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Analysis Nutrient Content of Stem Banana Compost as Organic Fertilizer

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ABSTRACT

Organic fertilizer is a type of fertilizer obtained from natural organic materials. This organic material is in the form of plant residues, animal waste, organic waste and other organic materials which are processed into fertilizer. One type of organic fertilizer that farmers can use is compost made from organic materials derived from banana stem waste. Banana stem waste has a high organic content is 83%, with a lignin and cellulose content of around 15-20% and hemicellulose around 14.6%. The aim of the research was to determine the nutrient content of banana stem compost. Composting was carried out using a Randomized Block Design with 5 repetitions. Sampling of mature compost was carried out in a composite manner by taking 80 grams from each replication and collecting them for a total of 400 grams. The samples are then analyzed at the Central Plantation Services (CPS) laboratory. Parameters tested: water content, % N, % P2O5, % K2O, % Mg, % Ca, organic C and pH. Data analysis was carried out descriptively by comparing the quantity and quality parameters of compost according to Indonesian National Standard No. 197030-2004. Through research, the results obtained were 38.4% water content, N (0.89%), P_2O_5 (0.40%), K_2O (1.63%), Mg (0.38%), Ca (0.99%) , C-organic (29.4%) and pH (7.97%). The chemical properties of the banana stem compost obtained meet the national compost quality standards SNI No. 197030-2004.

Keywords: *banana stem, compost, nutrients content, organic fertilizers, organic materials*

1. INTRODUCTION

The currently widely used fertilizers are organic fertilizers such as compost, which have many advantages over anorganic fertilizers. The advantage of organic fertilizer is that it not only provides nutrients, but also improves the physical properties of the soil and increases the activity of soil microorganisms.

Composted fertilizers are useful for a variety of reasons, including not polluting the environment, low cost, simple manufacturing process, and raw materials are not difficult to obtain. Organic matter is one of the components of soil quality. Addition of organic matter is necessary to create best soil quality. According to Pereira *et al.* (2014), organic matter is a buffer that improves the physical, chemical, and biological properties of soil. Composting involves the decomposition of organic materials by microorganisms that use them as an energy source (Dewi and Tresnowati, 2012).

Compost is a type of fertilizer obtained from natural organic materials. From an environmental perspective, composting can reduce the volume of waste in our environment, because most of this waste is organic waste (Surtinah, 2013).

This organic material is in the form of plant residues, animal waste, organic waste and other organic materials which are processed into fertilizer. One type of organic fertilizer that farmers can use is compost made from organic materials derived from banana stem waste. Bananas are a plant that is widely planted by farmers and has many benefits.

Banana plant parts such as stems, fruit peels and banana tubers are rarely used and are simply thrown away as waste. Banana stem waste has a high organic material content of 83%, lignin and cellulose content of around 15–20%, and hemicellulose content of around 14.6%, so it can be used as organic fertilizer through composting (Zhang, 2013).

2. MATERIAL AND METHODS

The research was carried out in the compost house of the Aie Malanteh Batu Farmers Group in Lima Puluh Kota District. The material used was 400 grams of mature stem banana compost. Composting was carried out using a Randomized Block Design with 5 repetitions. Sampling of mature compost was carried out in a composite manner by taking 80 grams from each replication and collecting them for a total of 400 grams. The samples were analyzed at the Pekanbaru Central Plantation Service (CPS) Laboratory. Parameters tested: water content, % N, % P2O5, % K2O, % Mg, % Ca, organic C and pH.

Table 1. Test method used from Central Plantation Services :

No	Parameter Tested	Test Method
1	Water content	Oven 105^0 C for 16 hours
2	Total N	Kjeldahl
3	Total P_2O_5	Spectrophotometry
4	Total K_2O	Flamephotometry
5	Total Mg	AAS
6	Total Ca	AAS
7	Organic Carbon	Loss in Ignition
8	pH	pH meter

Source : Laboratorium Central Plantation Sevices

Data analysis was carried out by comparing the quantity and quality parameters of compost or organic fertilizer with the Indonesian National Standard (SNI) No. 197030-2004 to provide a descriptive picture of the quality of compost or organic fertilizer production.

3. RESULT AND DISCUSSION

Compost analysis or compost testing is the activity of analyzing soil samples to determine their condition and characteristics based on chemical properties. The aim of this analysis was to determine the macro nutrient content (N, P, K, Ca, Mg, S) available from banana stem compost. The results of technical analysis in the laboratory on the concentrations of macro nutrients N, P, K, Ca and Mg in banana stem compost can be seen in Table 1. The resulting chemical analysis values are compared with the quality of the compost which meets the national compost quality standards SNI No. 197030-2004.

Table 1. Results of nutrients content of banana stem compost

No	**Parameter**	**Value**	**SNI No. 197030-2004**
1	Water content (%)	38,4	Maks 50%
2	N (%)	0,89	> 0,40
3	P_2O_5 (%)	0,40	> 0,10
4	K_2O (%)	1,63	> 0,20
5	Mg (%)	0,38	< 0,6
6	Ca (%)	0,99	< 25,50
7	C Organic (%)	29,4	9.8 - 32
8	pH	7,97	netral

Based on the data in Table 1, it can be seen that the compost product resulting from the research is of good quality because it meets the threshold

values required by SNI-compost No. 197030-2004.

1. Water content

The water content required according to SNI-compost is a maximum of 50% and the water content resulting from research is 38,4%. Water content is an important factor in the composting process. This happens if the water content is too low or high, it will reduce the efficiency of the composting process (Kurnia, *et al.* 2017). If the water content exceeds 60%, the air volume is reduced, odors are produced (due to anaerobic conditions), and decomposition is slowed**.**

2. Macro nutrient analysis (% N, % P2O5, % K2O, % Mg, % Ca)

This macro nutrient analysis was carried out at the end of the research when the compost was mature. Compost fertilizer that is suitable for use is one that contains balanced macro nutrients N, P, and K. Unbalanced levels of N, P, and K in compost fertilizer can have a bad impact on plants. One of the negative impacts caused by plants that have sufficient nitrogen for growth will show deficiency symptoms characterized by chlorosis on the leaves.

From Table 1. It can be seen that the macro nutrient analysis from the research is in accordance with the requirements of SNI compost. The total N required is >0.40, while the research results show a result of 0.89%. Total Nitrogen is a measure of the total nitrogen content in a substance, such as soil, water, or an organic sample such as compost. The availability of nitrogen in compost is caused by the process of decomposing organic materials by microorganisms (Surtinah, 2013). The element nitrogen plays a very important role in the formation of plant cells, tissues and organs.

The total P^2O^5 obtained was 0.89% and this is in accordance with the SNI requirements of >0.10%. The presence of phosphorus nutrients in compost is caused by the weathering of organic material originating from waste that is processed into compost. Phosphorus is mainly produced by the weathering of natural mineral rocks, and the rest is produced by the weathering of organic materials. Based on research by Kaswinarni (2016), high phosphorus levels may also be related to nitrogen levels in compost. Added by Marlina et al., 2010. because the higher the total nitrogen content, the higher the number of microorganisms, the higher the number of microorganisms also increases the decomposition of phosphorus, which is one of the causes of the higher phosphorus concentration in compost.

From the potassium analysis that was carried out, the potassium content of K2O was 1.63%. The results obtained have met the standards based on SNI 19-7030-2004, namely 0.20%. Potassium in compost comes from the basic ingredients of the compost. The nutrient content of potassium (K) in rice straw ranges from 1.1-3.7%. According to Wirosoedarmo (2019), organic materials that already contain the element K are still complex organic materials so plants cannot utilize them. The microorganisms in the starter use K for their activities, and the process by which complex organic materials are broken down into simpler organic materials during composting makes the element K available to plants.

From Table 1. The total Mg obtained is 0.38% and meets the SNI compost requirements of 0.6%. The

presence of Mg is obtained from the organic materials used and the addition of bioactivators which accelerates the fermentation of organic materials thereby producing nutrients. The process of decomposing organic substances occurs aerobically or anaerobically in the biological activity of microorganisms and mesofauna, producing nutrients and humus (Setiyorini, 2006 *cit* Simamora 2022).

The resulting Ca analysis was 0.99% and in accordance with SNI standards for compost of <25.50%. According to Hidayati (2023), to determine the quality of the compost, identify the Mg and Ca nutrients in the compost. The magnesium and calcium nutrients in compost come from organic materials contained in the substrate. Differences in the C/N ratio of the substrate affect the Mg and Ca content in the compost.

3. C-Organic

The C-Organic content is an important element for organic fertilizer, because it is intended to increase soil organic matter. The C-organic content in the compost produced is included in the SNI 19-7030-2004 organic fertilizer quality standard (9.80%-32%), is 29,4%. The lower the C-organic content of the compost indicates the better the decomposition process carried out by microorganisms during the composting process.

4. pH

The degree of acidity (pH) produced exceeds the SNI requirements for compost of 7.97. According to Kaswinarni, 2016. A pH value between 5.5 and 8.5 is the optimal pH range for compost microorganisms. When bacteria and fungi decompose organic material in compost, the bacteria and fungi will release organic acids.

4. CONCLUSION

From the analysis of nutrients in banana stem compost, it was obtained 38.4% water content, N (0.89%), P^2O^5 (0.40%), K^2O (1.63%), Mg (0.38%), Ca (0.99%) , C-organic (29.4%) and pH (7.97%). The chemical properties of the banana stem compost obtained meet the national compost quality standards SNI No. 197030-2004.

REFERENCES

Dewi, Y.S. dan Treesnowati. 2012. Pengolahan sampah skala rumah tangga menggunakan metode composting. *Jurnal Ilmiah Fakultas Teknik LIMIT'S.* 8(2): 35-48.

Hidayati, Y,A. D.Z. Badrussaman, E.T. Marlina, dan E. Harlia. Analisis Ca, Mg, Ktk Dalam Kompos Dari Feses Kambing Perah, Jerami, Limbah Pakan Hijauan. Jurnal Ziraa'ah, 48 (1) : 61-67.

Kaswinarni, F. 2016. Pengaruh Penambahan Variasi Starter pada Pengomposan Sampah Organik Pasar terhadap Kadar N Total, N Tersedia dan C/N Rasio, Prosiding Seminar Nasional Masif II, 152-155.

Kurnia, V.C., S. Sumiyati, G. Samudro. 2017. Pengaruh Kadar Air Terhadap Hasil Pengomposan Sampah Organik Dengan Metode Open Windrow. Jurnal Teknik Mesin (JTM), 6 : 119-123.

Pereira, da S.A., B.L. Carlos., F.J. Cezar., R. Ralisch., M. Hungria., and G.M. De Fatima, 2014. Soil Structure and Its Influence On

Microbial Biomass In Different Soil and Crop Management Systems. Soil & Tillage Research, Vol. 142, pp. 42–53.

Simamora, D.R.P.,S. Sitorus dan D. Tarigan. 2022. Analisis Kadar Magnesium (Mg) Total Dan Mangan (Mn) Pada Penambahan EM4 Terhadap Pupuk Kompos (Sampah Kulit Kedelai - Kacang Panjang). Prosiding Seminar Nasional Kimia 2022. Jurusan Kimia FMIPA UNMUL.

Surtinah, 2013. Pengujian Kandungan Unsur Hara Dalam Kompos yang Berasal dari Serasah Tanaman Jagung Manis (*Zea mays)*. Jurnal Ilmiah Pertanian. 11 (1) : 11-17

Wirosoedarmo, R., Cesaria, R.Y., dan Suharto, B. (2019), Pengaruh Penggunaan Starter Terhadap KualitasFermentasi Limbah Cair Tapioka Sebagai Alternatif Pupuk Cair, Jurnal Sumberdaya Alam dan Lingkungan, 8-14

Zhang, C, Li, J, Liu, C, Liu,X, Wang, J, Li, S, Fan, G, dan Zhang, L. 2013. Alkaine Pretreatment For Enhancement of Biogas Production from Banana Stem and Swine Manure by Anaerobic Codigestion. Bioresource Technology, 149: 353-358.