

# Effectiveness in Various Types activator Composting of Waste Kol (*Brassicca oleracea*)

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# EFFECTIVENESS IN VARIOUS TYPES activator COMPOSTING OF WASTE KOL (*Brassicca oleracea*)

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## ABSTRACT

Waste cabbage usually stacked just on landfills and are not transported every day. Stacking is too long can result in the emergence of the environmental pollution sulfide acid gas and ammonia gases that cause the unpleasant smell of rotting waste and can become a breeding ground for germs. Tanah Karo is famous as one of the largest cabbage producer in North Sumatra. There should be some way of handling and processing of the waste as cabbage, among other compostable material that does not negatively impact the environment. One process that can speed and does not cause unpleasant aroma is by using an activator. In this study used different types of activator that is EM4 (Effective Microorganisms), cow dung and MOL solution. The research aims to produce compost from waste vegetable cabbage using activator. Research shows the maturity of compost from cow manure activators, EM4 and physically mole shows that the smell of the soil (humus), blackish brown color and texture resembling soil. Compost Quality (sodium, phosphorus, potassium) generated already standardized compost SNI 19-7030-2004 ie 10-20%. On the third activator found that cattle manure levels of C / N ratio of 11.4%, amounting to 0.65% phosphorus and 0.20% potassium. To activator Mol C / N ratio of 10.9%, amounting to 0.57% phosphorus and 0.87% potassium. As for the EM4 activator C / N ratio of 10.1 %, amounting to 0.57% phosphorus and potassium 0.67% while the optimum time for composting is the 30th day.

Keywords: Waste Cabbage, Activator, Compost

## INTRODUCTION

The trash problem is now an issue for a number of major cities and are predicted to continue to increase every year in Indonesia. The amount of waste is generated in an area comparable to the number of population, type of activity and the level of consumption of the population against the goods / material. Semakin large number of the population or the level of consumption, the greater the volume of waste generated.

In Indonesia, as Pangalengan (West Java), Sumber Brantas (East Java), and Tanah Karo (North Sumatra) in cabbage / cabbage has been cultivated commercially in a wide area even a harvest of cabbage from the Karo marketed abroad such as Singapore and Penang (Sunarjono, 2013). To overcome the buildup is too long, there should be some way of handling and processing of the waste as cabbage, among other compostable material that does not negatively impact the environment. One process that can speed and does not cause unpleasant aroma is to use an activator. (Tombe, 2010).

According to the research daughter et al (2012), shows the provision of bio-activator manure during composting significantly affect the rate of decomposition of various types of leaf litter around the campus of the University of Hasanuddin. The same thing was stated by the study of Iight et al (2011), that composting can be

accelerated by using bacteria **efektive** Microorganisms (bucket) <sup>2</sup> 4. Composting will naturally take a relatively long time, which is about 2-3 months or 6-12 months. Composting can take place with a faster fermentation with the aid of microorganisms (Saptoadi, 2003)

Local Microorganisms (MOL) is one activator which can help speed up the composting process and rewarding improve nutrient compost. The study by Wbowo (2011) Use of Microorganisms local level Tapai and EM-4 as a bio-activator Organic Fertilizer Production sheep dung mixture with pisangKesimpulan rods that can be taken on this research that Local Microorganisms and EM4 activator is an activator that can make compost with **best** quality.

Based on the results of field observations made by the author in November 2014 looks so huge amount of waste each day cabbage is thrown away and not used so as to make the environment dirty and smelly, whereas Land karo renowned as **one** of the largest cabbage producer in North Sumatra. There should be some way of handling and processing of the waste as cabbage, among other compostable material that does not negatively impact the environment.

#### *METHODS*

Type of research is an analytical study design randomized, primary data were obtained from the results of research in the form of data on the comparison of the time needed for the maturation of compost, and maturity of compost were judged on physical parameters (odor, color and texture) as well as data from other parameters such as temperature, humidity and pH started from doing trials to become compost and prenatal Sodium, and Potassium Phosfor. Secondary data were obtained from **the** agricultural institutions in the form of a data volume of cabbage per week and the others. The object of this research is **the** solid waste vegetables are generally in the form of leaves or petals that can not be consumed obtained from the Village Tigapanah Kec.Tigapanah karo **district**. Working procedure includes activation of EM4, **application** of cow dung, and Composting. Data were analyzed using bivariate.

## RESULT

Table 1. Maturity of compost assessed on physical parameters (color, temperature, pH, humidity)

NO	Jenis Aktivator	HSP	Warna	Bau	Suhu (°C)	Ph	Kelembapan (%)
1	EM4	10	Segar - hijau tua	***	278	6.2	480
		20	Coklat tua Kehijauan	**	263	6.2	43.7
		30	Coklat kehitaman	*	262	6.8	420
2	MOL	10	Segar - hijau tua	***	28.0	6.2	483
		20	Coklat tua Kehijauan	**	267	6.2	437
		30	Coklat kehitaman	*	26.3	7.1	423
3	Kotoran Lembu	10	Segar - hijau tua	***	28.2	6.2	48.3
		20	Coklat tua Kehijauan	**	27.5	6.2	433
		30	Coklat kehitaman	*	26.0	7.1	42.5
	Kontrol	10	Segar - hijau tua	***	28.0	6.1	48
		20	Coklat tua Kehijauan	**	27.8	6.9	44
		30	Coklat	**	27.4	7.4	42.5

## 2. Quality Compost

Table 2. Results of C-Organic Analysis, total N, C / N Ratio, Phosfor (P2O5) and potassium (K2O)

NO	Jenis Aktivator	HSP	C-Organik	N-Total	C/N	P2O <sub>5</sub>	K <sub>2</sub> O
1	EM4	10	27.3	1,16	23,5	0,64	0,43
		20	25,2	1,23	20,5	0,67	0,44
		30	22,7	2,26	10,1	0,65	0,67
2	MOL	10	28,6	1,19	24,2	0,61	0,64
		20	26,6	1,22	21,8	0,63	0,66
		30	23,2	2,13	10,9	0,57	0,87
3	Kotoran Lembu	10	37,3	1,18	31,6	0,61	0,27
		20	35,3	1,23	28,8	0,63	0,28
		30	32,3	2,83	11,4	0,65	0,20

Table 3: Comparison of C-organic content total N, C / N Ratio, Phosfor (P2O5) and potassium (K2O) on day 30 with SNI

NO	Jenis Aktivator	HSP	C-Organik	N-Total	C/N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	SNI
1	EM4	30	21.1	226	9,4	0,65	0,67	
2	MOL	30	232	2,13	10,9	0,57	0,87	
3	Kotoran Lembu	30	32.3	2,83	11,4	0,65	0,20	

Table 4: Quality Compost Produced According SNI 19-7030-2004

No	Parameter	Aktivator									SNI 19- 7030 2004
		EM4			Mol			Kotoran lembu			
1	C/N Ratio	23,62	20,81	9,5	24,4	224	11,36	31,9	28,78	12,1	10-20
2	Phosfor (%)	0,62	0,64	0,63	0,65	0,68	0,68	0,69	0,70	0,70	>,10
3	Katium (%)	0,42	0,68	0,21	0,75	0,79	1,82	0,32	0,34	0,70	>,20

From the table above shows that when compared with SNI 19-7030-2004 content of the C / N ratio, and Potassium Phosfor meet the standards.

### DISCUSSION

Maturity compost judged on physical parameters (color, temperature, pH, humidity)

From the results of the observations made during the composting process material color change from the original color towards brown and finally black after the composting process lasted 30 days. On day 10-20 on each hole composting emit aromas smell due to the anaerobic decomposition process. **due to the very high water content in the main material is waste cabbage compost.** In such conditions, aeration in composted materials are not good, very watery compost and remove the stench was overpowering. To lower the water content and deodorize and change that occurs in anaerobic decomposition in order to be aerobic, then the reversal once every 2-3 days in the compost.

During the composting process, the compost temperature has increased at the beginning of the composting process is 1-10 days and then decreased to approach room temperature. This drop in temperature during the composting process occurs because of the reversal is often done. The heat generated from microbial activity. There is a direct relationship between the increase in temperature with oxygen

consumption. The higher the temperature the faster the decomposition process anyway. Increased temperatures can occur rapidly in the compost heap. Temperature in the range 30-60°C shows rapid decomposition activity.

The decline at the start of composting pH to 4.5 or 5.0. Standard quality compost based SNI 19-7030-2004 pH was 6.80 -7.49. The pH value is generally began to fall during the early stages of the composting process. It is caused by increased activity of acid-forming bacteria. Humidity plays a very important role in the metabolism of microbes and has no effect on oxygen supply. Microorganisms can utilize organic material when the organic materials are soluble in water. Humidity 40-60% is the optimum range for microbial metabolism. If the humidity below 40%, microbial activity will decline. Meanwhile, humidity greater than 60% will be leached nutrients, air volume will be reduced, as a result of microbial activity will decrease and there will be anaerobic fermentation that cause odor (Gaur, 1981).

#### Quality Compost

Mature compost besides characterized by a blackish brown color compost and temperature stable, mature compost is also characterized by low C / N ratio. Speed reduction in C / N ratio is highly dependent on the content of C and N material to be composted. If the organic material contains a lot of lignin or other resistant materials with C / N ratio is high, then the decomposition process will be slow compared with a little organic material containing lignin and has a C / N ratio is low.

Based on the results of laboratory analysis of the data obtained a mean value of C / N ratio on the 30th day ie Mol 11.36% and 12.14% ox dung. Where based SNI Compost (SNI: 17-03-2004) for the C / N ratio is 10-20%, it is known that the levels of nitrogen in the compost is already eligible to be used as organic fertilizer on crops. Where the activator Mol cow manure and able to bind free nitrogen (Palacios, 2005)

The increasing value of Nitrogen is thought to be caused by cow dung and MOL are added, the number of microbes as agents pendekomposisi organic materials will be more and more also, so that the total value of inorganic N in compounds of  $\text{NH}_4^+$  and  $\text{NO}_3^-$  as a result of the decomposition of organic material (protein) will also increase. The same thing on the compost activator also use cow dung. Cow manure contains a lot of N and little C so that the C: N ratio is low. Instead sawdust little N and many C. Mixing both with the same counterweight generates the C: N ratio combination of cow manure and sawdust. Furthermore, the addition of sawdust on dairy cow manure volume still cause an increase in element content of C mixture of compost material. As a result the C: N ratio increases. Microbes use elements of C to get energy and utilize elements of N, P, and K to growth metabolism, and reproduction (Djaja, 2006). Nitrogen is the main macro nutrients that are essential to plant growth, average nitrogen levels in plant tissue is 2% -4% dry weight. Nitrogen is essential for plant nutrient vegetatif. Kekurangan This phase will lead to the early growth of plants turn yellow and dry up and fall off. Leaf yellowing starting from the bottom, then followed up on the upper leaf severe circumstances the plants can suffer death (Rosmarkam, 2002). Based on the influence of the nitrogen merupakan very important element in the quality of the compost will be applied to plants.

Phosphorous levels Potassium Based on the results of laboratory analisa conducted found average levels of potassium which is about 0.21 to 1.82%. Based Compost SNI (SNI: 17-03-2004) levels of potassium in the compost is  $> 0.20$  means

that the compost is already qualified or well qualified, so it can be used as an organic fertilizer that can be applied to plants because potassium is an element that is needed in large quantities (macro nutrients). Potassium levels will be increasing as well. This is presumably due to the addition of EM-4, cow dung and MOL then the more microorganisms in degrading poses that causes interrupted carbon chains into simpler carbon chains, breakdown of the carbon chain causes elemental phosphorus and potassium increased. This is also supported by a statement Amanillah (2011) which states that potassium is a compound that is also produced by the metabolism of the bacteria, which bacteria use K<sup>+</sup> ions are free.

#### CONCLUSION

Giving activator MOL, EM-4 and cow dung showed differences in the timing of maturation within 10 days, 20 days and 30 days where the obtained results indicate activator Cow dung already are maturing more effective than the activator EM-4 and MOL. Compost Quality (sodium, phosphorus, potassium) generated already standardized compost SNI 19-7030-2004 that the average levels of C / N of 95 to 12.14%, from 0.63 to 0.70% Phosfor, and potassium levels of around 0.21 to 1.82%.

To produce a quality compost composting it is not directly on the ground or have to use a container so that the temperature of the composting can be more easily controlled sehingga can maximize the activity of microorganisms menguraikan compost. Further research can be done using activators Mol with basic materials of various kinds of other vegetables in the compost.

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