit and vegetable waste is carried out in a tightly closed container.

Liquid Organic Fertilizer from Oil Palm Midrib Waste

The measure of success in making liquid organic fertilizer from the fermentation of oil palm frond waste is characterized by a change in aroma that smells unpleasant and slightly sour and a change in color from light yellow to brownish yellow. The fermentation process of liquid organic fertilizer from oil palm frond waste is carried out in an uncovered container.

Results of Analysis of POC Nutrient Content and Midrib Bone Extract

The results of testing the nutrient content of N, P, K in the manufacture of Liquid Organic Fertilizer using Fruit and Vegetable Waste and the addition of Palm Oil Frond Extract have been carried out. Liquid organic fertilizer that is ready to use will change color to brown and have a sour smell.

Table 1 Nutrient levels of liquid organic fertilizer for fruit, vegetables and midrib extract.

No.	Sample Code	Types of Analysis		
		N-Total (%)	P-Total (%)	K-Total (%)
1	Midrib Extract	0.04	0.04	0.11
2	POC BDS	0.10	0.13	0.41

Source: BPTP Medan Laboratory

Table 1 shows that the NPK nutrient content in oil palm frond extract and liquid organic fertilizer from fruit and vegetable waste does not meet the quality standards in accordance with the Minister of Agriculture regulations (2011). It has been stated that the minimum technical requirements for making Nitrogen fertilizer in liquid fertilizer are at least 3-6 %.

Results of Analysis of the Effect of Liquid Organic Fertilizer Treatment

Analytical tests of the effects and nutrient levels of all liquid organic fertilizer treatments for fruit, vegetables and oil palm frond extract were carried out in the BPTP Medan laboratory.Test results show that liquid organic fertilizer with the addition of palm frond extract reduces Nitrogen (N) nutrient levels by 40-70%, Phosphorus (P) levels by 30-40%, and Potassium (K) levels by 29-39%. This is because during fermentation the container was not closed tightly so that other microorganisms entered the container and the fermentation results were not optimal.

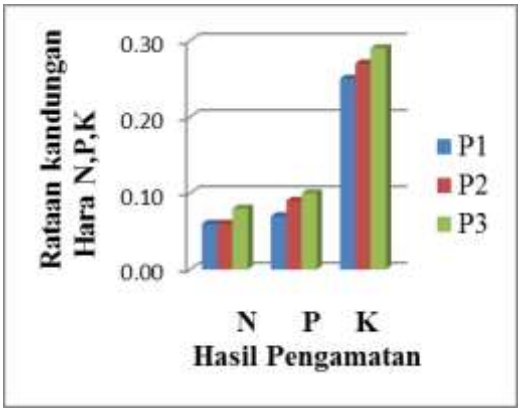

Figure 1 Graph of Average Nutrient Content N, P, K

Based on Figure 1, it shows that the nutrient levels of N, P, K in POC added with oil palm frond extract have no effect at all levels of treatment. According to Lubis et al (2011) one way to use oil palm leaf midribs as a source of plant nutrients is in the form of compost. Palm oil leaf midribs contain high levels of lignin so the composting process of oil palm leaf midribs takes a long time. The natural process of decomposition of oil palm fronds takes a long time, namely around 3-4 months. A short composting time can cause fermentation between the fronds and liquid organic fertilizer to be less than optimal.

Nutrient N Content in Liquid Organic Fertilizer

The results of the analysis of the N nutrient content in liquid organic fertilizer from fruit and vegetable waste with the addition of midrib extract can be seen in table 2 below.

Table 2. Nutrient N content

Treatment	Average
P1	0.06
P2	0.06
P3	0.08
Signification	Mr

Based on table 2, it can be seen that the addition of palm frond extract to liquid organic fertilizer from fruit and vegetable waste has no effect on all treatment levels. While the fermentation process is running, liquid organic fertilizer must not be contaminated by air and microorganisms other than the microbes contained in the liquid organic fertilizer so that the microbial development process is more optimal and the process of decomposing the material is more optimal. This is supported by the statement by Wijaksono et al (2015) that the more bacteria there are, the nitrogen content will also increase. Changes in N values in each treatment are not the same due to the different speeds at which microbes break down fermented materials.

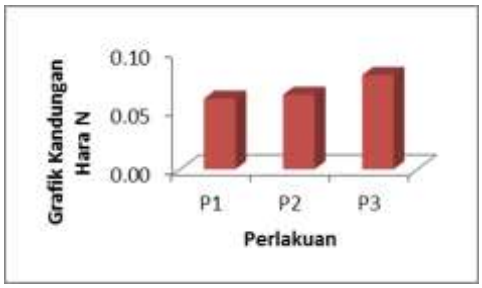

Figure 2 Graph of Average N Nutrient Content in POC

Based on Figure 2, it shows that the highest N nutrient content was obtained in treatment P3 with a nutrient content of 0.08% and the lowest treatment was obtained in treatment P1, namely 0.06%, as well as the treatment obtained in P2. However, the nitrogen content in the P3 sample apparently did not meet the standard nitrogen content for making liquid fertilizer. Based on the Ministry of Agriculture regulations (2011), it is stated that the minimum technical requirements for making organic fertilizer state that the Nitrogen content in liquid fertilizer is a minimum of 3-6%.

Nutrient P Content in Liquid Organic Fertilizer

The results of the analysis of the P nutrient content in liquid organic fertilizer from fruit and vegetable waste with the addition of oil palm frond extract can be seen in table 3 below.

Table 3 Nutrient N Content

Treatment	Average
P1	0.10
P2	0.07
P3	0.09
Signification	Mr

In table 3 it can be seen that the addition of oil palm frond extract to liquid organic fertilizer from fruit and vegetable waste has no effect on all treatment levels. The P content in all treatments is different because each waste has a different phosphorus content. Nur et al (2016) stated that each waste or waste has a different phosphorus content and depends on the type and can influence the speed of the decomposition process.

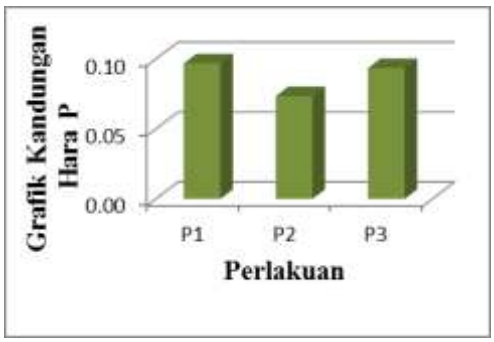

Figure 3 Graph of Average P Nutrient Content in POC

Based on Figure 4.5, it shows that the highest P nutrient content was obtained in treatment P1 with a nutrient content of 0.10%, while the lowest treatment was obtained in treatment P2, namely 0.07%. This shows a value that is very far from the average required by the Ministry of Agriculture regulations (2011) that the minimum technical requirements for making liquid organic

fertilizer have a phosphorus content of at least 3-6%. The low phosphorus content in the final result of liquid organic fertilizer is thought to be a process that occurs in the manufacture of liquid organic fertilizer where some of the nutrients produced are also a food source for microorganisms. This is supported by the opinion of Indriani et al (2013) who state that the nutrient content of phosphorus comes from the breakdown of organic material during the fermentation process. A decrease in phosphorus levels can occur because phosphorus is also needed by microorganisms as a source of macro nutrients for growth.

Nutrient K Content in Liquid Organic Fertilizer

The results of the analysis of the K nutrient content in liquid organic fertilizer from fruit and vegetable waste with the addition of oil palm frond extract can be seen in table 4

Table 4 Results of analysis of potassium nutrient content

Treatment	Average
P1	0.25
P2	0.27
P3	0.29
Signification	Mr

Based on table 4, it can be seen that the addition of palm frond extract to liquid organic fertilizer from fruit and vegetable waste has no effect on all treatment levels. The K content in each treatment is relatively low because it is possible that the fermentation process is not yet complete so that the decomposition of the material is slow. The K content will increase if the fermentation process goes well. This is in accordance with Supriyanti's (2017) statement which states that the role of potassium itself is as a catalyst for microorganisms to speed up fermentation.

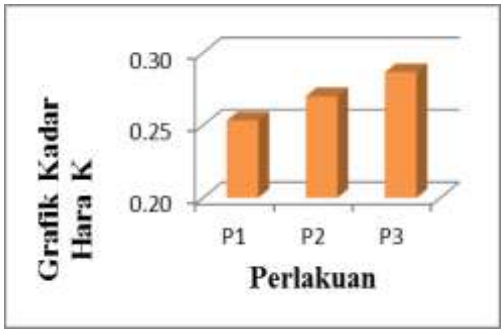

Figure 4 Graph of the average K nutrient content in POC

Based on Figure 4, it shows that the highest K nutrient content was obtained in treatment P3 with a nutrient content of 0.29% and the lowest treatment was obtained in treatment P1, namely 0.25%. Apart from that, Sundari et al (2014) stated that low levels of potassium can be caused by the basic ingredients for making organic fertilizer which are high in crude fiber content so that the decomposition process has not occurred optimally, so that the organic material has not all been graded.

4. CONCLUSION

Based on the results of this research, it can be concluded that

1. The effect of adding oil palm frond waste extract has no significant effect on N, P and K nutrient levels.

2. Composition: The best Nitrogen (N) nutrient content of all treatment levels is found in treatment P3, namely 0.08%, the best Phosphorus (P) nutrient content is found in P1 treatment, namely 0.10%, and the best Potassium (K) nutrient content at all treatment levels found in treatment P3, namely 0.29%.

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