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Quality of Duck Manure Fertilizer and Paitan Leaves with the Addition of MOL Papaya Skin

Hana Khairunnisa, Aminah Asngad*
Biology Education Department, Faculty of Teacher Training and Education, Muhammadiyah University of Surakarta. Jl. A. Yani Tromol Pos I, Pabelan, Kartasura, Surakarta 57162, Central Java, Indonesia
*Corresponding Author. E-mail address: aa125@ums.ac.id

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ABSTRACT

The use of organic materials for the manufacture of fertilizers is an alternative to reduce waste in the environment. Fertilizer can be made using duck manure and paitan leaves (Tithinia diversifolia) which produce high levels of nutrients.The purpose of this study was to determine the quality of N,P, and K as well as sensory test results which included color, texture, pH, and aroma of duck manure and paitan leaves with the addition of papaya peel bioactivator.This study used an experimental research method with a completely randomized design (CRD) with a factorial pattern.The treatment factors were: Factor 1 weight of duck manure and sick leaves (B1: 300g duck manure+200g paitan leaves, B2: 200g duck manure + 300g paitan leaves), Factor 2: Addition of papaya skin waste bioactivator (P1: 25ml MOL of papaya skin waste , P2: MOL of papaya skin waste 30ml) data analysis used a qualitative descriptive study.The results showed that the best quality was the N test, namely the B1P2 treatment (5.34%), the P test, namely the B2P2 treatment (0.15%),the K test, namely the B2P2 treatment (0.47%).The results showed that the best quality was B1P2 which produced black fertilizer, loose texture, earthy aroma and had a pH of 6.

1. INTRODUCTION

Indonesia is part of a country with a tropical climate, so it is easier for most people to grow crops. In terms of farming, land with adequate soil elements is needed. Please note that the tropical climate can fertilize the soil. Through fertilization, the plants will thrive well because of the nutrients provided. Unfortunately, fertilizers that are often used by the community are inorganic. Inorganic fertilizers have terrible impacts, such as environmental pollution, if used continuously. In addition, the price of inorganic fertilizers, which is too high, affects the quality of the farmers' crops. Overcoming this problem requires another alternative replacing inorganic fertilizers with fertilizers derived from organic materials.

Organic fertilizers can meet the needs required by the soil in meeting the needs of nutrients and improve the earth's physical, chemical, and biological properties (Ketut et al., 2019). The organic materials needed are used as solids and liquids from plant or animal waste. Organic fertilizers can be used as plant fertilizers in solid form. Solid organic fertilizers must contain macro and micronutrients such as Nitrogen, phosphorus, and Potassium. With organic matter in the form of duck manure, the nitrogen and phosphorus content needed by plants can be adequately fulfilled.

Duck manure is still a waste that the community needs to utilize more effectively. The utilization of duck manure includes quality organic matter as fertilizer. However, this requires processing that plant roots can absorb. This duck manure will be processed into fertilizer material that can provide fertility for the soil and plants. Based on research , Duck manure as an organic material can provide the nutrients needed by plants, including the elements of Nitrogen, phosphorus, and Potassium, so the more significant the content of duck manure N: 2.37%, P:

6.89% and K: 0.37%. Adding paitan leaves (Tithinia diversifolia) was carried out to increase the value of the quality of the nutrient content of the duck manure.

Paitan leaves contain active ingredients, especially in the leaves, namely: alkaloids, Flavonoids, saponins, tannins, terpenoids phenolic compounds(Syahputra et al., 2022). Therefore, this part of the leaf, which has bioactive properties, can be used as a plant insecticide. Paitan leaves are wild plants or invasive weeds usually found in tropical areas. According to researchAnnisa (2017), paitan contains N: 3.5%, P; 0.37%, and K 4.10%, so applying paitan compost can reduce inorganic fertilizer doses. Therefore, Paitan has the potential as an inorganic fertilizer supplement to support plant growth and production, reduce pollutants and reduce active P, Al, and Fe adsorption levels.

Papaya peels MOL contains microbes that degrade organic matter as protein decomposition (complex compounds) into more specific elements, including Nitrogen. According toDwiyogo et al. (2022), Nitrogen can be absorbed by plants in the form of ammonium ions or nitrate ions. Therefore, it can be utilized by plants; protein compounds must be broken down into more superficial elements. Microbes contained in MOL from papaya fruit skin are Pseudomonas, Bacillus, and Aspergillus niger. These microbes and fungi also act as phosphorus solvents in the organic matter (Fryatama, 2016). Therefore, the MOL manufacturing solid organic fertilizers also affect the nitrogen content produced.

Based on this background, the problems found with this research are: What is the nutrient content of N, P, and K, and what are the results of sensory observations, which include color, pH, texture, and aroma in solid organic fertilizer (POP) from duck manure and paitan leaves with the addition of papaya peel MOL bioactivator. Therefore, the objectives of this study were as follows: to determine the nutrient content of N, P, and K, to observe sensory input, including color, texture, pH, and aroma in solid organic fertilizer (POP) from duck manure and paitan leaves with the addition of papaya skin MOL bioactivation. This research is expected to provide benefits: 1). Providing innovations as materials for making solid organic fertilizer in the form of duck manure and paitan leaves; 2). Be an alternative organic fertilizer for farmers so that it is not at risk for long-term use.

2. MATERIALS AND METHODS

This research was conducted in Tlangu, Bulan, Wonosari, and Klaten to manufacture organic fertilizers and sensory tests. The Muhammadyah University, Yogyakarta, Faculty of Agrotechnology laboratory, conducted the N, P, and K elemental tests. The research took place from 12 February – 11 March 2023.

The tools used in this study were measuring cups, knives, cutting boards, basins, stirrers, plastic containers, blenders, spoons, label paper, rags, kjdahl flasks, destruction tools, distillation tools, titration tools, pipettes, kjdahl tablets, tubes reaction, volumetric flask, spectrophotometer, and beaker. In addition, the materials used in this study were papaya peel, rice washing water, granulated sugar, aqua dest, paitan leaves, and duck manure.

The research procedures included: 1) preparing four pieces of plastic, each labeled to mark the treatment combination. 2). Put 25 ml and 30 ml of papaya skin MOL bioactivator into the plastic according to the treatment combination. 3). Add 200g and 300g of duck manure into the plastic according to the treatment combination 4). Finally, put as much as 200g and 300g of paitan leaves into the plastic according to the treatment combination. 5). Stir all the ingredients that have been mixed until smooth. 6) Stir and open every three days.

This study uses experimental research methods in descriptive qualitative and quantitative methods Two Way Anova. This study used a completely randomized design (CRD) with a factorial pattern consisting of 4 treatments and three replications. The treatment factors are as follows: Factor 1 is the weight of the duck manure and pain leaves (B_1: 300g duck manure + 200g paitan leaves, B_2: 200g duck manure + 300g paitan leaves), Factor 2: Addition of papaya skin MOL bioactivation (P_1: MOL papaya skin 25 ml, P2: MOL papaya skin 30 ml).

3. RESULTS AND DISCUSSION

Based on the test results of each treatment in laboratory tests (N, P, and K) on the average test results of solid organic fertilizer duck manure and paitan leaves with the addition of MOL papaya skin bioactivator, presented as follows:

Table1. Average laboratory test results for N, P, and K on solid organic fertilizer from duck manure and paitan leaves with the addition of papaya peel MOL bioactivator

No	Treatment	N total (%)	P total (%)	K total (%)
1	B_1P_1	3.52	0.11	0.41
2	B_1P_2	5.34	0.14	0.47*
3	B_2P_1	4.01*	0.14	0.39
4	B_2P_2	3.92	0.15*	0.39

Description: * = Highest element value

3.1. Nitrogen

Nitrogen (N) levels based on Table 1 contained in solid organic fertilizer of duck manure and paitan leaves with the addition of papaya skin MOL bioactivation in four treatments, namely B_1P_1, B_1P_2, B_2P_1, and B_2P_2 after fermentation for four weeks are as follows:

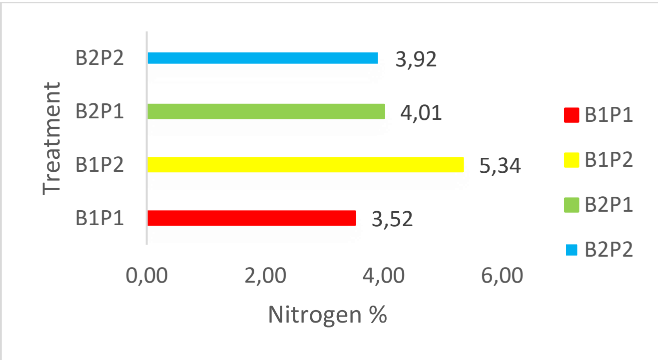

Figure 1. Elemental N test results

Nitrogenase nutrients are needed by plants in large quantities and are absorbed by plants in the form of ammonium (NH4) and nitrate (NO3); these ions come from the decomposition of compounds in the form of proteins by decomposer microorganisms. According to Mustofa (2022), ammonia is the nitrogen produced in the fermentation process. The amount of oxygen in the fermentation process is minimal, so the ammonia obtained in the fermentation process cannot be converted into nitrate, and nitrogen can be lost in the form of NH3 gas at high pH and temperature conditions. Nitrogen plays an essential role in stimulating plant vegetative growth. The research data results in Figure 2 shows that the highest nitrogen content was found in the B_1P_2 treatment, 5.34%, and the lowest nitrogen content was in the B_1P_1 treatment, 52%. The B_2P_1 treatment was 4.01%, and the B_2P_2 treatment was 3.92%. The observed data above shows that the N content in this organic fertilizer complies with the standard quality criteria for organic fertilizer, namely a minimum total N content of 0.40% (SNI-19-7030-2004). This is reinforced by conducting tests using Two Way Anova data analysis in the following table: From the observed data above, it shows that the N content in this organic fertilizer complies with the standard quality criteria for organic fertilizer, namely a minimum total N content of 0.40% (SNI-19-7030-2004). This is reinforced by conducting tests using Two Way Anova data analysis in the following table: From the observed data above, it shows that the N content in this organic fertilizer complies with the standard quality criteria for organic fertilizer, namely a minimum total N content of 0.40% (SNI-19-7030-2004). This is reinforced by conducting tests using Two Way Anova data analysis in the following table:

Table 2. Dependent Variable: Nitrogen Content

Tests of Between-Subjects Effects					
Dependent Variable: Kandungan_N					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5.629[a]	3	1.876	10722.714	.000
Intercept	211.428	1	211.428	1208160.429	.000
Bahan_Utama	.649	1	.649	3706.714	.000
Bioaktivator	2.245	1	2.245	12826.714	.000
Bahan_Utama * Bioaktivator	2.736	1	2.736	15634.714	.000
Error	.001	8	.000		
Total	217.059	12			
Corrected Total	5.631	11			
a. R Squared = 1.000 (Adjusted R Squared = 1.000)					

On Two-Way Anova results in Table 2. The main ingredients are duck manure, and Paitan leaves in sig. i.e. 0.000<0.05. In bioactivators with sig. 0.000 <0.05, and the interaction between the main ingredient and the activator affects the nitrogen content. Due to the high N content in the duck manure, which is 2.37%, pain leaves at 3.5%, and the bacteria in the MOL of papaya skin, which causes the effect on nitrogen content. Based on this treatment, the high nitrogen content in solid organic fertilizer from duck manure and paitan leaves with the addition of MOL papaya peel bioactivator was due to the large composition of the main ingredients and additional ingredients given. The amount of concentration in this solid organic fertilizer's ingredients will affect the nitrogen yield. On the other hand, the low nitrogen content in solid organic fertilizers of duck manure and paitan leaves with the addition of the MOL papaya skin bioactivator in the B_1P_1 treatment was 3.52% because this treatment used less MOL of papaya skin, namely 25 ml; this is evidenced in table 1. The low nitrogen content is caused by also the loss of nitrogen levels in the form of ammonia gas during the fermentation process, characterized by the appearance of gas from the container during the fermentation of solid organic fertilizers when it is opened.

3.2. Phosphorus (P)

Test results Phosphorus (P) levels in Table 1 contained in solid organic fertilizer of duck manure and Paitan leaves with the addition of the papaya skin MOL bioactivator, which was carried out with four levels of treatment, namely B_1P_1, B_1P_2, B_2P_1, and B_2P_2 after four weeks of fermentation were as follows:

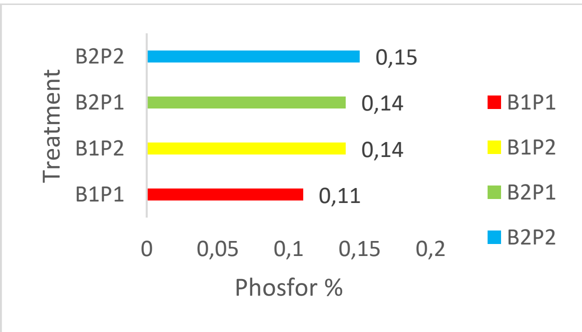

Figure 3. P element test results

Based on research data in Figure 3, it was found that the highest content of element P was in the B_2P_2 treatment with a value of 0.15%, and the treatment with the lowest value was in B_1P_1, namely 0.11%. The results were the same in the B_1P_2 and B_1P_2 treatments, namely 0.14%. The results of the P content test were 0.11% - 0.15%. The observation data above show that the elemental content of phosphorus resulting from the treatment meets the criteria for solid organic fertilizer quality raw materials by SNI 1970-30-2004 with a minimum total requirement of 0.10%. The low content of P produced can be caused by the content of total N from papaya fruit skin is also low, which is 0.14% (Syahputriani, 2017). Because protein is a complex compound composed of elements C, H, O, and N, and sometimes P and S will be broken down into simpler compounds, and one of them is phosphorus. Therefore, based on the research data results, the nitrogen content is greater than the P element content because the P element in the chemical formula of protein is only a side chain. The P element content in fertilizers is related to the nitrogen element content in the material from the manufacture of fertilizers. The higher the nitrogen content in the material, the multiplication of microorganisms that will break down the P element will increase, and the P element content in fertilizers will increase along with the higher the P content in the material (Fryatbhanneet, 2016). According to Syahputriani (2017), the P content contained in papaya fruit skin is relatively small, namely 0. 02%, so the P element produced in this study was relatively small. This is by the data obtained in the Two Way Anova test as follows:

Table 3. Dependent Variable: Phosphorus Content

Tests of Between-Subjects Effects

Dependent Variable: Kandungan_P

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.003[a]	3	.001	2.400	.143
Intercept	.219	1	.219	583.200	.000
Bahan_Utama	.001	1	.001	3.200	.111
Bioaktivator	.001	1	.001	3.200	.111
Bahan_Utama * Bioaktivator	.000	1	.000	.800	.397
Error	.003	8	.000		
Total	.224	12			
Corrected Total	.006	11			

a. R Squared = .474 (Adjusted R Squared = .276)

Based on the Two-Way Anova test results for phosphorus elements in Table 3, the duck manure and Paitan leaves with sig. 0.111> 0.05, MOL papaya skin bioactivator with sig. 0.111> 0.05, and the interaction with the content of the element phosphorus has no effect. With this, the content of each ingredient, namely duck manure, is 6.89%, and pain leaves 0.37%, with the addition of a bio activator so that there is no effect or interaction between the ingredients and the activator. In the B_1P_1 treatment, with a bioactivator concentration of 25 ml, it was seen to produce a low phosphorus content. In contrast, compared to the B_2P_2 treatment, which used a bioactivator concentration of 30 ml, the phosphorus content was higher; this could happen because the 30 ml bioactivator contained microorganisms that were actively growing. This is in line with Kusumadewi's research (2019) that phosphorus-degrading microbes grow and spread the fastest, causing an increase in microbial activity in the decomposition of organic matter and contributing to an increase in phosphorus levels.

3.3. Potassium

ResultsTesting the levels of potassium (K) in Table 1 contained in solid organic fertilizer of duck manure and Paitan leaves with the addition of papaya skin MOL bioactivation in 4 treatments B_1P_1, B_1P_2, B_2P_1, and B_2P_2 after four weeks of fermentation were as follows:

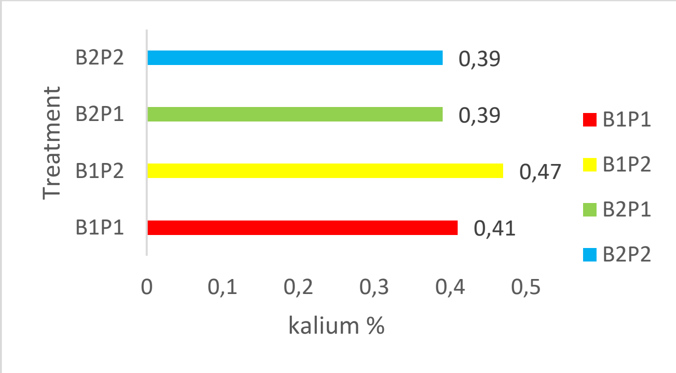

Figure 4. K-element test results

Based on the observational data in Figure 4, the Potassium test was found in the B_1P_2 treatment with the highest elemental yield of 0.47%, while the lowest treatment results were found in B_2P_1 and B_2P_2. In the B_1P_1 treatment, the result was 0.41%. The testing results on potassium levels obtained in this study were between 0.39% - 0.41%. The value of potassium content from the observations meets the criteria for organic fertilizer-quality raw materials according to SNI 1970-30-2004, which requires a minimum potassium content of 0.20%. Rahmawati (2020) states that the element potassium contained in potassium dioxide (K_2O) compounds in the substrate is used by microorganisms as a catalyst; this will affect the presence of bacteria and their activity in the fermentation process. Element K is stored and bound by bacteria and fungi in cells; potassium will be available again if it is degraded again by microorganisms. In another source Safitri et al. (2017), Potassium is an element produced from the process of bacterial metabolism; in bacteria, it will use free K+ ions contained in organic matter as a catalyst so that the potassium level will increase along with the increasing number of bacteria. According to Afiyah et al. (2021) that the activity that occurs in microorganisms during the process of degrading organic matter in the process of making fertilizer will cause the carbon chains in organic matter to break down into more specific elements so that it will cause an increase in the element of Potassium in the fertilizer produced. Potassium levels increase along with growing and increasing the number of bacteria. Reinforced by the data generated in the data analysis test using Two Way Anova, namely as follows:

Table 4. Dependent Variable: Potassium Content

Tests of Between-Subjects Effects

Dependent Variable: Kandungan_K

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.013a	3	.004	14.333	.001
Intercept	2.067	1	2.067	6889.000	.000
Bahan_Utama	.008	1	.008	25.000	.001
Bioaktivator	.003	1	.003	9.000	.017
Bahan_Utama * Bioaktivator	.003	1	.003	9.000	.017
Error	.002	8	.000		
Total	2.082	12			
Corrected Total	.015	11			

a. R Squared = .843 (Adjusted R Squared = .784)

Two-Way test results ANOVA in Table 4 of the potassium element in the dirt and pain leaves with a sig. 0.001<0.05, bioactivator with sig. 0.017< and the interaction between the main ingredient and the activator significantly affects the potassium element content. With this, the content of 0.70% duck manure and 4.10% pain leaves with the addition of MOL papaya skin causes an effect on potassium content. Potassium content in organic fertilizers in the combination of materials between treatments with the highest and lowest content yields has a different concentration composition, causing different potassium content results. The difference between the highest and lowest treatment results is in the content of the materials used; it can affect the results of the potassium content.

Table 5. Average sensory testing (aromatic, texture, color, and pH) on fertilizer from duck manure and paitan leaves with the addition of papaya peel MOL bioactivator

No	Treatment	Observation result			
		Color	Texture	Aroma	pH
1	B_1P_1	Dark brown	Rather subtle	Land	6,6
2	B_1P_2	Very black	Crumb	Land	7
3	B_2P_1	Chocolate	Rather rough	Less stinging	6
4	B_2P_2	Chocolate	Rather rough	It stings enough	6,3

Information :

Color : 1 = Yellow, 2 = Brown, 3 = Dark Brown, 4 = Very Black
Texture : 1 = Coarse, 2 = Slightly Coarse, 3 = Slightly Smooth, 4 = Crumbly
Smell: 1 = Very pungent, 2 = Quite pungent, 3 = Less pungent, 4 = Smells of earth
B_1P_1 : 300 grams of duck manure and 200 grams of paitan leaves with the addition of 25 ml of MOL
B_1P_2 : 300 grams of duck manure and 200 grams of paitan leaves with the addition of 30 ml of MOL
B_2P_1 : 200 grams of duck manure and 300 grams of paitan leaves with the addition of 25 ml of MOL
B_2P_2 : 200 grams of duck manure and 300 grams of paitan leaves with the addition of 30 ml of MOL

B_1P_1

B_1P_2

B_2P_1

B_2P_2

Figure 5. Fertilizer sensory test results (aroma, texture, and color) on fertilizer from duck manure and paitan leaves with the addition of papaya skin MOL bioactivator

3.4. Color parameters

Based on Table 2. And figure 1. The results of observations on the sensory test with the color parameters of organic fertilizer from duck manure and paitan leaves with the addition of the papaya skin MOL bio activator showed that of the four treatments, the best results were obtained according to Figure 5, namely in the B_1P_2 treatment with fertilizer color, namely black on number 4.

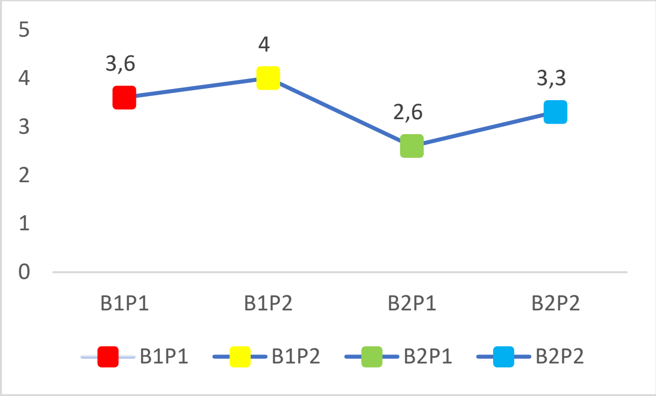

Figure 6. Average color test results

At the beginning of the fermentation, all treatments had the same color as the raw material, namely light brown. Until the end of the fermentation, there was a change in each treatment. Per Figure 5, the results of the color test on B_1P_1 are blackish brown, B_1P_2 is very black, B_2P_1 and B_2P_2 are brown. In the fermentation process, there is a decomposition of organic matter by microbes that take water, oxygen, and nutrients from organic matter, which will then undergo decomposition and release CO_2 and O_2. The color change in the fertilizer is due to organisms that work actively in the decomposition process, namely in the form of duck manure and pain leaves, which are present in each treatment. This is appropriate Abdullah, (2018) states that a color change during composting is caused by the decomposition process carried out by microbes. The color change in solid organic fertilizer is caused by comparing the materials used to manufacture solid organic fertilizer. These organic materials will be converted into nutrients to lose their color pigments which causes the color to turn black. This is in opinion Sarpong et al. (2019) state that the color change that occurs is due to the composting process, which changes organic matter with complex C chains into simple C forms. This process will cause the composted material to lose its color pigment, so the color turns black according to its constituent elements so that the final result of fermenting fertilizer with a black color is obtained according to the standard provisions (SNI No 19-7030-2004), which states that when solid organic fertilizer is ripe, it will have a black color like soil.

3.5. Texture Sensory Test

Based on the sensory observation test results of solid organic fertilizer from duck manure and Paitan leaves with the addition of papaya skin MOL bioactivator with texture parameters in Table 2. And figure 1. Shows that the texture of fertilizer in the B_1P_2 treatment has the best texture, namely crumb-like soil, compared to other treatments.

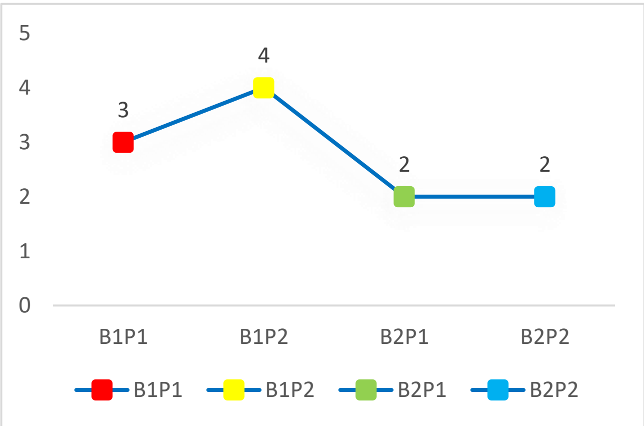

Figure 7. Average texture test results

Differences in texture in fertilizers are caused by the decomposition process using different combinations that affect the final fertilizer yield. The addition of decomposers to fertilizers aims to speed up the decomposition process of fertilizers. The smaller the available particles, the faster the decomposition process will be. The treatment with a rough texture because the decomposing organisms in the fertilizer cannot decompose organic waste quickly. The final results of the sensory parameters of the texture show that the fertilizer has resulted in small particles. Figure 6 shows the results for the B_1P_1 treatment with a rather fine texture at number 3 and the B_2P_1 and B_2P_2 treatments with a slightly rough texture at number 2. This is by government regulations in the form of compost quality standards, namely 0.55-25mm (SNI-19- 7030-2004). Fertilizers with a crumb texture, like soil, will be more easily absorbed by plants. So that the nutrient content in the fertilizer has decomposed, when it is applied, it will be directly absorbed by plant roots.

3.6. Aroma Sensory Test

Based on the sensory observation test results of organic fertilizer from duck manure and Paitan leaves with the addition of papaya skin MOL bioactivator with texture parameters in Table 2. And Figure 7. The aroma of fertilizer in the B_1P_1 and B_1P_2 treatments had the best aroma, namely an earthy smell.

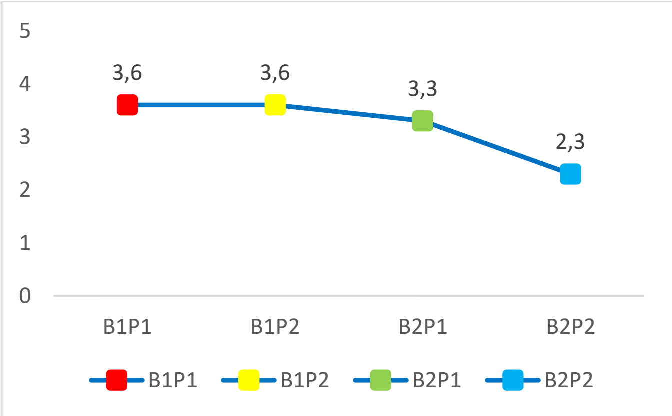

Figure 8. Average aroma test results

The aroma produced by the fertilizer is a sign of decomposition activity by decomposer organisms. The organisms used as decomposers will break down the organic matter into ammonia so that the gas produced can affect the odor present in the material. The odor generated can also come from materials that are too wet. The odor produced will decrease over time, and the pungent smell at first will be replaced with an earthy odor which indicates that the compost is ripe. In the B_2P_1 treatment, the results of a less pungent odor are shown in number 3.3, in the B_2P_2 treatment, the odor is quite pungent. This is by the opinionMentari et al. (2021), which states that the odor produced will decrease over time, and the rotten smell at the beginning of composting will be replaced by an earthy odor indicating that the compost is ripe. The unpleasant smell of compost is due to the process of forming ammonia from the organic matter due to decomposition activity by decomposer organisms where this compound is volatile. At the end of the fermentation, it was found that the fertilizer had an earthy aroma, which by the government decree stated that ripe compost would have an earthy smell (SNI No 19-7030-2004).

3.7. pH content

Based on Table 1. and Figure 4. Observations on the sensory test with the color parameters of organic fertilizer from duck manure and Paitan leaves with the addition of papaya skin MOL bioactivation show that of the four treatments, the pH results obtained can be said to be good because it has a susceptible pH content between 4-9. This is by the Minister of Agriculture

Regulation No. 70/Armenian/SR.140/10/2011 and is reinforced by stating that for good growth, the range of pH content is from 4 to 9 (SNI No 19-7030-2004).

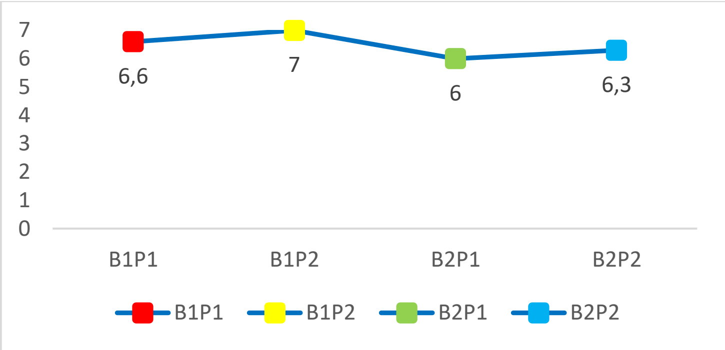

Figure 8. Average fertilizer pH test results

High and low pH can be affected by the activities of decomposing organisms due to the process of converting organic matter into organic acids. This is by research Suwatanti, (2017), which states that changes in pH that occur at the composting stage are thought to be due to the formation of acids by decomposing organisms. The process of decomposition of organic matter by these organisms produces lactic acid and other organic acids, which are weak. In addition, the experimental results showed that the pH was close to neutral, which was caused by mature compost. The increase in pH close to the neutral number can be due to the mineralization process. This is in line with the opinion that the pH of mature compost is usually close to a neutral pH. The increase in neutral pH is due to the addition of organic matter due to the mineralization of organic anions into CO2 and H2O or due to the alkaline nature of the organic matter. Duck manure and paitan leaves, with the addition of papaya peel MOL bioactivator, can be used as a solid organic fertilizer that provides macro-nutrients for plants. This solid organic fertilizer can provide alternatives to farmers as a substitute for chemical fertilizers.

4. CONCLUSIONS

Based on the results of the study, it was shown that the organic fertilizer from duck manure and Paitan leaves with the addition of papaya peel MOL bio activator had, on average good quality in terms of the quality of the elements N, P, and K, and quality tests in the form of color, texture, aroma, and pH by SNI No. 19-7030-2004. In the B_1P_2 treatment with the highest yield, namely the highest N element, namely 5.34%, Potassium element, namely 0.47%, and in the best organic fertilizer quality test, which had black fertilizer results, crumb texture, soil aroma with a pH of 7. The highest phosphorus test result was 0.15% in the B_2P_2 treatment. The limitations of the researchers in this study were obtaining fertilizer materials in large quantities. It is hoped that in the future, further research will be carried out on organic fertilizers for duck manure and paitan leaves with the addition of MOL papaya skin with a larger organic matter composition, and it is necessary to carry out further tests on the application of solid organic fertilizers It's in plants.

5. ACKNOWLEDGMENTS

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