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Analysis of the Physical and Chemical Quality of Compost Waste Smoking Unit Water Treatment and Composting Plant PT. Djarum Oasis Kretek Factory Kudus

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Abstract
Unit of Water Treatment and Composting Plant of PT. Djarum Oasis Kretek Factory Kudus is a waste water management systems produce clean water and compost. Waste water treatment unit processes Waste Water Treatment Plant produces sludge reaches 500 kg/day in dry or weights reach 2-2.5 tons/day in the wet weight. This type of research using this type of comparative, descriptive study where a population of the research was all compost produced by composting plant Water Treatment Unit and Composting Plant of PT. Djarum Oasis Kretek Factory Kudus with samples windrow compost and vermin compost with a weight of 1 kg each. The results of the examination of the physical quality of the windrow compost obtained 21.33% water content, temperature 32^{0}C aircraft, color dark brown, smelling the ground. The results of the examination of the physical quality of the vermin composting gained 24.15% water content, temperature 30^{0}C, blackish brown color, smelling the ground. The results of the examination of the quality of the compost windrow chemical gained 25.50% of organic C, total N 1.61%, P_2O_5 0.51%, K_2O of 1.34%, macro nutrient levels (N Total+P_2O_5+K_2O) of 3.46%. Vermin kompos chemical quality inspection results gained 23.76% of organic C, total N 1.26%, 0.92% P_2O_5, K_2O of 0.86%, macro nutrient levels (N Total+P_2O_5+K_2O) 3.04%. The results of the examination of the physical and chemical quality of windrow compost and vermin compost there are a few parameters that do not meet the requirements as organic fertilizer composting in accordance with technical requirements a minimum of organic fertilizer from waste water treatment Installation Industry number: 70/regulation of the minister of agriculture/SR 140/10/2011 (Annex I. 3) about biological fertilizers, organic fertilizers, and improve the soil, so that the windrow compost and vermin compost known simply as repair soil.

Keywords: *Compost, Quality Physical, Chemical Quality.*

1. BACKGROUND

PT. Djarum Oasis Kudus Kretek Factory is one of Indonesia's largest cigarette company. Smoking products are produced from primary raw materials in the form of kreteks and tobacco. From the process of making smoking will result in a waste of gas, liquid or solid. The required special handling waste in order not to contaminate the surrounding environment (Yeti, et al, 2016). Water Treatment and Composting Plant of PT. Djarum Oasis Kudus Kretek Factory is a waste water management systems that will be processed into waste that can be utilized. The waste water treatment process produces sludge solids (sludge) from aerobic microbial activity that can be used as compost. The main components of the mud is an organic solid material which can serve as a use as soil enricher. Waste water treatment of PT Djarum Kudus generate sludge up to 500 kg/day with a calculation of the base weight of dry or wet weights in reach 2 - 2.5 tonnes/day. Composting results processing unit Water Treatment and Composting Plant is one of the program's community social responsibility of companies for tobacco farmers (Firli Rahmatullah, et al., 2013). Compost is a mixture decomposition of organic materials that can be accelerated by increasing the population of various microorganisms, fungi or worms in the environmental conditions that are warm and humid. Technically, the term refers to compost organic fertilizer made from man-made process of decomposition of the remains of the exiles living things (plants or animals) (Mulyani, 2014). The process of composting is the decomposition process conducted by the microorganisms against organic waste which is biodegradable (Damanhuri and Tripadmi, 2010).

The parameters that influence the process of making compost is carbon (C)/Nitrogen (N) ratio, moisture content, oxygen, temperature, consentration of the degree of acidity (pH), and others from the raw materials that will be used as compost. A good organic fertilizer was demonstrated with the availability of sufficient nutrient elements for plants and are in the range of the ratio of carbon (C)/Nitrogen (N) is 10 - 20 (Djuarnani, 2005). Comparisons between carbon and Nitrogen (C/N ratio is between 20 to 40-to-1 or 30-to-1 ratio that is the best. The garbage of the city have Carbon (C)/Nitrogen (N) ratio of 30 to 40-to-1, so the optimal enough to support the manufacturing process through composting can walk well (Sahwan, M.F., 2001). The process of composting in PT. Djarum Oasis Kudus

Kretek Factory using 2 methods, they are methods of windrow composting and vermin method. Windrow method on material used is sludge waste water treatment installations and coupled with organic material in the form of leaves of borassus flabellifer mats, while the process of composting process of occured vermi reshuffle sludge and organic and with the help of worm Lumbricus lumberus (Yeti, et al, 2016).

2. METHODS

2.1The type and design of the researc

Of this type of research is descriptive research, aims to analyse the comparison of physical and chemical Carbon (C) inorganic, pH, Nitrogen, Phosphate (P), Kalium (K) of compost waste smoking PT Djarum Oasis Kretek Factory Kudus standard with quality physical and chemical Carbon (C), pH, inorganic Nitrogen, phosphate (P), potassium (K) contained in the technical requirements of minimal organic fertilizer from waste water treatment installations of Industrial Agriculture Minister Regulation number: 70/ Regulation of the Minister of agriculture/SR 140/10/2011 (Annex I. 3) about Biological Fertilizers, organic fertilizers, and improve the soil. In this study using the design used is the comparative descriptive design because researchers do a measurement of physical and chemical qualities Carbon (C) inorganic, pH, Nitrogen (N), Phosphate (P), Kalium (K) of windrow compost and vermi compost unit Water Treatment and Composting Plant. The results are then compared with the minimum technical requirements for organic fertilizer from waste water treatment installations of Industrial Agriculture Minister Regulation number: 70/regulation of the Minister of agriculture/SR 140/10/2011 Appendix I. 3 to see the difference the quality of the compost from the unit water treatment and composting plant with raw compost quality in accordance with the regulation of the Minister of Agriculture number: 70/regulation of the minister of agriculture/SR 140/10/2011 (Annex I. 3) about biological fertilizers, organic fertilizers, and improve ground.

2.2 Populations and Samples

The population of this research is the water treatment unit of compost and composting plant of PT Djarum Oasis Kretek Factory.

2.3 Sample research

Large samples in this research was conducted sampling as much as 2 times with a large sample of each 1 pack compost windrow and 1 pack vermin compost with a weight of 1 kg each. Sampling techniques: using simple random sampling technique because the sampling was done randomly without regard to strata in the population. How this is done when the population considered to be homogeneous (Sugiyono, 2015).

2.4 Variables of research.

Variable is a variable that has an impact on other variables. In this study, a independent variable is a quality physical and chemical Carbon (C) inorganic, pH, Nitrogen (N), Phosphate (P), Kalium (K)) of compost water treatment and composting plant of PT Djarum Oasis Kretek Factory. A disturbance variable is the variable that is affected by the variable free. In this study, the variables are bound is the quality of the windrow compost and vermin compost as compared to the raw quality. The variable is the variable that the bullies are a hypothetical means concretely the invisible influence, but theoretically could affect the relationship between independent and disturbance variables being researched. In this study, the variable bullies is the process of composting.

2.5 Location research

The location of the research carried out at the unit of water treatment and composting plant of PT. Djarum Oasis Kretek Factory and Laboratory soil science University Eleven Maret Surakarta.

2.6 Data collection

Observation: observation done by observing and recording data on the type of compost from the unit water treatment and composting plant of PT Djarum Oasis Kretek Factory. Sampling: to obtain data of physical and chemical quality of compost type of unit water treatment and composting plant of PT Djarum Oasis Kretek Factory Kudus conducted by taking samples of compost.

How to compost sampling physics or chemistry in the composting unit in water treatment and composting plant of PT Djarum Oasis Kretek Factory. 1) Tools and materials: a) Scope. b) Plastics clips. c) Paper label, d) Analytical scales. 2) The sample-taking procedure: a) Take 100 grams of compost using a scope. b) Insert into the plastic clip. c) Give the label on the plastic clip. 3) Sampling point: point sampling the composting unit in windrow method and vermin composting unit water treatment and composting plant of PT. Djarum Oasis Kretek Factory. 4) Sampling method: is a method of simple random sampling because of sampling from a population is randomly done regardless of strata in the population. 5) Quality checks of compost waste smoking: physical quality checks are performed in units of water treatment and composting plant of PT. Djarum Oasis Kretek Factory Kudus to find out the moisture, temperature, color, and odor of compost. For chemical quality checks in the form of levels Carbon (C) inorganic, pH, Nitrogen (N), Phosphate (P), Kalium (K)) carried out in the laboratory of soil science University Eleven Maret Surakarta.

Examination of moisture and pH: 1) Tools and materials: a) A Soil tester. b) Form of measurement. c) Compost (Windrow compost and Vermin compost). 2) Work procedures: a) To prepare the necessary tools and materials. b) Plug a soil tester with 450 slope until the limit is yellow. c) Press the button to find out the moisture (green line indicator), note the number that appears. d) release the button to find out the pH (indicator red line), record the numbers that come up. Temperature measurement: 1) Tools and materials: a) Thermometer. b) Form of measurement. c) Composting (windrow compost and vermin compost). 2) Work procedures: a) Plug thermoter in compost. b) Wait for about 10 minutes, record the numbers shown. Examination of color and odor: 1) Tools and materials: a) Composting. b Assessment Form). 2) Work procedures: a) Grab a hunk of compost. b) Observe the color of the compost, record the results on the assessment form. c) Observe the odors from the compost, record the result on the form of assessment.

2.7 Methods of data analysis

Data processing: 1) Editing: activities conducted after researchers completed gathers data in the field. These activities became important due to the fact that the data gathered sometimes do not meet the expectations of researchers. Editing in this research are the results collected through observations that need to be edited first. If it turns out there are still data or information which is not yet complete. 2) Coding: data change activity is shaped into a letter-shaped data figures/numbers. Usefulness of the coding is to ease at the time of data analysis and also speeding at the time of data entry. Data entry is the transfer of data from the questionnaire to the coding software. The grant of a code on the data is to translate data into codes that are usually in the form of numbers. The goal is to be moved into a storage facility, such as the computer and the next analysis (Sugiyono, 2015).

Data Analysis: analysis used in this study is the analysis of using tables to show the difference between the results of the measurements of the physical and chemical qualities Carbon (C) inorganic, pH, Nitrogen (N), Phosphate (P), Kalium (K)) and compost requirements minimal technical requirements appropriate organic fertilizer from waste water treatment installations of Industrial Agriculture Minister Regulation number: 70/regulation of the Minister of agriculture/SR 140/10/2011 (Annex I. 3) about Biological Fertilizers, organic fertilizers, and improve the ground.

3. RESULTS

Based on research done to the quality of the compost produced from the composting plant water treatment unit and composting plant of PT. Djarum Oasis Kretek Kudus Factory obtained the following results.

3.1. Examination of the physical quality of the:

Moisture content: The results of the measurement of moisture content in sample windrow composting and compost generated from vermin composting plant water treatment unit and composting plant of PT Djarum Oasis Kretek Factory Kudus can be seen as follows:

Table 1. The results of the measurement of moisture content of compost Composting Plant Water Treatment Unit and Composting Plant of PT. Djarum Oasis Kretek Factory Kudus

Types of Compost	Measurement Results (%)	The raw quality (%)	Noted
Windrow compost	21.33	15 - 25	

Vermin compost	24.15	15 - 25	Number: 70 / Minister of Agriculture Regulation / SR.140 / 10/2011.

Based on table 1. It shows that windrow compost has lower water content than vermi compost water content where the water content of windrow compost is 21.33% and vermi compost water content is 24.15%. From the table above it can be seen that the water content of windrow compost and vermi compost is in accordance with the quality standard.

Temperature: The results of temperature measurements on compost and vermin compost windrow samples produced from the composting plant unit water treatment and composting plant PT. Djarum Oasis Kudus Kretek Factory can be seen as follows:

Table 2. Temperature Measurement Results of Compost Composting Plant Unit for Water Treatment and Composting Plant PT. Djarum Oasis Kretek Factory Kudus

Types of Compost	Measurement Results (^{0}C)	The raw quality (^{0}C)	Noted
Windrow compost	32	30	SNI 19-7030-2004 about the Specifications of Compost from Domestic Organic Waste
Vermin compost	30	30	

Based on table 2. It shows that the temperature of the compost windrow exceeds the quality standard of 2^{0}C while the temperature of vermin compost is in accordance with the quality standard of 30^{0}C.

Color and Smell: The results of color and odor examination on samples of compost and vermin compost windrow produced from the composting plant unit water treatment and composting plant PT. Djarum Oasis Kudus Kretek Factory can be seen as follows:

Table 3. Color Observation and Smell of Compost Composting Plant Unit for Water Treatment and Composting Plant PT. Djarum Oasis Kretek Factory Kudus Types of Compost Odor Quality Standards Description

Types of Compost	Smell	The raw quality (%)	Noted
Windrow compost	Smells of land	Minimal 15	SNI 19-7030-2004 about the Specifications of Compost from Domestic Organic Waste
Vermin compost	Smells of land	Minimal 15	

Based on table 3. It shows that the smell of windrow compost and vermin compost smells like soil. The color of windrow compost is brown, while vermin compost is blackish brown.

2.2. Chemical Quality Check

C-Organic: The results of the C-Organic examination on samples of compost and vermin compost windrow produced from the composting plant unit water treatment and composting plant PT. Djarum Oasis Kudus Kretek Factory can be seen as follows:

Table 4. Results of Measurement of C-Organic Compost Composting Plant Water Treatment Unit and Composting Plant PT. Djarum Oasis Kretek Factory Kudus

Types of Compost	Measurement Results (%)	The raw quality (%)	Noted
Windrow compost	23.76	Minimal 15	Number: 70 / Minister of Agriculture Regulation / SR.140 / 10/2011.
Vermi compost	25.50	Minimal 15	

Based on table 4. Shows C-Organic content of windrow compost at 23.76% and vermin compost at 25.50%. From these results indicate that C-Organic from windrow compost and compost vermicelli has met the quality standard.

Degree of Acidity (pH): The pH measurement results on samples of compost and vermiculite windrow produced from the composting plant unit water treatment and composting plant PT. Djarum Oasis Kudus Kretek Factory can be seen as follows:

Table 5. pH Measurement Results of Compost Composting Plant Unit for Water Treatment and Composting Plant PT. Djarum Oasis Kretek Factory Kudus

Types of Compost	Measurement Results (%)	The raw quality (%)	Noted
Windrow compost	7.5	4 - 9	Number: 70 / Minister of Agriculture Regulation / SR.140 / 10/2011.
Vermi compost	7.5	4 - 9	

Based on table 5. It shows that the pH of windrow compost and vermin compost is 7.5 where the results show that the pH of compost and vermin compost windrow meets the quality standard.

Nitrogen (N), Phosphate (P), Kalium (K) (N Total, P_2O_5 and K_2O): The examination of N Total, P_2O_5, and K_2O in the windrow compost and vermin compost the water treatment and composting plant units produced from the composting plant of PT. Djarum Oasis Kudus Kretek Factory can be seen as follows:

Table 6. Results of Measurement of N Total, P_2O_5 and K_2O Compost Composting Plant Unit for Water Treatment and Composting Plant PT. Djarum Oasis Kretek Factory Kudus

Type of compost	N Total (%)	P_2O_5 (%)	K_2O (%)	N Total +P_2O_5+ K_2O (%)	The raw quality (%)	Noted
Windrow compost	1.61	0.51	1.34	3.46	Minimal 4	Number: 70 / Minister of Agriculture Regulation / SR.140 / 10/2011.
Vermi compost	1.26	0.92	0.86	3.46	Minimal 4	

Based on table 6. It shows the total N content of windrow compost 1.61% and vermi compost 1.26%. P_2O_5 compost windrow content 0.51% and compost vermi 0.92%. The content of K_2O windrow compost is 1.34% and compost verm is 0.86%. Total macro nutrients (N Total, P_2O_5 and K_2O) compost windrow 3.46% and compost vermi 3.04%. From these results indicate that the total macro nutrients (N Total, P_2O_5 and K_2O) from windrow compost and vermi compost are not in accordance with the quality standard.

3. DISCUSSION

3.1. Physical Quality of Compost

Water content: Water content has a very large influence in the composting process. Water levels that are too low or too high can interfere with the optimization of the composting process (Luo, W and Chen, T.B. 2007). Water content plays an important role in the composting process because the decomposition process of organic matter depends on the available water content (Lua, S.Y et al., 2007). Based on table 1. the results of the water content for windrow compost is 21.33% and the water content of vermin compost is 24.15% where the value of the water content has met the quality standard requirements for mature compost water which has a water content of 15-25%. Based on the research it was found that 9 types of compost tested had water content below 50% and had complied with the moisture requirements of compost in accordance with SNI 19-7030-2004, while 1 type of compost had a humidity of 68% so that it did not meet the requirements in accordance with SNI 19-7030-2004 (Tantya Tantri PTN, et al. 2016). The water content of windrow compost is lower than vermin compost because the windrow compost, compost process is carried out on land that is directly exposed to sunlight and in the process of composting windrow compost is a reversal and watering process to maintain the water content of the windrow compost while vermin compost is moisture content higher is caused by the process of making vermin compost in a closed manner which is always moist to keep the moisture in accordance with the living conditions of the worms used in the composting process. Another thing that

causes high water content in vermin compost is the spraying process which is intended to maintain moisture in the vermin compost composting process and there is no reversal process in the vermin compost.

Temperature: Heat generated from microbial activity is directly related to increasing temperature with oxygen consumption. The higher the temperature, the more oxygen consumption and the faster the decomposition process. Increased temperatures can occur quickly in compost piles (Adi Budi Yulianto et al., 2009). Temperature is one indicator of compost maturity. In the composting process, the resulting temperature reaches 60^0C and over time will decrease in temperature when the compost begins to enter the maturation stage. Based on table 2, the measurement results of windrow compost temperature of 32^0C and vermin compost temperature of 30^0C where the temperature has met the requirements in accordance with SNI 19-7030-2004 to be said as mature compost. Based on the results of the study showed that the vermin composting process was carried out until near 14 days with special treatment to maintain bedding and food moisture, as well as a temperature of 15-25^0C (Firli Rahmatullah et al., 2013). Based on the results of the study showed that compost with normal temperature or according to ground water temperature is 30^0C where the temperature is in accordance with the requirements according to SNI 19-7030-2004 (Tantya Tantri et al., 2016). The high temperature of windrow compost is inversely proportional to the water content of windrow compost. The windrow compost temperature of 32^0C is caused by the microbial composting process which works mesophilically which works until the temperature reaches 60^0C which slowly drops during the compost maturation process. The temperature of windrow compost which is higher than vermin compost is also affected due to the low water content of the windrow compost which can be caused due to the lack of watering process carried out to maintain the moisture content in compost. The compost vermin temperature is lower than windrow compost because the water content in vermin compost is higher than windrow compost. Another thing that affects is in the manufacturing process, the environmental humidity of making vermin compost is always maintained so that it is always moist and not dry. In addition, the stack of vermin compost is also often done fogging so that the compost moisture is not too wet, but also not too dry. This makes the temperature of vermin compost lower than the temperature of windrow compost.

Smell and color: Compost has a smell resembling soil, this is due to the content of material that has soil nutrients in it. Black compost color is formed due to the influence of stable organic matter. The texture of compost, the fine texture of compost occurs due to the decomposition of microorganisms that live in the composting process (Isroi, 2008). This study concluded that the physical quality of the two compost treatments had blackish, earthy, and fine-textured color categories according to the SNI 19-7030-2004 (EPS Suwatanti, P Widiyaningrum, 2017). The change in odor on compost is an indicator of the decomposition process. The foul odor that is produced at the beginning of the process takes longer to decrease and changes to the smell of the soil. Compost that has smelling soil is an indication that the compost is ripe (Istiyani, 2013). Based on Table 3. the results of observations of dark brown windrow compost while the colors obtained from the observation of vermin compost are blackish brown. The results of the observation of odors on windrow compost and vermin compost have smell of soil according to the indicators of compost maturity. The color difference between windrow compost and vermin compost is due to differences in the raw materials used in the composting process. In making windrow compost the raw material used is a mixture of sludge, chopped siwalan mats, and dried leaves. This causes the color that arises when the mature compost is dark brown, whereas in making vermin compost, the material used is only sludge without added other ingredients. The use of sludge without the addition of other ingredients makes the color that appears at the end of composting is blackish brown. The smell of soil on windrow compost and vermin compost is an indicator of compost maturity. In the initial process of composting for windrow compost, the odor produced is quite stinging with the smell of fermentation, but after the end of the process of maturation the smell of fermentation decreases and changes with the smell resembling soil. Vermi compost does not have a stinging fermentation odor at the beginning of the manufacturing process. This is because the raw material used is sludge which has a neutral pH, so that in the composting process there is no typical sour odor of fermented fermentation.

3.2. Compost Chemical Quality

C-Organic: Organic C and water content have an inverse relationship, where when the water content increases, the organic C-content decreases, and vice versa (Lu Y., Wu X. and Guo J., 2009). Based on the research of the lowest C-organic content in vermin compost produced from food with the composition of banana midrib: pandanus mats: sludge = 1: 1: 4 by pheretema worms with B2M2-P code which is 28.04%. This is because the pheretema worm is geophagus (predominantly a land eater), besides that of the type of food composition that contains a lot of organic

C which is found in M2, such as banana midribs and pandan mats which tend to be unpopular with pheretema worms (Firli Rahmatullah et al. , 2013). According to research on C-organic analysis carried out at the end of the composting process the results were 9.9% - 32%. These results have decreased compared to C-Organic at the beginning of the composting process by 42.14% (Ganjar Samudro, 2017). Based on Table 4. the results of examination of C-Organic compost plant unit water treatment and composting plant PT. Djarum Oasis Kudus Factory Kretek obtained results for compost windrow of 25.50% and compost for vermin at 23.76%. Water and C-organic content has an inverse relationship. This means that the increase in C-Organic content is followed by a decrease in water content (Lu Y., Wu X. and Guo J., 2009). This is in accordance with the results of C-Organic examination from windrow compost and vermin compost. Windrow compost which has a lower amount of water content has higher C-Organic content than vermin compost. Vice versa, the high water content possessed by vermin compost causes lower C-Organic levels compared to windrow compost. From these results it can be concluded that the levels of C-Organic for windrow compost and vermin compost samples of windrow have complied with compost Organic C requirements in accordance with Annex I.3 minimum technical requirements for organic fertilizers from industrial wastewater treatment installations regulation of the Minister of Agriculture of the Republic of Indonesia Regulation of the Minister of Agriculture Number 70 / Minister of Agriculture Regulation / SR.140/10/2011 (Appendix I.3) concerning organic fertilizers, biofertilizers and soil improvement with a minimum value of 15%.

Degree of Acidity (pH): pH plays an important role in composting. pH can be used as an indicator of the life of microorganisms. The pH range of the compost pile should be maintained between 7 - 7.5 (Damanhuri and Tripadmi, 2010). The decrease in pH at the end of composting occurs because of the enzymatic oxidation of inorganic compounds resulting from the decomposition process (Baharuddin, U.S., et al., 2009). The vermin composting process is carried out until near 14 days with special treatment to maintain the pH so that the compost pH remains at pH 7.5 - 8 (Firli Rahmatullah et al., 2013). The pH value in the composting process affects the growth of bacteria. Changes in pH values in the composting process are caused by the decomposition of proteins into ammonia (NH3). The initial pH of the compost tends to be acidic. This is caused by the formation of simple organic acids which then pH slowly rises in the ripening process caused by protein breakdown and the release of ammonia (NH3) (Supadma, A. A, et al., 2008). Based on Table 5. pH value of windrow compost and vermin compost is 7.5. the initial pH of the windrow compost reaches pH 5 where the condition includes an acidic state. In the composting process, the pH slowly approaches neutral pH, and at the end of the composting process the windrow compost pH becomes neutral pH. The initial condition of vermin compost which has sludge as raw material has an initial pH that tends to base, which is 9.5 - 10. In the process, the pH of vermin compost will drop to near neutral pH at the end of the composting process. From these results it can be said that the pH of the two types of compost is in accordance with Annex I.3 minimum technical requirements for organic fertilizer from industrial wastewater treatment installation Minister of Agriculture Regulation No. 70 / Minister of Agriculture Regulation / SR.140 / 10/2011 concerning organic fertilizers , biofertilizer and soil improvement.

Nitrogen (N), Phosphate (P), Kalium (K) (N Total, P_2O_5, and K_2O): The presence of nitrogen in compost is caused by the decomposition of organic matter by microorganisms. Nitrogen is obtained through three stages of reaction, namely the protein decomposition reaction into amino acids (amination), the changes in amino acid reactions into ammonia (NH_3) and ammonium (NH_4^+), and the last step is the change of ammonia into nitrate with the help of nitrifying bacteria (Surtinah, 2013). Phosphorus is a nutrient that plays a role in the processes of respiration, photosynthesis, nucleic acid preparation, formation of plant seeds, fruit producers, and stimulates the development of roots so that plants are resistant to drought (Elfiati, 2005). Potassium is a macro nutrient absorbed by plants in the form of K^+ ions which are absorbed through xylem and phloem. Kalium has an important role in plant growth, the presence of Kalium in the cytoplasm and chloroplasts has a role to neutralize the solution, so that pH becomes neutral (Aulia Rahman Khani Selian, 2008). Nitrogen is 1%, Phosphorus is 0.23%, and Kalium is 0.52%, the results obtained already meet the standards based on SNI 19-7030-2004 which is equal to 0.20% (I Made Ogik Indrawan et al., 2016). Compost from the sludge raw material for the factory waste water treatment plant obtained N content of 22.38%, P content of 0.894%, and K content of 0.25%, these results are in accordance with SNI 19-7030-2004 compost quality standards (Dicky Cahyadhi, 2016). Based on table 6. the results of windrow compost examination have a total N content of 1.61%, P content in P_2O_5 is 0.51%, K_2O content is 1.34%, so the macro nutrient content (N Total + P_2O_5 + K_2O) is 3.46%. As a result of vermin compost total N content of 1.26%, the P content in P_2O_5 was 0.92%, K_2O content was 0.86%, so the macro nutrient content (N Total + P_2O_5 + K_2O) was 3.04%. From these results it can be concluded

that macro nutrients (N Total + P_2O_5 + K_2O) from windrow compost and vermin compost do not meet the macro nutrient quality requirements (N Total + P_2O_5 + K_2O) compost according to the minimum technical requirements for organic fertilizers from waste water treatment plants industry regulation of the Minister of Agriculture of the Republic of Indonesia Regulation of the Minister of Agriculture No. 70 / Regulation of the Minister of Agriculture / SR.140 / 10/2011 (Appendix I.3) concerning organic fertilizers, biofertilizers and soil improvement, which is at least 4%.

Total N, P_2O_5, and K_2O levels from windrow compost have higher levels due to more diverse organic materials used in windrow compost compared to vermin compost. In the process, when composting windrow compost takes longer than vermin compost. Longer time and involving degrading microorganisms that help reduce degradation of organic matter are more perfect, while the process of making vermin compost takes less time, which is half the time of composting windrow compost. In addition, the process of making vermin compost only relies on the degradation of using worms by utilizing digestive enzymes in the worm's body. Total N, P_2O_5, and K_2O levels in compost are strongly influenced by the total N levels, P_2O_5, and K_2O from the materials used and remodeling activities by microorganisms that play a role in the degradation process. Based on the results obtained, the amount of total N, P_2O_5, and K_2O windrow compost and vermin compost does not meet the minimum technical requirements of organic fertilizer from industrial waste water treatment installation Minister of Agriculture Regulation No. 70 / Minister of Agriculture Regulation / SR.140 / 10/2011 Appendix I.3 concerning organic fertilizers, biofertilizers, and soil improvement so that they cannot be called compost but are referred to as soil enhancers. This is because soil enhancers come from synthetic and organic materials and minerals that are able to improve soil properties, both physical, chemical and biological properties (Regulation of the Minister of Agriculture No. 70 of 2011).

4. CONCLUSION

Examination of the physical quality of windrow compost results in water content of 21.33%, temperature of 30^0C, dark brown color, smelling of soil. Examination of the physical quality of vermin compost was obtained at 24.15% moisture content, 30^0C temperature, blackish brown color, smelling of soil.

Examination of the chemical quality of windrow 30^0C obtained C-Organic results of 25.50%, total N of 1.61%, P_2O_5 of 0.51%, K_2O of 1.34%, macro nutrient content (N Total + P_2O_5 + K_2O) of 3.46%. Examination of chemical quality of compost vermicelli obtained C-Organic results of 23.76%, total N of 1.26%, P_2O_5 of 0.92%, K_2O of 0.86%, macro nutrient content (N Total + P_2O_5 + K_2O) 3.04%.

The physical quality of windrow compost and vermin compost is in accordance with the physical requirements of SNI 19-7030-2004 compost regarding the specifications of compost from domestic organic waste. The chemical quality of windrow compost and compost vermicelli C-Organic parameters and pH is in accordance with the minimum technical requirements of organic fertilizer from industrial wastewater treatment installation Minister of Agriculture Regulation No. 70 / Minister of Agriculture Regulation / SR.140 / 10/2011 (Appendix I.3) concerning organic fertilizers, biological fertilizers, and soil enhancers, while the parameters N, P, K (macro nutrient) are not in accordance with the requirements.

The results of physical and chemical quality checks of windrow compost and vermin compost have several parameters that have not fulfilled the requirements as compost organic fertilizer according to the minimum technical requirements for organic fertilizers from industrial wastewater treatment installation Minister of Agriculture Regulation No. 70 / Minister of Agriculture Regulation / SR.140 / 10/2011 (Appendix I.3) concerning organic fertilizer, biofertilizer, and soil improvement, so that the windrow compost and compost vermicelli are only referred to as soil enhancers.

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