KEMENTERIAN PENDIDIKAN KEBUDAYAAN RISET DAN TEKNOLOGI
UNIVERSITAS PEMBANGUNAN NASIONAL "VETERAN" JAWA TIMUR
FAKULTAS TEKNIK
Jl. Raya Rungkut Madya Gunung Anyar Surabaya, Telp. 031 8782179 Fax. 031 8782257

SURAT KETERANGAN
HASIL PEMERIKSAAN TINGKAT PLAGIARISME
Nomor : 123 / UN63.3/ TU.PLAGIASI/ III /2023

Yang bertanda-tangan di bawah ini,

Nama	: Dr. Dra. Jariyah, MP.
NIP	: 19650403 199103 2 001
Jabatan	: Dekan Fakultas Teknik

dengan ini menerangkan bahwa Penulis telah melakukan pemeriksaan tingkat kesamaan (plagiarisme) menggunakan *software* **Turnitin** secara mandiri dan **penulis bertanggung jawab** terhadap dokumen publikasi dalam daftar di bawah ini:

Judul Karya Tulis	: Utilization Of Blotong as an Activator Organic Fertilizer
Jenis Publikasi	: Jurnal
Penulis	: Dr. Ir. Munawar Ali, MT.
Tingkat Kesamaan (%)	: 13 %

Demikian Surat Keterangan ini dibuat dengan sebenarnya, agar dapat digunakan sebagaimana mestinya.

Surabaya, 07 Maret 2023
Dekan Fakultas Teknik

Dr. Dra. Jariyah, MP.
NIP. 19650403 199103 2 001

UTILIZATION OF BLOTONG AS AN ACTIVATOR ORGANIC FERTILIZER

by Munawar Ali

Submission date: 06-Apr-2023 10:52AM (UTC+0700)
Submission ID: 2039037331
File name: Munawar-Mirwan_1.docx (93.92K)
Word count: 3052
Character count: 15764

UTILIZATION OF BLOTONG AS AN ACTIVATOR ORGANIC FERTILIZER

Munawar Ali and M. Mirwan
Faculty of Engineering Environmental Engineering Study Program
East Java "Veteran" National Development University

ABSTRACT

Utilizing microbial activity to transform organic waste into material with the characteristics of soil, composting is a method of biological treatment of organic waste. Sugar factory filter cake contains minerals like carbon, nitrogen, phosphate, calcium, and others that can be used to recover soil, such as a high water holding capacity. Green manure made from organic waste is the goal of the research. Filter cake is the waste from the sugar factory mixed with trash.

The aerobic system used in this study adds 1 kg, 2 kg, 3 kg, and 4 kg of filter cake, respectively. The dosage options for the aeration method, both without and with an aerator, are 1.8; 2,7 and 3,6 l/min/kgVs. Rubbish without a filter cake and weighing 3 kg serve as a control.

The study found that a C/N ratio of 19.2 was decreased when 4 kg of filter cake was added to each 3 kg of trash stimulation. The air circulation strategy that is powerful for treating the soil is to utilize an aerator. During composting, the microbial growth influences a decrease of 84% in the C/N ratio.

Key phrases: cake filtering, composting, aeration, and garbage.

INTRODUCTION

Nowadays environmental problems are often caused by waste that is not handled properly. In addition, the large volume of waste reduces environmental aesthetics, disrupts people's lives if it is not handled immediately. The Candi Baru Sugar Factory in Sidoarjo produces solid waste in the form of filter cake of ± 60 tons/day or 3 % sugar cane, dry ash 28.8 tons/day and wet ash ± 27 tons/day (report of PG Candi Baru Sidoarjo waste 2011) .

B lotong is the waste with the highest level of pollution and is a problem for the sugar factory and the community. This waste is usually disposed of into rivers and causes pollution, because in the water the organic matter in the filter cake will naturally decompose, thereby reducing oxygen levels in the water and causing the water to be dark and smell bad (Purwaningsih 2011) . However, blotong has properties that support the improvement of soil properties, including high water holding capacity, low unit weight, porous and high CEC. Blotong shows great potential to be used as a source of organic matter without disturbing plant growth (Rajiman 2008) .

Meanwhile, the use of filter cake as organic fertilizer is still not maximized and its users are limited, this is because the processing of filter cake waste into organic fertilizer can still be said to be perfunctory, it has not been handled using a good and correct process so that the organic fertilizer it produces is still not perfect, and the lack of knowledge of farmers about the benefits of using organic fertilizer from filter cake (Widodo 2009). Meanwhile, in the North Medayu area there are lots of piles of organic waste, especially garden waste (leftover leaves). This will reduce the aesthetics of the environment. So far, residents have been burning the garden waste. Combustion can cause air pollution and interfere with breathing. From these things, the idea arose to utilize these wastes into something that has benefits and also has economic value, namely to be used as material for making organic fertilizer.

This study utilized the solid waste of PG Candi Baru Sidoarjo in the form of cake and garden waste in the North Medayu area, with the aim of looking at the effect of applying filter cake as an activator on the speed of decomposition of garden waste and its effect on compost quality and to find out which aeration method is most effective in speeding up the process. decomposition . The benefit of this research is to add insight into how composting techniques and their contribution to minimizing the volume of existing waste and the results of organic fertilizer from this research can be utilized in fertilizing the soil.

LITERATURE REVIEW

Blotong

Blotong or *filter cake* is sediment from dirty sap in the sap purification process which is filtered in *a rotary vacuum filter* . On average, 3.8% of sugar cane is produced, or around 1.1 million tonnes of blotong per year (sugar cane production in 2011 was around 28 million tonnes) . The production of blotong reaches 3.5-7.5% of the weight of milled sugarcane. According to Triwahyuningsih and Muhammad, the properties of blotong that support the improvement of soil properties include high water holding capacity, low unit weight, porous and high CEC. Blotong shows great potential to be used as a source of

organic matter without disturbing plant growth (Rajiman 2008) .

Based on the results of a study by Mudhoo *et al* (2011) which mixed the filter cake with vegetable waste and bagasse to be used as fertilizer, it turned out that the filter cake showed potential to be used as an ingredient for making organic fertilizer and the filter cake could be combined with other ingredients such as bagasse, vegetable waste and other waste containing cellulose and lignin.

Based on Bhosale's research (2012) which studied the physico-chemical characteristics of the organic matter in the blotong and its effect on the capacity or power of the soil to hold water, it shows that fresh blotong cannot be directly used as fertilizer because it will make the physical properties of the soil worse. extraction or composting process.

The results of the study show that the extraction of organic matter in blotong can be seen significantly to the physical structure and quality of blotong and helps increase the capacity of the soil to hold water . to increasing rice production can also slow down the aging of rice leaves.

Garden Waste (Leaf Remains)

The substance of garden waste comes from natural constituent elements, so this waste is easily decomposed by decomposing bacteria so that it is easily destroyed and becomes a soil-forming element that is very fertile and useful for soil fertility. Examples of this waste are leaves, food scraps, fruit peels, etc. (Sanggilora 2012) .

Composting is the decomposition of organic matter into simpler organic matter by microorganisms so that the simpler organic matter can be used as fertilizer to improve soil structure and add nutrients to the soil.

RESEARCH METHODS

The method to be used in this study is to set garden waste as a control weighing 3 kg. The independent variables are the addition of filter cake which is varied into 1, 2, 3 and 4 kg, as well as the aeration method which is divided into manually and using an aerator, aeration using an aerator is divided into 3 doses, namely 1.8 l/min/kgVs or equivalent to 0 .1 bar, 2.7 l/min/kgVs or equivalent to 0.15 bar and 3.6 l/min/kgVs or equivalent to 0.2 bar. As the dependent variable is the C/N ratio.

The stages of this research were preparing research tools and materials, conducting preliminary tests including testing temperature, pH, water content and C/N ratio for each material, then weighing the weight of each material and then mixing it in the reactor tub. After that, a preliminary test was carried out on each mixture.

During the composting process, aeration and overturning of the heap is carried out every 3 days, measuring temperature every day, measuring pH once every 3 days, counting bacterial colonies, measuring water content and C/N ratio once a week. The composting process is limited to approximately 3 weeks, then the C/N ratio data is processed using graphical statistics with a linear formula and Anova statistical tests using Minitab 14 software. Conclusions are drawn from the statistical test results.

RESULTS AND DISCUSSION

The results of the initial characteristic analysis for blotong and garden waste can be seen in table 1 below:

Table 1 Initial characteristics of blotong and garden waste

Parameter	Blotong	Garden Trash
Temperature (^{oC})	37	30
pH	6	6,4
Water content (%)	20,41	1.82
C-organic (%)	15,62	18.01
N-organic (%)	0.26	0.31
C/N ratio	60,1	58,1

Source: Laboratory Analysis Results, 2013.

Temperature dynamics is an indicator of the dynamics of microbiological activity in composting. Therefore the temperature change profile also describes the characteristics of the ongoing composting process, and even becomes a parameter of compost maturity (Wahyono 2008) .

The temperature rises and microorganisms quickly become present in the compost during the warming stage, also known as the mesophilic stage. Mesophilic microorganisms are responsible for reducing the particle size of organic matter in order to increase the material's surface area and speed up the composting process. They live at temperatures between 10 and 45 degrees Celsius. The second stage, known as the thermophilic stage, is characterized by the presence of thermophilic microorganisms in compost piles. These microorganisms live at temperatures ranging from 45 to 60 degrees Celsius and are tasked with consuming carbohydrates and proteins in order to facilitate the rapid breakdown of compost materials (Cahaya, 2009) .

Temperature Conditions During the Composting Process.

During the composting process, temperature changes occur. Each - each reactor reached a peak temperature on the second day until the fourth day, this shows that there is energy released by microorganisms in the form of heat. This energy is a product of the carbonization process.

pH Conditions During the Composting Process.

In the composting process, the degree of acidity (pH) plays an important role in the activity of microorganisms, microorganisms can live and develop at a neutral pH in the range of 6.5– 8. If the pH in the heap of composted material is high or the atmosphere is alkaline, microorganisms cannot grow and develop so that the composting process composting is slow. And if the pH is low or the atmosphere is acidic, it will trigger the growth of pathogenic bacteria and fungi which will actually interfere with the growth of decomposer microorganisms and cause the compost heap to smell bad.

During the composting process, the pH of each compost reactor was in a neutral condition, which was in the range of 6.5– 8. This was due to the periodic turning of heap and aeration.

Moisture Content Conditions During the Composting Process.

In the composting process, the parameter that is measured is the water content, because water content is one of the environmental factors that affect the activity of microorganisms in decomposing organic matter. Water is a nutrient solvent factor and protoplasmic cells. Water is produced during the composting process by microorganisms

in the form of leachate and some is lost due to evaporation into the air stream.

At the beginning of mixing the materials to be composted the water content was the same, namely ± 20.2%, but then in the first week it tended to decrease. Then in the following weeks there was an increase, according to Polprasert (1996), an increase in water content occurred due to the production of leachate by microorganisms that decompose organic matter, where when decomposing microorganisms decompose organic matter it is accompanied by an increase in temperature, release of CO2 and water vapor, and changes in – changes according to Indriani (2002):

a. Carbohydrates, cellulose, hemicellulose, and lignin into CO_2 and H_2O
b. Egg white substance (protein) is converted into ammonia, CO_2 and H_2O (Pradana 2007) .

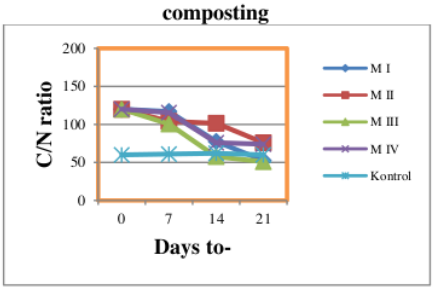
In the third week, the percent water content of each reactor is no more than 50%, which is the maximum limit for the percent water content according to SNI 19-7030-2004.

C/N Ratio Conditions During Composting Process

Compost maturity can be seen from two things, namely qualitatively such as color, smell and texture as well as quantitatively, namely the value of the C/N ratio. The decrease in the C/N ratio occurred due to the carbonization and denitrification processes. Carbonization is the release of C-organic into the air in the form of carbon dioxide, this occurs because C-organic is used by microorganisms as an energy source so that carbon levels are reduced. While denitrification is the release of nitrogen oxides from their bonds to become free nitrogen, thereby increasing the organic N content in the compost heap. N-organic is used by microorganisms for the formation of cell structures.

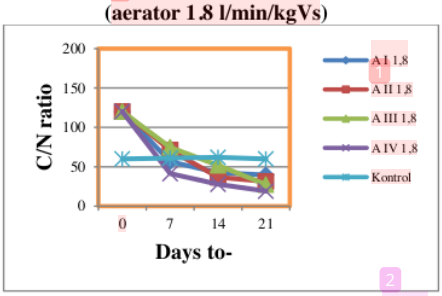
In the third week of the composting process, each reactor showed a decrease, the C/N ratio was in accordance with SNI 19 – 7030 – 2004 standards, namely 19.2 in the reactor with the addition of 4 kg of filter cake and mechanical aeration using an aerator with a dose of 1.8 l/ min/kgVs is equivalent to 0.1 bar. However, sometimes the value of the C/N ratio at compost maturity can be relatively above 20, this is because there are some forms of C-organic which are difficult to be degraded by microorganisms. The decrease in the C/N ratio of each reactor can be seen through the C/N ratio data graph. N is shown in the pictures below:

Figure 1 C/N ratio during manual composting



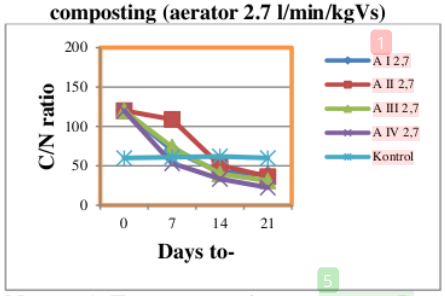
Ket. : M : Treatment without using aerator I, II, III, IV : weight of filter cake (kg)

Figure 2 C/N ratio during composting (aerator 1.8 l/min/kgVs)



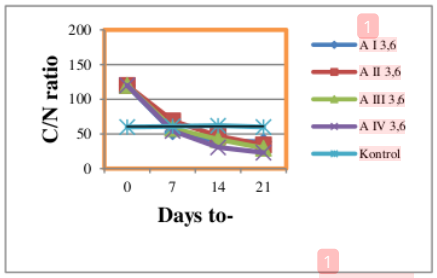
Note: A: Treatment using aerators I, II, III, IV: bag weight (kg) 1.8: aerator dose (l/min/kgVs) equivalent to 0.1 bar

Figure 3 C/N ratio conditions during composting (aerator 2.7 l/min/kgVs)



Note : A:Treatment using an aerator I, II, III, IV : bag weight (kg) 2.7 : aerator dose (l/min/kgVs) equivalent to 0.15 bar

Figure 4 C/N ratio during composting (aerator 3.6 l/min/kgVs)



Note : A:Treatment using an aerator I, II, III, IV : bag weight (kg) 3.6 : aerator dose (l/min/kgVs) equivalent to 0.2 bar

From the graphs above, each reactor experienced a decrease in the C/N ratio on the 7th day of the composting process. This is due to reduced C-organic content from the heap and released into the air in the form of carbon dioxide, as well as increased N-organic content due to the release of nitrogen oxide bonds to become free nitrogen, thereby increasing the N-organic content in the compost heap. Data on the decrease in the C/N ratio were tested. statistics to determine the effect of differences from the two treatments applied. The statistical test used is the *two way Anova method* , because there is more than one variable that is expected to affect the decrease in the C/N ratio. Through statistical tests the weight of the addition of bag cake p-value is 0.977 if the p-value is more than 0.05 then the weight of the addition of bag cake does not affect the decrease in the C/N ratio, seen from the aerator dose treatment it shows a large p-value of 0.022, if the p-value is less than 0 .05, the aerator dose has an effect on decreasing the C/N ratio.

Shredder Bacteria

In decomposing organic materials, the role of decomposing bacteria or microorganisms is very important. According to Djuarani (2004) because these microorganisms break down organic compounds into simpler compounds to produce energy. The energy produced is mostly used for the synthesis of micromolecules such as nucleic acids, lipids, and polysaccharides. Nucleic acid synthesis is important for cell growth and development (Fitri 2012) .

The data obtained was tested using the *Correlation method statistical test* to find out whether or not there was a relationship between bacterial growth and a decrease in the C/N ratio . *From the results of the Correlation* statistical test, the correlation value is negative, meaning that the relationship between the 2 variables if one variable decreases, the other variable will increase. The p-value is 0.024, so there is a correlation or relationship between the two variables. In other words, the development of bacteria has a relationship or affects the speed of decomposition.

CONCLUSION

1. There is an effect of applying filter cake on compost quality with a C/N ratio of 19.2. The dose of blotong that speeds up the decomposition process the most is 4 kg per 3 kg of garden waste weight.
2. The most effective aeration method in accelerating the composting process is mechanically using an aerator.
3. There is an effect of applying filter cake as an activator on the speed of decomposition marked by the growth of bacteria in the filter cake which affects the decrease in the C/N ratio during the decomposition process. The decrease in the C/N ratio is 84%.

SUGGESTION

1. It is necessary to carry out further composting experiments over 21 days to determine the effect of varying the weight of the filter cake and the dose of aerator.
2. In this study, only temperature, pH, moisture content, carbon content, nitrogen content and C/N ratio were examined for compost maturity. It is advisable to review other factors such as phosphate levels, potassium levels and pile height.

REFERENCE

Bhosale P.R., Chonde S.G., Nakade D.B., dan Raut P.D. 2012. *Study on Physico – Chemical Characteristics of Waxed and Dewaxed Pressmud and its effect on Water Holding Capacity of Soil*. Kolhapur. India. ISCA Journal of Biological Sciences (1) 1: 35 – 41.

Cahaya, A., Dody Adi Nugroho. 2009. *Pembuatan Kompos Dengan Menggunakan Limbah Padat Organik (Sampah Sayuran Dan Ampas Tebu)*. Jurusan Teknik Kimia FT Universitas Diponegoro. Semarang. 1 – 7 hal.

Fitri, Rahayu Fadillah. 2012. *Isolasi Dan Identifikasi Bakteri Selulotik Pengurai Sampah Organik Dari Berbagai Tempat*.Universitas Pendidikan Indonesia.

Kuswurj, R. 2009. *Blotong (filter cake)*.www.risvank.com diakses pada tanggal 15 Oktober 2012.

Mudhoo, A., A. Bhawoo dan R. Mohee. 2011. *Process Parameter Variations During The Co-composting of Mixed Filtercake, Bagasse and Vegetable Waste*. 1st International Conference on ”Waste Management in Developing Countries and Transient Economies. Mauritus. Africa.

Nurawan, A., Yati Haryati. 2008. *Pengkajian Penggunaan Pupuk Organik Blotong Pada Padi Di Lokasi Prima Tani Kabupaten Cirebon*. Bandung. Seminar Hasil Padi : 1053 – 1060.

Pradana, Andreas. 2007. *Pengaruh Penambahan Ragi Tape Dalam Pengomposan Sampah Organik Dengan Penambahan Ampas Tahu*.Skripsi Teknik Lingkungan FTSP UPN “Veteran” Jatim. Surabaya.

Purwaningsih, E. 2011.*Pengaruh Pemberian Kompos Blotong, Legin dan Mikoriza Terhadap Serapan Hara N dan P Tanaman Kacang Tanah*. Widya Warta. Madiun. 2: 55 – 68.

Rajiman, Prapto Y., Endang S., Eko Hanudin. 2008. *Pengaruh Pembenah Tanah Terhadap Sifat Fisika Tanah dan Hasil Bawang Merah Pada Lahan Pasir Pantai Bugel Kabupaten Kulon Progo*.Agrin.Yogyakarta. (12) 1: 67 – 77.

Sanggilora, Ayik. 2012. *Pengolahan Daur Ulang Sampah Organik*. http://ayiekzz.blogspot.com/2012/01/pengolahan-daur-ulang-sampah-organik_22.html diakses tgl 18 November 2012.

Wahyono, S., Firman L. Sahwan.2008. *Dinamika Perubahan Temperatur Dan Reduksi Volume Limbah Dalam Proses Pengomposan*.Pusat Pengkajian dan Penerapan Teknologi Lingkungan.BPPT. Jakarta. J. Tek. Ling. (9) 3: 255 – 262.

UTILIZATION OF BLOTONG AS AN ACTIVATOR ORGANIC FERTILIZER

ORIGINALITY REPORT

13%	11%	4%	2%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

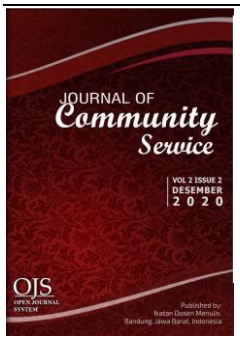
1	www.scribd.com Internet Source	3%
2	eprints.upnjatim.ac.id Internet Source	3%
3	www.justanswer.com Internet Source	1%
4	R Rahmad, N Nurmiaty. "Evaluation of Lignocellulolytic Fungal Consortium for Composting Sugarcane Bagasse, Filter Cake and Manure", KnE Life Sciences, 2022 Publication	1%
5	text-id.123dok.com Internet Source	1%
6	Muhammad Juwanda, Sakhidin, Saparso, Kharisun. "The Long Composting Period Effect of Leaf Shallots on the Compost Quality", IOP Conference Series: Earth and Environmental Science, 2022 Publication	1%

7	Ken-ichiro Suehara. "Simultaneous measurement of carbon and nitrogen content of compost using near infrared spectroscopy", Journal of Near Infrared Spectroscopy, 2001 Publication	1 %
8	www.ejge.com Internet Source	1 %
9	Smriti Bala, Deepak Joshi. "An Attention-based Deep CNN-BiLSTM Model for Forecasting of Fatigue-induced Surface Electromyography Signals During Isotonic Contractions", Institute of Electrical and Electronics Engineers (IEEE), 2022 Publication	<1 %
10	repository.ub.ac.id Internet Source	<1 %
11	ijphrd.com Internet Source	<1 %
12	R.B. Confesor, J.M. Hamlett, R.D. Shannon, R.E. Graves. "Potential Pollutants from Farm, Food and Yard Waste Composts at Differing Ages: Part I. Physical and Chemical Properties", Compost Science & Utilization, 2008 Publication	<1 %
13	T M Hasnah, E Windyarini, B Leksono, K Riyantika, B H Purwanto, H A Adinugraha, L	<1 %

Hakim. "Utilization of nyamplung industrial waste for compost and the response to nyamplung seedlings growth and nitrogen uptake", IOP Conference Series: Earth and Environmental Science, 2021
Publication

14	journal.ugm.ac.id Internet Source	<1%
15	proirofonic.upnjatim.ac.id Internet Source	<1%
16	repository.unsri.ac.id Internet Source	<1%
17	www.isah-soc.org Internet Source	<1%

Exclude quotes	On	Exclude matches	Off
Exclude bibliography	On		



Journal of Community Service

Volume 3, Issue 2, December 2021

P-ISSN **2715-2901**

E-ISSN **2715-291X**

Open Access at: https://idm.or.id/JCS/index.php/JCS

UTILIZATION OF BLOTONG AS AN ACTIVATOR ORGANIC FERTILIZER

PEMANFAATAN BLOTONG SEBAGAI PUPUK ORGANIK PENGAKTIF

Munawar Ali[1], M. Mirwan[2]

[1,2]*Universitas Pembangunan Nasional "Veteran" Jawa Timur*

E-mail: munawar.tl@upnjatim.ac.id

ARTICLE INFO

Correspondent:

Munawar Ali
munawar.tl@upnjatim.ac.id

Keywords:

Cake Filtering, Composting, Aeration, Garbage.

Website:

http://idm.or.id/JCS/index/JCS

page: 152 - 161

ABSTRACT

Utilizing microbial activity to transform organic waste into material with the characteristics of soil, composting is a method of biological treatment of organic waste. Sugar factory filter cake contains minerals like carbon, nitrogen, phosphate, calcium, and others that can be used to recover soil, such as a high-water holding capacity. Green manure made from organic waste is the goal of the research. Filter cake is the waste from the sugar factory mixed with trash. The aerobic system used in this study adds 1 kg, 2 kg, 3 kg, and 4 kg of filter cake, respectively. The dosage options for the aeration method, both without and with an aerator, are 1.8; 2,7 and 3,6 l/min/kgVs. Rubbish without a filter cake and weighing 3 kg serve as a control. The study found that a C/N ratio of 19.2 was decreased when 4 kg of filter cake was added to each 3 kg of trash stimulation. The air circulation strategy that is powerful for treating the soil is to utilize an aerator. During composting, the microbial growth influences a decrease of 84% in the C/N ratio.

INFO ARTIKEL

Koresponden:

Munawar Ali
munawar.tl@upnjatim.ac.id

Kata Kunci:

Penyaringan Kue, Pengomposan, Aerasi, Sampah.

Website:

http://idm.or.id/JCS/index/JCS

hal: 152 - 161

ABSTRAK

Memanfaatkan aktivitas mikroba untuk mengubah sampah organik menjadi bahan dengan karakteristik tanah, pengomposan merupakan salah satu metode pengolahan sampah organik secara biologis. Kue saringan pabrik gula mengandung mineral seperti karbon, nitrogen, fosfat, kalsium, dan lainnya yang dapat digunakan untuk memulihkan tanah, seperti daya ikat air yang tinggi. Pupuk hijau yang terbuat dari limbah organik merupakan tujuan dari penelitian ini. Filter cake merupakan limbah dari pabrik gula yang bercampur dengan sampah. Sistem aerobik yang digunakan dalam penelitian ini masing-masing menambahkan 1 kg, 2 kg, 3 kg, dan 4 kg filter cake. Pilihan dosis untuk metode aerasi, baik tanpa maupun dengan aerator adalah 1,8; 2,7 dan 3,6 l/mnt/kgVs. Sampah tanpa filter cake seberat 3 kg dijadikan sebagai kontrol. Studi ini menemukan bahwa rasio C/N sebesar 19,2 menurun ketika 4 kg blotong ditambahkan ke setiap 3 kg stimulasi sampah. Strategi sirkulasi udara yang ampuh untuk merawat tanah adalah dengan memanfaatkan aerator. Selama pengomposan, pertumbuhan mikroba mempengaruhi penurunan rasio C/N sebesar 84%.

INTRODUCTION

Nowadays environmental problems are often caused by waste that is not handled properly. In addition, the large volume of waste reduces environmental aesthetics, disrupts people's lives if it is not handled immediately. The Candi Baru Sugar Factory in Sidoarjo produces solid waste in the form of filter cake of ± 60 tons/day or 3% sugar cane, dry ash 28.8 tons/day and wet ash ± 27 tons/day (report of PG Candi Baru Sidoarjo waste 2011).

B lotong is the waste with the highest level of pollution and is a problem for the sugar factory and the community. This waste is usually disposed of into rivers and causes pollution, because in the water the organic matter in the filter cake will naturally decompose, thereby reducing oxygen levels in the water and causing the water to be dark and smell bad (Purwaningsih 2011). However, blotong has properties that support the improvement of soil properties, including high water holding capacity, low unit weight, porous and high CEC. Blotong shows great potential to be used as a source of organic matter without disturbing plant growth (Rajiman 2008).

Meanwhile, the use of filter cake as organic fertilizer is still not maximized and its users are limited, this is because the processing of filter cake waste into organic fertilizer can still be said to be perfunctory, it has not been handled using a good and correct process so that the organic fertilizer it produces is still not perfect, and the lack of knowledge of farmers about the benefits of using organic fertilizer from filter cake (Widodo 2009). Meanwhile, in the North Medayu area there are lots of piles of

organic waste, especially garden waste (leftover leaves). This will reduce the aesthetics of the environment. So far, residents have been burning the garden waste. Combustion can cause air pollution and interfere with breathing. From these things, the idea arose to utilize these wastes into something that has benefits and also has economic value, namely to be used as material for making organic fertilizer.

This study utilized the solid waste of PG Candi Baru Sidoarjo in the form of cake and garden waste in the North Medayu area, with the aim of looking at the effect of applying filter cake as an activator on the speed of decomposition of garden waste and its effect on compost quality and to find out which aeration method is most effective in speeding up the process. decomposition . The benefit of this research is to add insight into how composting techniques and their contribution to minimizing the volume of existing waste and the results of organic fertilizer from this research can be utilized in fertilizing the soil.

LITERATURE REVIEW

Blotong

Blotong or *filter cake* is sediment from dirty sap in the sap purification process which is filtered in *a rotary vacuum filter* . On average, 3.8% of sugar cane is produced, or around 1.1 million tonnes of blotong per year (sugar cane production in 2011 was around 28 million tonnes). The production of blotong reaches 3.5-7.5% of the weight of milled sugarcane. According to Triwahyuningsih and Muhammad, the properties of blotong that support the improvement of soil properties include high water holding capacity, low unit weight, porous and high CEC. Blotong shows great potential to be used as a source of organic matter without disturbing plant growth (Rajiman 2008).

Based on the results of a study by Mudhoo *et al* (2011) which mixed the filter cake with vegetable waste and bagasse to be used as fertilizer, it turned out that the filter cake showed potential to be used as an ingredient for making organic fertilizer and the filter cake could be combined with other ingredients such as bagasse, vegetable waste and other waste containing cellulose and lignin.

Based on Bhosale's research (2012) which studied the physico-chemical characteristics of the organic matter in the blotong and its effect on the capacity or power of the soil to hold water, it shows that fresh blotong cannot be directly used as fertilizer because it will make the physical properties of the soil worse. extraction or composting process.

The results of the study show that the extraction of organic matter in blotong can be seen significantly to the physical structure and quality of blotong and helps increase the capacity of the soil to hold water to increasing rice production can also slow down the aging of rice leaves.

Garden Waste (Leaf Remains)

The substance of garden waste comes from natural constituent elements, so this waste is easily decomposed by decomposing bacteria so that it is easily destroyed and becomes a soil-forming element that is very fertile and useful for soil fertility. Examples of this waste are leaves, food scraps, fruit peels, etc. (Sanggilora 2012).

Composting is the decomposition of organic matter into simpler organic matter by microorganisms so that the simpler organic matter can be used as fertilizer to improve soil structure and add nutrients to the soil.

METHOD

The method to be used in this study is to set garden waste as a control weighing 3 kg. The independent variables are the addition of filter cake which is varied into 1, 2, 3 and 4 kg, as well as the aeration method which is divided into manually and using an aerator, aeration using an aerator is divided into 3 doses, namely 1.8 l/min/kgVs or equivalent to 0 .1 bar, 2.7 l/min/kgVs or equivalent to 0.15 bar and 3.6 l/min/kgVs or equivalent to 0.2 bar. As the dependent variable is the C/N ratio.

The stages of this research were preparing research tools and materials, conducting preliminary tests including testing temperature, pH, water content and C/N ratio for each material, then weighing the weight of each material and then mixing it in the reactor tub. After that, a preliminary test was carried out on each mixture.

During the composting process, aeration and overturning of the heap is carried out every 3 days, measuring temperature every day, measuring pH once every 3 days, counting bacterial colonies, measuring water content and C/N ratio once a week. The composting process is limited to approximately 3 weeks, then the C/N ratio data is processed using graphical statistics with a linear formula and Anova statistical tests using Minitab 14 software. Conclusions are drawn from the statistical test results.

RESULTS AND DISCUSSION

The results of the initial characteristic analysis for blotong and garden waste can be seen in table 1 below:

Table 1. Initial Characteristics of Blotong and Garden Waste

Parameter	Blotong	Garden Trash
Temperature (^oC)	37	30
pH	6	6,4
Water content (%)	20,41	1.82
C-organic (%)	15,62	18.01
N-organic (%)	0.26	0.31
C/N ratio	60,1	58,1

Source: Laboratory Analysis Results, 2013

Temperature dynamics is an indicator of the dynamics of microbiological activity in composting. Therefore, the temperature change profile also describes the characteristics of the ongoing composting process, and even becomes a parameter of compost maturity (Wahyono 2008).

The temperature rises and microorganisms quickly become present in the compost during the warming stage, also known as the mesophilic stage. Mesophilic microorganisms are responsible for reducing the particle size of organic matter in order to increase the material's surface area and speed up the composting process. They live at temperatures between 10 and 45 degrees Celsius. The second stage, known as the thermophilic stage, is characterized by the presence of thermophilic microorganisms in compost piles. These microorganisms live at temperatures ranging from 45 to 60 degrees Celsius and are tasked with consuming carbohydrates and proteins in order to facilitate the rapid breakdown of compost materials (Cahaya, 2009).

Temperature Conditions During the Composting Process

During the composting process, temperature changes occur. Each reactor reached a peak temperature on the second day until the fourth day, this shows that there is energy released by microorganisms in the form of heat. This energy is a product of the carbonization process.

pH Conditions During the Composting Process

In the composting process, the degree of acidity (pH) plays an important role in the activity of microorganisms, microorganisms can live and develop at a neutral pH in the range of 6.5-8. If the pH in the heap of composted material is high or the atmosphere is alkaline, microorganisms cannot grow and develop so that the composting process composting is slow. And if the pH is low or the atmosphere is acidic, it will trigger the growth of pathogenic bacteria and fungi which will actually interfere with the growth of decomposer microorganisms and cause the compost heap to smell bad.

During the composting process, the pH of each compost reactor was in a neutral condition, which was in the range of 6.5-8. This was due to the periodic turning of heap and aeration.

Moisture Content Conditions During the Composting Process.

In the composting process, the parameter that is measured is the water content, because water content is one of the environmental factors that affect the activity of microorganisms in decomposing organic matter. Water is a nutrient solvent factor

and protoplasmic cells. Water is produced during the composting process by microorganisms in the form of leachate and some is lost due to evaporation into the air stream.

At the beginning of mixing the materials to be composted the water content was the same, namely ± 20.2%, but then in the first week it tended to decrease. Then in the following weeks there was an increase, according to Polprasert (1996), an increase in water content occurred due to the production of leachate by microorganisms that decompose organic matter, where when decomposing microorganisms decompose organic matter it is accompanied by an increase in temperature, release of CO2 and water vapor, and changes in-changes according to Indriani (2002):

1. Carbohydrates, cellulose, hemicellulose, and lignin into CO_2 and H_2O
2. Egg white substance (protein) is converted into ammonia, CO_2 and H_2O (Pradana 2007).

In the third week, the percent water content of each reactor is no more than 50%, which is the maximum limit for the percent water content according to SNI 19-7030-2004.

C/N Ratio Conditions During Composting Process

Compost maturity can be seen from two things, namely qualitatively such as color, smell and texture as well as quantitatively, namely the value of the C/N ratio. The decrease in the C/N ratio occurred due to the carbonization and denitrification processes. Carbonization is the release of C-organic into the air in the form of carbon dioxide, this occurs because C-organic is used by microorganisms as an energy source so that carbon levels are reduced. While denitrification is the release of nitrogen oxides from their bonds to become free nitrogen, thereby increasing the organic N content in the compost heap. N-organic is used by microorganisms for the formation of cell structures.

In the third week of the composting process, each reactor showed a decrease, the C/N ratio was in accordance with SNI 19-7030-2004 standards, namely 19.2 in the reactor with the addition of 4 kg of filter cake and mechanical aeration using an aerator with a dose of 1.8l/min/kgVs is equivalent to 0.1 bar. However, sometimes the value of the C/N ratio at compost maturity can be relatively above 20, this is because there are some forms of C-organic which are difficult to be degraded by microorganisms. The decrease in the C/N ratio of each reactor can be seen through the C/N ratio data graph. N is shown in the pictures below:

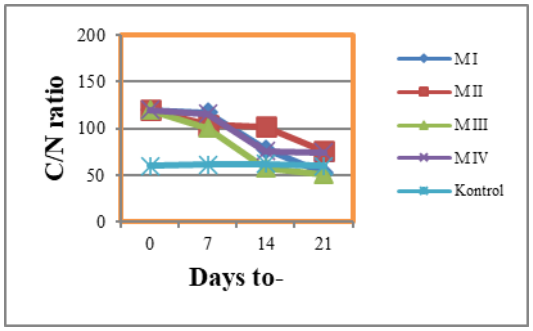


Figure 1. C/N Ratio During Manual Composting

Note:

M: Treatment without using aerator
I, II, III, IV: weight of filter cake (kg)

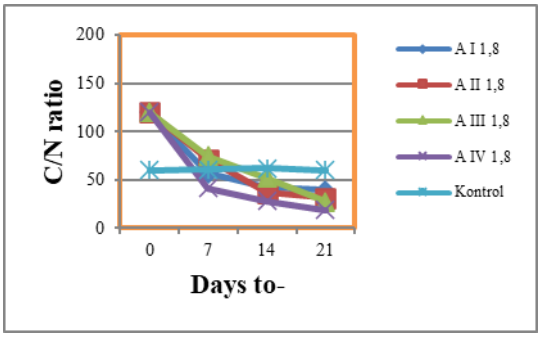


Figure 2. C/N Ratio During Composting (Aerator 1.8 l/min/kgVs)

Note:

A: Treatment using aerators
I, II, III, IV: bag weight (kg)
1.8: aerator dose (l/min/kgVs) equivalent to 0.1 bar

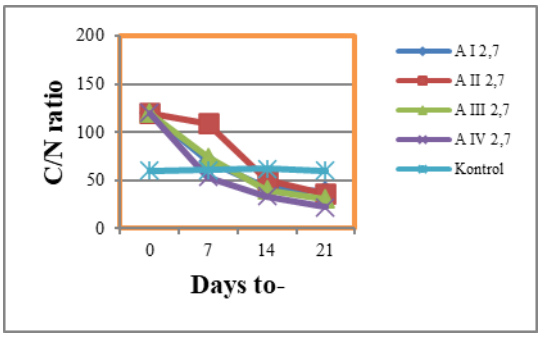


Figure 3. C/N Ratio Conditions During Composting (Aerator 2.7 l/min/kgVs)

Note:

A: Treatment using an aerator
I, II, III, IV: bag weight (kg)
2.7: aerator dose (l/min/kgVs) equivalent to 0.15 bar

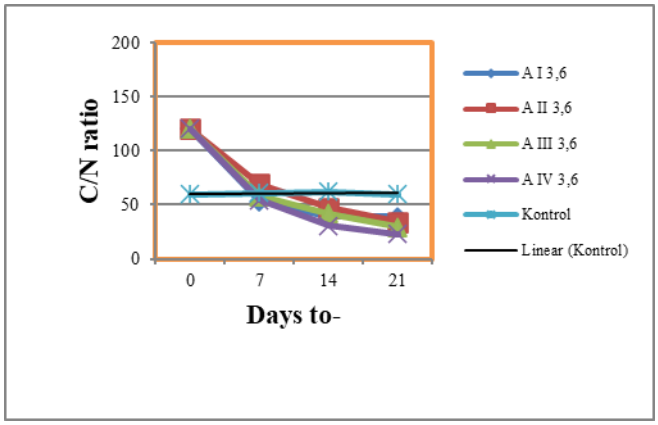


Figure 4. C/N Ratio During Composting (aerator 3.6 l/min/kgVs)

Note:

A: Treatment using an aerator
I, II, III, IV: bag weight (kg)
3.6: aerator dose (l/min/kgVs) equivalent to 0.2 bar

From the graphs above, each reactor experienced a decrease in the C/N ratio on the 7th day of the composting process. This is due to reduced C-organic content from the heap and released into the air in the form of carbon dioxide, as well as increased N-organic content due to the release of nitrogen oxide bonds to become free nitrogen, thereby increasing the N-organic content in the compost heap. Data on the decrease in the C/N ratio were tested. statistics to determine the effect of differences from the two treatments applied. The statistical test used is the *Two-Way ANOVA method*, because there is more than one variable that is expected to affect the decrease in the C/N ratio. Through statistical tests the weight of the addition of bag cake p-value is 0.977 if the p-value is more than 0.05 then the weight of the addition of bag cake does not affect the decrease in the C/N ratio, seen from the aerator dose treatment it shows a large p-value of 0.022, if the p-value is less than 0 .05, the aerator dose has an effect on decreasing the C/N ratio.

Shredder Bacteria

In decomposing organic materials, the role of decomposing bacteria or microorganisms is very important. According to Djuarani (2004) because these microorganisms break down organic compounds into simpler compounds to produce energy. The energy produced is mostly used for the synthesis of micromolecules such as nucleic acids, lipids, and polysaccharides. Nucleic acid synthesis is important for cell growth and development (Fitri 2012).

The data obtained was tested using the *Correlation method statistical test* to find out whether or not there was a relationship between bacterial growth and a decrease in the C/N ratio. *From the results of the Correlation* statistical test, the correlation value is negative, meaning that the relationship between the 2 variables if one variable

decreases, the other variable will increase. The p-value is 0.024, so there is a correlation or relationship between the two variables. In other words, the development of bacteria has a relationship or affects the speed of decomposition.

CONCLUSION

There is an effect of applying filter cake on compost quality with a C/N ratio of 19.2. The dose of blotong that speeds up the decomposition process the most is 4 kg per 3 kg of garden waste weight. The most effective aeration method in accelerating the composting process is mechanically using an aerator. There is an effect of applying filter cake as an activator on the speed of decomposition marked by the growth of bacteria in the filter cake which affects the decrease in the C/N ratio during the decomposition process. The decrease in the C/N ratio is 84%.

REFERENCES

Bhosale, P. R., Chonde, S. G., Nakade, D. B., & Raut, P. D. (2012). Studies on physico-chemical characteristics of waxed and dewaxed pressmud and its effect on water holding capacity of soil. *ISCA Journal of Biological Sciences*, *1*(1), 35-41.

Busroh, R. A. (2022). *Studi Pengaruh Karagenan terhadap Mutu Selai Lembaran Kulit Kopi Arabika (Coffea arabic) dan Robusta (Coffea canephora)* (Doctoral Dissertation, Universitas Muhammadiyah Malang).

Cahaya, A., Dody Adi Nugroho. (2009). *Pembuatan Kompos Dengan Menggunakan Limbah Padat Organik (Sampah Sayuran dan Ampas Tebu)*. (Universitas Diponegoro).

Chummun, V., Mudhoo, A., & Mohee, R. (2011). Process dynamics and parameter variations during co-composting of mixed vegetables, broiler litter, cow dung and textile sludge. *Dyn. Soil Dyn. Plant*, *5*, 70-81.

Fitri, R. F. (2012). *Isolasi dan Identifikasi Bakteri Selulotik Pengurai Sampah Organik Dari Berbagai Tempat. (*Universitas Pendidikan Indonesia).

Kuswurj, R. (2009). *Blotong (filter cake)*. Retrieved from: www.risvank.com

Nurawan, A., & Haryati, Y. (2008). *Pengkajian Penggunaan Pupuk Organik Blotong Pada Padi di Lokasi Prima Tani Kabupaten Cirebon*. Bandung: Seminar Hasil Padi.

Purwaningsih, C. (2011). Pengaruh pemberian kompos blotong, legin, dan mikoriza terhadap serapan hara N dan P tanaman kacang tanah. *Widya Warta: Jurnal Ilmiah Universitas Katolik Widya Mandala Madiun*, *35*(02), 55-68.

Rajiman, R., Yudono, P., Sulistyaningsih, E., & Hanudin, E. (2008). Pengaruh pembenah tanah terhadap sifat fisika tanah dan hasil bawang merah pada lahan pasir pantai bugel Kabupaten Kulon Progo. *Agrin*, *12*(1).

Sanggilora, A. (2012). *Pengolahan Daur Ulang Sampah Organik*. Retrieved from: https://ayiekzz.blogspot.com/2012/01/pengolahan-daur-ulang-sampah-organik_22.html

Wahyono, S., & Sahwan, F. L. (2008). Dinamika Perubahan Temperatur dan Reduksi Volume Limbah Dalam Proses Pengomposan. *Jurnal Teknik Lingkungan, 9*(3), 255-262.