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Differences Effect on the Quality of Organic Fertilizer Fermentor of Ongole Crossbred Cattle's Feces

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ABSTRACT: The research aimed to determine differences quality of organic fertilizer from cow feces PO (Ongole Crossbred Cattle) in pilot project Napis's Village Tambakrejo's district Bojonegoro's Regency East Java by using two fermentors, such as EM4 and biofermo/biofaster. The research method uses a sample survey and secondary data analyzed descriptively based on the results of laboratory analysis. The results showed that organic fertilizer with fermentor biofermo/ biofaster better quality compared to using EM4 fermentor. Organic fertilizer composition is pH (6.97 ± 0:15), organic matter (16:14 ± 5:51%), nitrogen (N) (0.96 ± 0.16%), carbon (C) (9:33 ± 3:18%), phosfor (P) (0:31 ± 0:12 %), C / N ratio (9.67 ± 1:53), potassium (K2O) (0:39 ± 0.91%), calcium (Ca) (8:55 ± 2.96%), magnesium (Mg) (0:55 ± 0:31%) and sodium (Na) (0.37 ± of 0.02%). The conclusion is the process of organic fertilizer from cow feces, the quality is better to use the fermenter biofermo/biofaster. Suggestions from this study is further research to determine the results of the use of organic fertilizer when applied to agriculture.

Keywords: organic fertilizer, EM4, biofaster, Crossbred Ongole Cattle's feces.

INTRODUCTION

Farm waste such as animal manure, can be used to increase the value by processing with technology into new products. New products such as organic fertilizer or compost that is much needed at this time due to broken ground conditions when using chemical fertilizers in the long term. Organic fertilizer that is easy and inexpensive with the basic ingredients of animal manure and other materials, is an attempt to improve conditions, soil fertility and improve soil structure because it can add macro nutrients (nitrogen, phosphorus, potassium, calcium, magnesium and sulfur) and micro (zinc, copper, cobalt, barium, manganese and iron) in the soil. Anonymous (2012) said fertilizer is a material that is added to the growing media and plants to provide for the necessary plant nutrient so as to produce well. There are two types of fertilizers are fertilizers organic/natural fertilizer/manure and chemicals fertilizer, based on the physical form of the solid fertilizer and liquid fertilizer while based on a single ingredient, namely fertilizer and compound fertilizer. The advantages of organic fertilizers one is able to improve the physical condition of the soil as it helps the binding of water effectively. Sudirja (2007) said that organic fertilizers are fertilizers that mostly composed of organic materials derived from plants and or animals that have been through the process, it can be solid or liquid that is used to supply organic matter, improved physical properties, chemical and soil biology.

Fermentor

The process of making organic fertilizers from animal feces which make easy and low cost. Raw materials and other organic material composted with the help of microorganisms. Organisms involved in the composting process contents microflora (microflora bacterial 108-109 g/compost, actinomicetes 105-108 g/compost, fungi 104-106 g/compost, microfauna (protozoa 104-105 g/ compost, macroflora (mushrooms) and macrofauna (earthworms, termites, ants, fleas and others) (Isroi, 2012). The composting process takes place immediately after the mixed raw materials are divided into two phases, the active phase and stage of maturation. During the early stages of the

process, oxygen and degradable compounds will be utilized by mesophilic microbes. Temperature and pH of the compost pile will increase rapidly. Temperature rising to over 50°C-70°C. The microbes are active in this condition is a thermophilic microbes are active at high temperature causing decomposition of organic matter are very active. Microbes using oxygen in the compost will decompose organic materials into CO_2, water vapor and heat. After most of the material has been dispersed, the temperature will gradually decrease. At the time this happened compost maturation advanced, namely the formation of clay humus complex. During the composting process will be shrinking volume and biomass materials. This reduction can reach 30-40% of the volume / weight of initial materials. Composting process depends on the characteristics of the materials composted, composting activator used and the method of composting is done. While the factors that affect the composting process the C/N ratio, particle size, aeration, porosity, water content, temperature, pH, nutrient content and the content of hazardous substances (Isroi, 2012).

EM is a mixture of beneficial microorganisms which consists of five groups, 10 genera, 80 species and once on land to 125 species. EM is a solution with a pH of 3.5 to 4.0, brown, consisting of aerobic and anaerobic microorganisms. The content of EM consists of photosynthetic bacteria, lactic acid bacteria, actinomicetes, yeast and fungal fermentation. Photosynthetic bacteria forming beneficial substances that produce amino acids, nucleic acids and bioactive substances from harmful gases and serves to bind nitrogen from the air. Lactic acid bacteria fermentation of organic material functions to be lactic acid, speeding reshuffle organic matter, lignin and cellulose, and suppress pathogens by lactic acid produced. Actinomicetes produce antimicrobial properties of the resulting amino acids of photosynthetic bacteria. Yeast produces an anti-biotic, produces enzymes and hormones, secretion of yeast to be effective substrates for microorganisms actinomicetes lactic acid bacteria. Fungi capable of fermenting organic materials decompose quickly that produce alcohol esters anti-microbial, deodorize, prevent harmful insects and worms by eliminating feed. EM function to enable bacteria solvent, increasing the humus content of the soil so it can ferment lactobonillus organic material into amino acids.

The types of existing EM as a form of media EM1 granular solid containing 90% actinomicetes. EM2 consists of 80 species were prepared based on a certain ratio. Shaped cultured in fish broth with a pH of 8.5. the issuing of antibiotics to suppress soil pathogens. EM3 consists of 95% of photosynthetic bacteria to pH 8.5 in a fish broth that serves to help the task of EM2. Saccharides and amino acids are synthesized by photosynthetic bacteria that are directly absorbed by plants. EM4 consists of 95% lactobacillus that serves organic materials decompose without incurring high heat for anaerobic microorganisms to work with the power of enzymes. EM5 form of organic pesticides. EM4 is a mixed culture of beneficial microorganisms, namely fermentation and synthetic microorganisms consisting of lactic acid, photosynthetic bacteria, *Actinomycetes sp*, *Streptomycetes sp*, yeast and fungi decomposing cellulose. This EM4 healthy livestock, reducing stress on livestock, balance of microorganisms in the digestive tract of cattle, increase appetite and reduce pollution or odor and environmental enclosure (Cloud, 2004). Yani (2006) examined the use of EM4 in drinking water, 1.5 ml per liter of drinking water for NZW rabbits breed, which can increase body weight gain. Others fermenters are biofermo and biofaster. Anonymous (2010a) explains that the way organic fertilizer with fermentation system using cow dung or goat as much as 50%, 20% phosphate, 10% dolomite, ziolit 10%, 5% ash and chicken manure (dry) 5%, can be used biofermo 1 can and biofaster 5 cans.

Feces

Farm waste such as feces or manure is an organic source that can be used for the manufacture of organic fertilizer. Waste pollution by dairy farms such as smell or pollution of river water. Poor waste management will be a serious problem on the farm, but when the waste is properly managed can provide added value. Hidayatullah *et al.,* (2005) conducted a study on the system of dairy farm waste management can reduce the concentration of Total Solid Suspension (TSS) 26.60%, Chemistry Oxygen Demand (COD) 83.33%, Nitrite: 57.14% and 54.15% H2S. Triatmojo (2001)

explained by the findings that the quality of compost produced from dairy cattle feces and waste tannery sludge could reduce levels of Cr (VI) due to the existing microbial activity during the composting process. Argo *et al.*, (2012) found that goat waste biogas and compost can be used as an alternative raw material for organic fertilizer granules. The best formula is to compost the goat as the main ingredient nutrient most likely have national standards with the minimum cost.

The results showed that the effects related to the composition of manure nutrients contained. The choice between manure and inorganic fertilizers because nutrient considerations, economic, transportation and accessibility. Dried manure has a nitrogen content varies, 2.41% cows, buffaloes, 1.09%, 2.11% pigs and broilers 3.17%. Nitrogen content was never stable and change over time. Waste from livestock enclosure is quite a lot, especially in the villages, still using livestock as processing power or livestock as one effort to improve agricultural activities in an integrated manner. Livestock waste was used for manure, but there are also burned. These materials are all considerable potential as a source of nutrients for crop residues mixed at composting. The critical factors that need to be understood in the composting process is the nitrogen content, C/N ratio and base materials are composted.

MATERIALS AND METHODS

The research was conducted in the Village District Napis Tambakrejo Bojonegoro. The samples were analyzed organic fertilizer made from natural material with cow feces PO fermenters EM4 and biofaster of some farmers built a Cooperative "Lembu Seto" (KSU Lembu Seto) and organic fertilizer made a cooperative itself. Compost samples were teken from 5 and 3 farmer, and then it were analyzed at the Laboratory of Agriculture Faculty of Brawijaya University. Descriptive data analysis was conducted based on the results of laboratory analysis.

RESULTS AND DISCUSSION

Results of analysis of C, N, P, K, C / N and OM organic fertilizer with EM4 and Biofaster fermenters organic fertilizer can be seen in Table. 1 and the results of the full analysis in Table. 2.

Table. 1. Analysis of C, N, P, K, C / N and OM organic fertilizer with EM4 and Biofaster fermenters.

Fermentor	Sample	C organic (%)	N total (%)	C/N	Organic matter (%)	P (%)	K (%)
EM4	1	5.38	0.51	11	9.31	0.12	0.18
	2	6.51	0.63	10	11.26	0.26	1.10
	3	10.45	1.25	8	18.08	0.35	0.88
	4	4.34	0.70	6	7.50	0.35	0.55
	5	2.59	0.48	5	4.48	0.31	1.03
	Average	**5.86±2.95**	**0.71±0.31**	**8.00±2.55**	**10.13±5.10**	**0.28±0.10**	**0.75±0.38**
Biofaster	1	11. 31	1.00	11	19.56	0.36	1.00
	2	11. 00	1.11	10	19.04	0.45	1.52
	3	6.14	0.82	8	10.62	0.45	0.85
	4	12. 50	1.13	11	21.63	0.22	0.56
	5	21. 30	1.89	11	36.84	0.76	0.60
	Average	**12.45±5.51**	**1.19±0.41**	**10.20±1.30**	**21.54±9.53**	**0.45±0.20**	**0.91±0.39**

Table. 2. The results of a complete analysis of organic fertilizer with EM4 and Biofaster

Fermentor	Sample	pH 1:2. 5 H2O	KCl 1n	C organic	N total	C/N	Organic matter (%)	P (%)	K (%)	Na (%)	Ca (%)	Mg (%)	KTK
EM4	1	6.7	0	10. 45	1.25	8	18. 08	0.35	0.88	0.4	12. 53	1.81	38.33
	2	7.2	7.1	10. 45	1.25	8	18. 08	0.35	0.88	0.66	13.87	0.43	49. 32
	3	7.8	7.2	2.59	0.48	5	4.48	0.31	1.03	1.72	14.47	1.45	37. 2
	Average	**7.23 ± 0. 55**	**4.77 ± 4.13**	**7.83 ± 4. 54**	**0.99 ± 0. 44**	**7.00 ± 1. 73**	**13. 55 ± 7. 85**	**0.34 ± 0. 02**	**0.93 ± 0. 09**	**0.93 ± 0. 70**	**13. 62 ± 0. 99**	**1.23 ± 0. 72**	**41. 62 ± 6. 70**
Bio Faster	1	6.8	0	12. 5	1.13	11	21. 63	0.22	0.56	0.36	8.11	0.26	49. 4
	2	7.1	7	6.14	0.82	8	10. 62	0.45	0.85	0.36	11. 71	0.52	42. 88
	3	7	6.8	9.35	0.93	10	16. 17	0.26	0.78	0.39	5.84	0.88	45. 55
	Average	**6.97 ± 0. 15**	**4.60 ± 3.98**	**9.33 ± 3. 18**	**0.96 ± 0.16**	**9.67 ± 1.53**	**16. 14 ± 5. 51**	**0.31 ± 0.12**	**0.73 ± 0.15**	**0.37 ± 0.02**	**8.55 ± 2.96**	**0.55 ± 0.31**	**45. 94 ± 3.28**

Table 3. The composition of organic fertilizers with EM4, biofaster and fertilizer quality standards

No.	Parameter	EM4	Biofaster	SNI[a)]		NASA'S organic fertiliser[b)]
				Min	Max	
1	pH	7.23±0.55	6.97±0.15	6.80	7.49	7.5
		4.77±4.13	4.60±3.98			
2	Organic matter(%)	13.55±7.85	16.14±5.51	27	58	
3	Nitrogen (N)(%)	0.71±0.31	0.96±0.16	0.40	-	0.12
4	Carbon (C)(%)	7.83±4.54	9.33±3.18	9.80	32	
5	Phosfor (P)(%)	0.34±0.02	0.31±0.12	0.1	-	0.03
6	C / n ratio	7.00±1.73	9.67±1.53	10	20	0.86%
7	Potassium (K2O) (%)	0.75±0.38	0.91±0.39	0.20	*	0.31
8	Calcium (Ca) (%)	13.62±0.99	8.55±2.96	*	25.5	
9	Magnesium (Mg) (%)	1.23±0.72	0.55±0.31	*	0.6	16.88 ppm
10	Sodium (Na) (%)	0.93±0.70	0.37±0.02			0.15

Note: * Value is greater than the minimum or less than the maximum.
a = standard quality organic fertilizer/compost, SNI 19-7030-2004
b = Anonymous (2010[b])

The table 3. can be explained that the compost with biofaster biofermo better than EM4 and closer quality standards (ISO) and NASA compost. Organic matter content is lower than the SNI and fertilizer NASA, both with fermenters biofermo biofaster and EM4. Siburian (2010) said that the different composting time will produce a different quality organic fertilizer, the effect on N, P and K. Some farmers in the Napis village produce organic fertilizer and applied to the fields. For example, to treat an area of 1 Ha rice fields require chemical fertilizers (urea) by 7 quintals, but when using a 5 quintals of organic fertilizer and chemical fertilizer use only 3 quintals. Rice crop need only 8 tons, now increased to 25%. Awali (2012) said that the use of organic fertilizers in maize farming in the Lamongan District in East Java can increase their farm income. Revenue/Ha organic fertilizer users corn growers higher than that do not use organic fertilizers, because total cost farmers less organic fertilizer users.

CONCLUSIONS

PO cow dung in the Napis village Tambakrejo district Bojonegoro East Java, can be used as raw material for organic fertilizer, quality organic fertilizer produced by using fermenters biofaster and biofermo better than using EM4.

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