THE DIFFERENT LEVEL OF NITROGEN (N), PHOSPHORUS (P) AND POTASSIUM (K) ON COMPOSTING WITH ACTIVATOR MEDIA

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THE DIFFERENT LEVEL OF NITROGEN (N), PHOSPHORUS (P) AND POTASSIUM (K) ON COMPOSTING WITH ACTIVATOR MEDIA OF COW DUNG AND GOAT MANURE ON COMPOSTING

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ABSTRAC

Background :Organic waste can be used as compost. To accelerate decomposition activators media can be used cow dung and goat manure that can produce high levels of nitrogen, phosphorus and potassium varied. The aim of research is to determine the differences in the levels of nitrogen (N), phosphorus (P) and potassium (K) in the compost activator media cow dung and goat manure in composting.
Methods :The study design is a true experimental design with equivalent control group. The population of all organic waste to sample from organic waste is taken by simple random sampling technique. Media independent variables and the dependent activator levels of N, P and K were collected by laboratory examination. Data were analyzed by ANOVA (Analysis of Variance).
Results :From the results, the mean value of the N content controls 31.48%, 56.76% cow manure media and media goat manure 54.48% with the highest media cow dung, the mean level of 11.43 ppm P media control, media manure 15 , 62 ppm and media goat manure 16.294 ppm with the highest on the junk media goat manure, the mean levels of C waste by media control 13.685 ppm, media cow dung 20.616 and media goat manure 20.839 with the highest junk media goat manure, $F(2, 6) = 874.698$; $p < 0.05$, there are differences in the levels of the end of the P litter significantly between controls, media cow dung and goat manure media, $F(2, 6) = 726.093$; $p < 0.05$, and there are differences in levels of late K litter significantly between controls, media cow dung and goat manure media, $F(2, 6) = 612.000$; $p < 0.05$.
Conclusion :From the results of this study concluded that nitrogen levels are highest composting with the media of cow dung. Phosphorous levels are highest in composting with media of goat manure. Potassium levels are highest in composting with goat media. The different media activators will produce high levels of different N, P and K.
Keywords*: activator (cow / goat), composting, K, N, P*

BACKGROUND

Garbage is a material that is wasted or disposed of the results of human and natural activities that have no economic value[1] .Waste is the waste material that is not desirable after the end of a

process. Waste is defined by humans according to their degree of exposure in natural processes, in fact there is no concept of waste, only the products produced after and during the natural process take place [2]

Trash environmental problems that need to take advantage of the movement of waste into something of value, with the utilization can reduce the level of rubbish around us. One of utilizations is by processing organic waste into compost. Composting is the decomposition partial / incomplete, accelerated artificially from a mixture of organic materials by a variety of microbial populations in environmental conditions of a warm, moist, and aerobics. Useful compost to improve soil structure, nutrients the necessary plant will be available. The microbes in the compost will help the absorption of nutrients that plants need. Soil will become looser. Plants are fertilized with compost will grow better.

Seeing the market trend like that, then it is proper that we take advantage of existing organic waste as compost. Besides it provides advantages for its economic value, on the other hand it can also help the environment clean. the organic waste generated from Public Health Center (Puskesmas) can be used as the base material of organic fertilizer. Materials of organic fertilizer are organic waste from waste media activator from livestock barns either from chicken manure, goat / sheep and cow dung [3].

Statistics East Java in 2013 recorded a garbage production of 1697 units of the traditional market of 37,000 tones / day in which 61.62% of which are organic. This requires special handling to cope. Waste in the form of vegetable waste which is just placed it in exile and waiting for scavengers to pick it up or disposed of TPAS (Landfill Waste) if the pile has been rising. Stacking is too long can result in contamination, which is a breeding pests and odor unwanted [4]. The problem is the utilization of organic waste as an organic fertilizer has not been done at all. If the evaluation is done, with the organic garbage ± 10 kg / day of inpatient health centers in Campurdarat, if it is disposed less sanitary, it could lead to pollution of soil and pollution and nuisance odor aesthetics in landfill. Therefore, it is not rare to visit a patient who is closely related to infectious diseases such as diarrhea that is still high, URTI, typhoid, dengue and others.

Many factors cause the lack of utilization of organic waste into organic fertilizer. A major cause is the lack of knowledge about organic fertilizer. Knowledge is less influential on attitudes, perception, motivation, confidence in the manufacturing of organic fertilizers. This is consistent with the theory of the behavior of K-A-P (knowledge-attitude-practice), that preceded the behavior and attitude preceded knowledge [5]. The impact is the utilization of organic waste into organic fertilizer is still very minimal.

Given these problems, the increasing knowledge of composting organic waste material should be given to each person. This is so that people are able to manage the use of organic fertilizer raw

materials in a professional manner. Composting with media activators or starter from cow and goat dung needs to be done by calculating the value of C / N ratio so that the composting process was swift and effective. Composting is considered as a sustainable technology because it aims at conserving the environment, human safety, and giving economic value. The use of compost helps conserve the environment by reducing the use of chemical fertilizers, which can lead to land degradation. Composting also is indirectly helping human safety by preventing environmental pollution [4].

Compost is an organic fertilizer derived from crop residues and animal waste that has undergone the process of decomposition or weathering [6] .Compost is a partial / incomplete decomposition of a mixture of organic materials that can be accelerated artificially by populations of various microbes in warm, humid, and aerobic or anaerobic environments [7]

Composting is defined as a biochemical process in which organic matter is decomposed into substances such as humus (compost) by different clusters of microorganisms under controlled conditions. Organic materials that can be used in compost can come from agricultural and non-agricultural wastes (municipal waste and industrial waste) [8]Compost has several beneficial properties such as repairing the soil structure of the clay so that it becomes lightweight, enlarge the sandy soil bond so that the soil does not droop, increase the water holding capacity of the soil, improve drainage and the air system in the soil, enhance the soil bonding capacity to nutrients, Complete nutrients, although the amount is small, helps the process of weathering mineral materials, provide the availability of food for mkroba [9]

Compost is made from organic material derived from various sources. Thus, compost is a source of organic and plant nutrients. It is possible that the compost material contains 15-16% cellulose, 10-30% of hemicellulose, 5-30% lignin, 5-30% protein, ash (3-5%) of mineral content, in addition to hot and cold water soluble (sugar , Starch, amino acids, urea, amodium salt) 2-30% and 1-15% fat soluble ether and alcohol, oil [10]

Compost is the final substance of a fermentation process of waste piles / litter plants and sometimes also including animal carcasses. According to the humidification of fermentation a fertilization is characterized by decreasing C / N yield. Commonly used raw materials such as; Straw, leaves, kitchen waste, municipal waste and others and generally have yields for C / N that exceed 30 [11]

Composting is the process of reforming (decomposition) and stabilization of organic materials by microorganisms in a controlled environment (controlled) with the final result of humus and compost [12]. Principles of composting is to reduce the C / N ratio of organic material to be equal to the ratio of C / N soil. C / N ratio is the ratio between karbohidtar and nitrogen contained in the ingredients. The value of C / N ratio of soil is 10-12. Yangmemiliki organic materials C / N ratio is equal to the ground allowing the material to be absorbed by tanamn [13]

During the composting process will occur shrinkage of volume and biomass of materials. This reduction can reach 30-40% of the initial weight of the material [14].The physical structure of the compost or the appearance of the compost can be seen from the texture, color, and smell of compost, and the product of the co-composting result. The physical condition of the compost is blackish brown to black and smells of soil, physically fulfilling the compost quality standard that has been established through SNI 19-7030-2004 [15] .Many factors cause the lack of utilization of organic waste into organic fertilizer. The main cause is the lack of knowledge about making organic fertilizer. Knowledge that is less influential on attitude, perception, motivation, belief in the manufacture of organic fertilizer. This is consistent with the behavioral theory of K-A-P (knowledge-attitude-practice), meaning that behavior is preceded by attitude and attitude preceded by knowledge [5]. The impact is the utilization of organic trash into organic fertilizer is still very minimal.

Liquid fertilizer from Goat Stool (feses) has a relatively more balanced nutrient content than other natural fertilizers because the goat litter mixes with the urine (nutrient content), it usually does not occur in other types of manure such as cow dung [16] Basically the activator is a water-soluble microorganism and mixed into the material to be composted then quickly this microorganism develops. Actually this activator can be made by developing the microorganisms that come from the stomach (colon, intestine) ruminant animals such as cattle or buffalo [17]

The technology of waste composting is very diverse, both aerobically and anaerobically, with or without composting activators. Starter is a population of microbes and physiological conditions that are ready to be inoculated on the fermentation medium. Various composting activators among others PROMI (Promoting Microbes), OrgaDec, SuperDec, ActiComp, BioPos, EM4, Green Phoskko Organic Decomposer and SUPERFARM (Effective Microorganism) or using worms to obtain compost (vermicompost). Each activator has its own advantages [18]

Giving an activator of manure in composting is one of attempts to accelerate the composting time and at the same time improving the quality of compost. Animal manure is the most appropriate medium for microbial growth and development. It also increased the number of microbes modifiers, livestock manure is also a contributor of nutrients in the compost material [4]
Based on the description in the above background, the problem can be formulated researchers "Is there a difference in the levels of nitrogen (N), phosphorus (P) and potassium (K) in the compost activator media cow dung and goat manure in composting? The purpose of this study was to determine differences in the levels of nitrogen (N), phosphorus (P) and potassium (K) in the compost activator media cow dung and goat manure in composting.

SUBJECTS AND METHODS

The study design used in this research is true experimental. The selected experimental models in the study are the design of Equivalent Control Group which can be described as follows (Setiadi, 2007):

Tabel : 1 Design of Research

	Pre test	Treatment	Post test
treatment 1		X1	01
treatment 2		X2	02
Control			02

Information:
X1 = composting with starter / media activator cow dung
X2 = composting with starter / activator media goat manure
01 = levels of nitrogen (N), phosphorus (P) and potassium (K) composted cow
02 = levels of nitrogen (N), phosphorus (P) and potassium (K) composted goat

Population Sample, and Sampling Techniques
The population in this study were all organic waste, while the sample most of the organic waste, sampling technique is random sampling

Research variable
The independent variable in this study is a starter / media activator of cow dung and goat manure. As the dependent variable is the level of Nitrogen (N), phosphorus (P) and potassium (K) in the compost.

Data Collection Instrument Research
Tools used observation sheet to assess the levels of Nitrogen (N), phosphorus (P) and potassium (K) compost. Analysis of the levels of Nitrogen (N), phosphorus (P) and potassium (K) in the Great Hall of the Regional Health Surabaya

The process of composting is done as follows:

a. Steps of working:
At this stage all the materials collected will be composted, either cow dung, goat dung, green

leaves and organic waste. Materials need to be washed are green leaves and organic waste to separate from impurities fetched as the ground is even possible pests. The dried material leaves only green and organic waste to reduce its water content so as to accelerate the decomposition process.The materials are chopped green leaves and organic waste and bitter leaves of ± 2 cm to increase the surface so that the material can be easily and quickly decomposed into compost.Chopped material was mixed with cow dung and goat dung to help speed up the composting process, set the humidity, if it is too dry then it needs to be watered / add water. Material has been mixed and then put in black plastic for composting. Plastic tied tightly so that no microorganisms or macro organism from outside that goes into the compost material. Compost is placed in a shady spot protected from direct sunlight and rain.Reversal performed to remove excessive heat, insert fresh air into the pile of material, leveling the weathering process in every part of the stack, leveling the provision of water, as well as help the destruction of the material into small particles.
Watering is done if the heap of compost material is too dry and should be done before the reversal so that when the reversal is done, water will be mixed by itself. The ideal moisture content during the composting process is 40-60%, with optimum value of 55%.After composting runs 30-40 days, temperatures will pile decreases to near room temperature. At that time the piles of rotten are dark brown or blackish. Compost entered the stage of maturation for 14 days. Ripe compost should be sieved to separate the fine compost and dispose of materials that pollute like pieces of wood. Analysis of levels of N, P, K performed in the Great Hall of the Regional Health Laboratory Surabaya

Data analysis

It is to determine differences in the levels of nitrogen (N), phosphorus (P) and potassium (K) in the compost activator media cow dung and goat droppings were analyzed by: Anova 1 Directions T.

RESEARCH RESULT

Levels of Nitrogen (N)

Levels of Nitrogen (N) on the media compost activator cow dung, goat dung and control at the waste can be presented in the table below.

Table 2 Levels of Nitrogen (N) on the Media Activators Compost Cow Dung, Goat Manure and Control

CODE MATERIAL	NITROGEN (%)	PHOSPHORUS (ppm)	POTASSIUM (ppm)
1	30,64	55,78	52,2

2	31,25	56,73	54,45
3	32,54	57,76	54,8
Average	31,48	56,76	54,48

Based on Table 2 can be seen from the average value of the nitrogen content control by 31.48%, 56.76% cow manure media and media goat manure 54.48% with the highest media contained in the garbage with cow dung.

Levels of Phosphorous (P)

Levels of phosphorus (P) in the compost activator media cow dung, goat dung and control at the waste can be presented in the table below.

Table 3 Levels of Phosphorous (P) on the Media Activators Compost Cow Dung, Goat Manure and Control

CODE MATERIAL	NITROGEN (%)	PHOSPHORUS (ppm)	POTASSIUM (ppm)
1	32,54	11,35	13,426
2	55,78	15,523	20,136
3	54,2	16,114	20,786
Average	11,43	15,62	16,294

According to the table 3 can be seen from the average value of the levels of phosphorus waste by media controls 11.43 ppm, with cow dung media amounted to 15.62 ppm and with goat droppings media at 16.294 ppm with the highest found in the garbage with goat droppings media.

Levels of Potassium (K)

Levels of Potassium (K) in the compost activator media cow dung, goat manure and control at the waste can be presented in the table below.

Table 4 Levels of Potassium (K) on the Media Activators Compost Manure Cow, Goat Dirt and Control

CODE MATERIAL	NITROGEN	PHOSPHORUS	POTASSIUM

	(%)	(ppm)	(ppm)
Media control	31,25	11,674	13,764
Media Cow Dung	56,73	15,661	20,973
Media goat manure	54,45	16,476	20,912
Average	13,685	20,616	20,839

Based tabel.4 can be seen from the average value of potassium trash with media control of 13.685 ppm, with cow dung media at 20.616 and 20.839 of goat manure media with the highest found in the garbage with goat droppings media.

Test Results Statistics

Test Results Statistics One Way Anova Difference Levels of Nitrogen (N) can be seen in the table below.

Test Results Statistics

Tabel.5 One Way A Difference Levels of Nitrogen (N) on the Media Activators Compost Cow Dung, Goat Manure and Without Media Activator (Control)

Group	Control			Cow Dung			Goat Manure			*One Way Anova (F)*	P
	N	*Mean*	SD	N	*Mean*	SD	N	*Mean*	SD		
Nitrogen (N)	3	31,48	0,97	3	56,76	0,99	3	54,48	0,30	874,698	0,000

Based on Table 5 are known through the One-Way ANOVA test, there are differences in the levels of nitrogen end at the waste significantly between controls, with the media dirt sapid with goat droppings media, $F(2, 6) = 874.698$; $p < 0.05$. With post hoc Tukey HSD test, the result is that the significance of the end of the Nitrogen levels between media control with cow dung media of 0.000 <0.05,

Test Results Statistics One Way Anova Difference Levels Phosphorous (P) can be seen in the table below.

Table 6 Test Results Statistics One Way A Difference Levels of Phosphorous (P) on the Media Activators Compost Cow Dung, Goat Manure and Without Media Activator (Control)

Group	Control			Cow Dung			Goat Manure			*One Way Anova (F)*	P
	N	*Mean*	SD	N	*Mean*	SD	N	*Mean*	SD		
Phosphorous (P)	3	11,43	0,22	3	15,62	0,08	3	16,29	0,18	726,093	0,000

Based on known through the table 6 One-Way ANOVA test, there are differences in levels of phosphorus ending at the waste significantly between controls, with cow dung media and the media goat manure, $F(2, 6) = 726.093$; $p < 0.05$.
With post hoc Tukey HSD test, the result is that the significance of the final phosphorus levels between media control with cow dung media of $0.000 < 0.05$,

Test Results Statistics One Way Anova Difference Levels of Potassium (K) can be seen in the table below.

Table 7 Test Results Statistics One Way A Difference Levels of Potassium (K) on the Media Activators Compost Cow Dung, Goat Manure and Without Media Activator (Control)

Group	Control			Cow Dung			Goat Manure			*One Way Anova (F)*	P
	N	*Mean*	SD	N	*Mean*	SD	N	*Mean*	SD		
Potassium (K)	3	13,69	0,23	3	20,62	0,43	3	20,84	0,07	612,000	0,000

Based on table 7 known through the One-Way ANOVA test, there are differences in levels of potassium in the garbage end significantly between controls, with cow dung media and the media goat manure, $F(2, 6) = 612.000$; $p < 0.05$.
With post hoc Tukey HSD test, the result is that the significance of potassium between media control with cow dung media of $0.000 < 0.05$, meaning

DISCUSSION

Levels of Nitrogen (N)

The results showed that the views of the average value of the highest nitrogen levels found in bins with cow dung media that is equal to 56.76%. Nitrogen is an important element in building a body of an organism, so the higher nitrogen

content, it will improve the quality of compost [4] In the process of composting is required elements (N) Nitrogen is needed for metabolism and growth [19]

Levels of Phosphorous (P)

Research shows that the views of the average value of the highest levels of phosphorus found in the garbage with goat droppings media that is equal to 16.294 PPM. P element is an essential element in the compost, because this element is the main nutrient for plant growth. Soepardi [4] reported that the higher the P element content by the weathering of organic material is composted. At the stage of maturation of the microorganism will die and P content in microorganisms will mix in compost material that will directly improve the content of phosphorus in compost. In the process of composting is required elements P. phosphorus needed for metabolism and growth [19]

Levels of Potassium (K)

The results showed that the views of the average value of the highest levels of potassium found in the garbage with goat droppings media that is equal to 20.839 PPM. Potassium in plants was instrumental in the formation of protein and carbohydrate, hardening of wooden parts, enhance resistance to disease and improve the quality of seeds and fruits. stated that the higher the K element content with their weathering composted organic material. If the organic material that is used for composting enough N content, then usually other nutrients such as P and K will be available in sufficient quantities. Potassium is an essential plant nutrient, and even all living beings. No other element that can replace its specific function in plants, and is one of the three main macro nutrients other than N and K in plants P.Ion serves as an activator of many enzymes that participate in several major metabolic processes in plants. Potassium is absorbed by plants from the soil in the form of ions (K +). Unlike N and P, K element in the plant is not in the form of organic compounds. Its main function is closely related to the metabolism of plants of several processes that occur in plants. Potassium is vital in the process of photosynthesis. If K deficiency is the process of photosynthesis is going down, but will increase plant respiration [4]

Differences in Levels of Nitrogen (N).

Based on the analysis of One-Way ANOVA test, there are differences in the levels of nitrogen end at the waste significantly between controls, with cow dung media and the media goat manure, $F(2, 6) = 874.698$; $p < 0.05$. Post hoc Tukey HSD test, the result is that the significance of the end of the Nitrogen levels between media control with cow dung media of $0.000 < 0.05$, meaning that there are differences in levels of nitrogen between media control with cow dung media. In other words, media composting with cow dung and cow dung media without (control) is much different nitrogen levels. Difference Mean (average difference) between the control with cow dung media at -25.28 (As marked negative means control lower than cow dung media).

Significance levels of Nitrogen final between media control media with goat droppings of 0.000 <0.05, meaning that there is a difference between media control nitrogen levels with mdia goat droppings. In other words composting with goat droppings and the media without the media goat manure (control) is much different nitrogen levels. Difference Mean (average difference) between the control with the media goat manure at -23.01 (due to the negative sign means that control is lower than goat manure media).

Significance levels of Nitrogen final between media manure with goat droppings media by 0.033 <0.05, meaning that there is a difference between the nitrogen content of compost with manure with compost media with goat droppings media. In other words composting cow manure with the media and media goat manure nitrogen levels much different. Difference Mean (average difference) between the media cow manure with goat droppings media is of 2.27 (as marked positive means cow dung media was higher than goat manure media). Garbage with no media (control) (M = 31.48; SD = 0.97) had higher levels of nitrogen lower end compared with cow dung media (M = 56.76; SD = 0.99) or with goat droppings media (M = 54.49; SD = 0.30).

A cow capable of producing solid and liquid dirt as much as 23.6 kg / day and 9.1 kg / day (Tauscher et al. In Prihandini & Purwanto. 2007). Law [6] reports that heifer gelding will produce 15-30 kg kg dung per day.

Cow dung has economic value because it includes organic fertilizer needed by all types of herbs. Most manure can be used as fertilizer after composting mature experience, that is, if the physical (color, appearance, texture and moisture content) is not similar to the original material, chemically contains N 2%.

Differences in levels of phosphorus (P)

The results of the analysis of One-Way ANOVA test, there are differences in levels of phosphorus ending at the waste significantly between controls, with cow dung media and the media goat manure, F (2, 6) = 726.093; p <0.05.

With post hoc Tukey HSD test, the result is that the significance of the final phosphorus levels between media control with cow dung media of 0.000 <0.05, meaning that there is a difference between media control phosphorous levels in cow dung media. In other words, media composting with cow dung and cow dung media without (control) levels phosphor much different. Difference Mean (average difference) between the control with cow dung media of -4.19 (As marked negative lower than the mean control cow dung media).

Significance levels of phosphorus final between media control media with goat droppings of 0.000 <0.05, meaning that there is a difference between media control phosphorus levels with goat droppings media. In other words composting with goat droppings and the media without the media goat manure (control) levels phosphor is much different. Difference Mean (average difference) between the control with the media goat manure at -4.86 (Because the negative sign means that control is lower than goat manure media).

Significance levels of phosphorus final between media manure with goat droppings media 0.007 <0.05, meaning that there are differences in levels of phosphorus between compost with manure with compost media with goat droppings media. In other words, the media composting cow manure and goat manure media phosphor levels much different. Difference Mean (average difference) between the media cow manure with goat droppings media amounted to -0.67 (Because the media is negative means cow dung lower than goat manure media). Garbage with no media (control) (M = 11.43; SD = 0.22) had higher levels of phosphorus lower end compared with cow dung media (M = 15.62; SD = 0.08) or with goat droppings media (M = 16.29; SD = 0.18).
Cow dung has economic value because it includes organic fertilizer needed by all types of herbs. Most manure can be used as fertilizer after composting mature experience, that is, if the physical (color, appearance, texture and moisture content) is not similar to the original material, chemical organic matter P2O5: 1%.

Differences in levels of potassium (K)

The results of the analysis of One-Way ANOVA test, there are differences in levels of potassium in the garbage end significantly between controls, with cow dung media and the media goat manure, F (2, 6) = 612.000; p <0.05.
With post hoc Tukey HSD test, the result is that the significance of potassium between media control with cow dung media of 0.000 <0.05, meaning that there is a difference between media control potassium levels with cow dung media. In other words, media composting with cow dung and cow dung media without (control) and potassium levels much different. Difference Mean (average difference) between the control with cow dung media of -6.931 (Because the negative sign means that control is lower than cow dung media).
The significance of the final potassium levels between media control with goat droppings media of 0.000 <0.05, meaning that there is a difference between media control potassium levels with goat droppings media. In other words composting with goat droppings and the media without the media goat manure (control) levels of potassium is much different. Difference Mean (average difference) between the control with goat droppings media of -7.514 (Because the negative sign means that control is lower than goat manure media).
The significance of the final potassium levels between media manure with goat droppings media amounted to 0.626> 0.05, meaning there is no difference between the levels of potassium compost manure with compost media with goat droppings media. In other words, the media composting cow manure and goat manure media potassium levels almost equal. Difference Mean (average difference) between the media cow manure with goat droppings media amounted to -0.22 (Because the media is negative means cow dung lower than goat manure media). Garbage with no media (control) (M = 13.69; SD = 0.23) had higher levels of potassium lower end compared with cow dung media (M = 20.62; SD = 0.43) or with goat droppings media (M = 20.84; SD = 0.07).

Cow dung has economic value because it includes organic fertilizer needed by all types of herbs. Most manure can be used as fertilizer after composting mature experience, that is, if the physical (color, appearance, texture and moisture content) is not similar to the original material, chemically contains 1% K2O.

Conclusion

Nitrogen levels are highest in the media composting manure, phosphorus levels are highest in composting with goat media, Potassium levels highest in composting with goat media. Activators of different media will produce high levels of N, P and K are different

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