

Analysis Of Nutrient Content And Organoleptic Test Of Fish Waste POC With The Addition Of Ecoenzyme

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ABSTRACT

Nutrients in fish waste can cause pollution (eutrophication) when directly discharged into waters. Efforts to minimize this can be done by processing fish waste into POC. Making POC from fish waste can be done by adding ecoenzymes. The purpose of this study was to observe the organoleptic, pH and nutrient content of POC from fish waste with and without the addition of ecoenzymes. The stages of the study were ecoenzyme production, POC products, organileptic tests, pH observations, and analysis of nitrogen (N), phosphorus (P), and potassium (K) content. Based on the results of the study on the observation of organoleptic odor tests before fermentation, Bucket 1 without the addition of ecoenzyme has a slightly rotten and fishy odor, reddish brown in color, pH 6, after fermentation it has a sour and fishy odor, brown in color pH 5. Bucket 2 With the addition of ecoenzyme has a slightly rotten and fishy odor, reddish brown in color, pH 5, after fermentation it has a slightly sour and fishy odor, brown in color, pH 4. The NPK content in bucket 1 without the addition of ecoenzyme is 0.35%, 0.19%, 0.09%, in bucket 2 with the addition of ecoenzyme is 0.57%, 0.32%, 0.12%.

Introduction

The city of Jayapura is a coastal area that produces abundant fish in the province of Papua. The abundant supply of fish creates problems of fish waste accumulation in the form of fish washing water, heads, skins, bones, and other unused parts of the fish [1].

Fish waste is an organic material that is easily decayed and can trigger the emergence of various diseases; moreover, the high nutrient content such as the nutrient elements in fish waste can cause water pollution (eutrophication) when directly discharged into water bodies. This eutrophication can lead to a decrease in water quality, uncontrolled algae growth that impacts the decrease in oxygen levels to mass fish deaths. Efforts to minimize this issue can be carried out by processing fish waste into liquid organic fertilizer (POC) [2].

Liquid organic fertilizer, commonly known as POC, is a type of natural organic fertilizer in liquid form that is produced from

the processing of fish waste through a fermentation process assisted by microorganisms or enzymes. POC functions and plays a role in the growth process of plants because it contains essential nutrients such as nitrogen, phosphorus, and potassium that can maximize the growth of the roots, stems, and leaves of plants, and it also impacts the fertility of plants [3]. Based on the research results [4] fish waste can be processed into POC which has an impact on the growth of cucumber plants. The process of making liquid organic fertilizer (POC) from fish waste can improve its quality through the addition of ecoenzymes.

Ecoenzyme is a brown liquid that has a distinctive aroma that is obtained through an anaerobic fermentation process. Ecoenzyme can be obtained from the fermentation of various household organic waste such as vegetable waste and fruit peels [5] Ecoenzymes contain

complex nutrient components that play an important role in the soil fertilization process. In addition, coenzymes act as biocatalysts in accelerating the waste decomposition process and are able to reduce unpleasant odors in the fish waste fermentation process [6].

Based on the background above, it is expected that the nutrient content in fish waste POC will increase with the addition of coenzymes, and can provide good organoleptic test results.

Method

Material

The materials used are banana and pineapple peels, fish waste, distilled water, brown sugar, EM4, H_2SO_4 , NaOH, HCL. The tools used are plastic containers, buckets, pH meters, test tubes, vortex, UV-Vis spectrophotometer, atomic absorption spectrophotometer (AAS)

Sampling

Samples of coenzyme production waste in the form of banana and pineapple peels were obtained from fried banana traders and pineapple rujak sellers in Kloofkamp, Jayapura City. Fish waste samples were obtained from fish traders in Jayapura City.

Ecoenzyme Production

Banana peels and pineapple peels are washed thoroughly in running water, then cut into cubes and put into a clean and dry plastic container. Next, brown sugar solution and clean water are added, with a ratio of 3000 grams of sample, 1000 grams of brown sugar and 10.000 mL of water. All the mixtures that have been put into the plastic container are then stirred and tightly closed for approximately 90 days. After 90 days, the fermentation results are filtered using a filter cloth, the filtrate obtained is an ecoenzyme that is ready to use [7]

Fish Waste POC Production

Prepare two clean and dry buckets, then in the first bucket put 250 grams of fish waste consisting of fish heads, bones and skin. Then add 125 mL of fresh coconut water, 250 mL of brown sugar solution and EM4 as much as 3 bottle caps. The second bucket of fish waste,

coconut water, brown sugar solution and EM4 are put into the bucket with the same composition as the first bucket, but in the second bucket, coenzyme is added as much as the amount of EM4. After all the ingredients are in the bucket, then stir and close tightly for approximately 21 days. After 21 days the POC fish waste is ready to be harvested by separating the residue and filtrate, the filtrate obtained is the POC fish waste from fermentation which is ready to be analyzed [8]

Organoleptic Test

The organoleptic tests carried out included observing changes in color, aroma/smell after the fish waste POC fermentation process.

pH observation

pH observations were carried out before and after the fish waste POC fermentation process

Determination of Nitrogen Content

Put 1 mL of sample into the digestion tube then add 10 mL of concentrated H_2SO_4 and 2 grams of catalyst, then perform blank determination. The mixture is then digested for 1.5 hours, then distilled and added as much as 35 mL of 40% NaOH. Then the distillation results are added as much as 25 mL of boric acid, distillation is ended when the volume of distillate has reached 50 mL. The distillate that has been collected is then titrated with 1 N HCL solution until the color changes from green to pink [9]

Determination of Phosphorus Levels

Put 2 mL of sample into a shaker bottle and add 10 mL of 25% HCL. Then the mixture was shaken for 30 minutes then left for 24 hours, after 24 hours the mixture was filtered using filter paper. The resulting filtrate was then pipetted as much as 0.5 mL into a test tube and added as much as 2 mL of distilled water, then shaken using a vortex until homogeneous. The homogeneous mixture was then analyzed using a UV-Vis spectrophotometer at a maximum wavelength of 693 nm

Determination of Potassium Levels

Put 2 mL of sample into a shaker bottle, then add 10 mL of 25% HCL and the mixture is shaken for 30 minutes. The homogeneous mixture is left for 24 hours. After 24 hours the mixture is filtered using filter paper, the filtrate obtained is then pipetted as much as 0.5 mL and added 9.5 mL of distilled water. The mixture is shaken using a vortex until homogeneous, then analyzed using AAS.

Result and Discussion

Organoleptic Test

Organoleptic observations conducted in this study include color and aroma. Observations were conducted before and after the fermentation process, this was done because the fermentation process was anaerobic. Frequent opening of the container during the fermentation process causes contamination of microorganisms and changes in pH and temperature during the fermentation process.

Table 1. Scent Observation

Sample	Before Fermentation	After Fermentation
Bucket 1	Bad and fishy smell	Sour and Fishy Smell
Bucket 2	Bad and fishy smell	Sour and slightly fishy smell

Table 1 shows that before the fermentation process, the samples in buckets 1 and 2 had an unpleasant and fishy odor. After the fermentation process, bucket 1 without the addition of ecoenzyme POC had a sour odor and still smelled fishy, while bucket 2 with the addition of ecoenzyme had a fresh sour odor and a slight fishy odor. Bucket 2 with the addition of ecoenzyme POC had a smell that was not as fishy as without the addition of ecoenzyme, this was because ecoenzyme functioned as a bioactivator that was able to work to accelerate the waste decomposition process so that it could reduce the fishy odor in POC. The presence of a fresh sour aroma in buckets 1 and 2 was caused by the activity of anaerobic microbes during the fermentation process which was able to increase the acidity

level. The fresh sour aroma produced is a parameter of the success of a fermentation [10].

Table 2. Color Observation

Sample	Before Fermentation	After Fermentation
Bucket 1	Reddish Brown	Brown
Bucket 2	Reddish Brown	Brown

Table 2 shows the color of the samples before and after fermentation, before fermentation for bucket 1 without the addition of ecoenzyme and bucket 2 with the addition of ecoenzyme produced a reddish brown color and after the fermentation process for 21 days the samples in buckets 1 and 2 turned brown. The brown color produced in buckets 1 and 2 is an indicator of successful fermentation. One indicator of successful fermentation of fish waste POC is producing a brown color at the end of the fermentation process [11]

pH observation

pH is an important parameter that is the basis for the success of fermentation. pH affects the activity of microorganisms that work during the fermentation process. Microorganisms that play a role in the process of decomposing organic waste must have the appropriate pH to be able to work optimally in decomposing organic waste. A pH that is too low or too high can cause microorganisms to die and the fermentation or decomposition process does not occur.

Table 3. pH Observation Result

Sample	Before Fermentation	After Fermentation
Bucket 1	pH 6	pH 5
Bucket 2	pH 5	PH 4

Table 3 shows that in buckets 1 and 2 there was a decrease in pH before and after fermentation, this is because the microorganisms have worked optimally in breaking down organic waste into organic acids. Acidic pH conditions are the appropriate

pH for the growth of decomposing microorganisms in organic waste materials that smell bad [12].

Results Of N,P,K Content Analysis

Testing the content of Nitrogen (N), phosphorus (P) and Potassium (K) in fish waste POC samples aims to ensure whether they comply with the NPK POC standards, thereby providing benefits at the time of application. Nitrogen (N) functions to stimulate overall plant growth from stem leaves to roots. Fofsor (P) functions to stimulate root development, strengthen roots and is able to increase harvest acceleration. Potassium (K) functions to help plants absorb water through the stomata, with sufficient water available to plants, plants will avoid pest attacks that cause plant damage [13].

Table 4. Average content of N,P,K Bucket 1

Repetition	Composition (%)		
	N	P	K
1	0,36	0,17	0,08
2	0,34	0,18	0,07
3	0,35	0,22	0,12
Average	0,35	0,19	0,009

Table 5. Average content of N,P,K Bucket 2

Repetition	Composition (%)		
	N	P	K
1	0,58	0,31	0,10
2	0,57	0,32	0,13
3	0,56	0,32	0,13
Average	0,57	0,32	0,12

Table 6. Result Of N, P ,K

Sample	Composition (%)		
	N	P	K
Bucket 1	0,35	0,19	0,09
Bucket 2	0,57	0,32	0,12

Table 4 shows the Nitrogen (N) content in bucket 1 without the addition of ecoenzyme of 0.35% and bucket 2 with the addition of ecoenzyme of 0.57%. The nitrogen content in bucket 2 with the addition of ecoenzyme has a higher content than without the addition of ecoenzyme. The phosphorus (F) content in bucket 1 without the addition of ecoenzyme is

0.19% and increases in content in bucket 2 with the addition of ecoenzyme of 0.32%. The potassium (K) content in bucket 1 without the addition of ecoenzyme is 0.09% and increases in content in bucket 2 with the addition of ecoenzyme of 0.12%. Based on the results obtained, the ecoenzyme content can increase the levels of nitrogen, phosphorus and potassium in fish waste POC, this is because ecoenzyme is a fermented solution that contains nutrients, ecoenzyme in the study was made from banana and pineapple peels which have a nitrogen content (N) of 0.067%, phosphorus (P) of 0.024% and potassium (K) of 0.166% [14]. However, the NPK content of fish waste POC with and without the addition of ecoenzyme is still below the established standard, namely 2-6%, the low NPK content in fish waste POC is because the fermentation process time is only 21 days so it is not optimal [15]. The duration of fermentation plays an important role in determining the NPK content in fish waste POC as it affects the decomposition process of organic materials and the release of nutrients. As time increases, proteolytic microbes and phosphate solubilizers break down proteins and dissolve minerals, resulting in a significant increase in NPK content [16].

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Conclusion

1. Bucket 1 before fermentation without the addition of ecoenzyme has a slightly rotten and fishy smell, reddish-brown color, pH 6, after fermentation the smell is sour and fishy, brown color, pH 5, with N content = 0.35%, P = 0.19%, K = 0.09%.
2. Bucket 2 with the addition of ecoenzyme has a slightly rotten and fishy smell, reddish-brown color, pH 5, after fermentation the smell is slightly sour and fishy, brown color, pH 4, with N content = 0.57%, P = 0.32%, K = 0.12%.

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