TEST OF LIQUID ORGANIC FERTILIZER ORIGINATED *C. odorata* AND COCONUT FIBER WITH VARIOUS COMPOSITION BY LENGTH FERMENTATION

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Received January 12, 2014

Accepted June 22, 2014

ABSTRACT

To test the quality of various compositions of liquid organic fertilizer product aimless originated coconut fiber and weeds *C. odorata* based on the length of fermentation by Micro-organisms Local (MOL) has been carried out for 2 months. Trial comparing different composition of raw materials, namely: P1 (20% *C. odorata*+70% coconut fiber+10% MOL), P2 (40% *C. odorata*+50% coconut fiber+10% MOL), P3 (60% *C. odorata*+30% coconut fiber +10% MOL), P4 (80% *C. odorata*+10% coconut fiber+10% MOL) and P5 (MOL), which was fermented for 15 and 45 days. Measurements of nutrient composition done for both macro and micronutrients. From the experimental results was known that there are variations in nutrient composition based on the composition of constituent materials, either after 15 days or 45 days of fermentation. There was increased content of macro and micronutrients between fermented for 15 days to 45 days, especially for N but not for others. Nutrient composition in accordance with the provisions of the minister of agriculture, except for levels of C-organic unfulfilled after 15 days and 45 days of fermentation. It is therefore recommended to perform the decomposition technique alternating aerobic and anaerobic, in order to get a quality liquid fertilizer is more optimized and tested for various types of crops.

Key Words : *C. odorata*, Coconut fiber, MOL, Liquid organic fertilizer, Fermentation

INTRODUCTION

Indonesian food production also still low due to poor soils has available a complete fertilizer to meet crop needs. Poor soil as well ultisol will support plant growth when given adequate fertilizer.¹ Various types of fertilizer in circulation ranging from organic and inorganic fertilizers, solid and liquid all of which have advantages and disadvantages. Lately, the need for increased organic liquid fertilizer among farmers, it is because of the fertilizer practical, safe for the environment and the effect can be seen in a faster time than solid manure.

Liquid organic fertilizer most widely circulated in Indonesia, both of which are produced by commercial traders who already has a name and a famous trademark to liquid fertilizer produced in small-scale farmer groups. Quality

liquid organic fertilizer also impact varies among the community. The experience of some crop farmers proves that liquid organic fertilizer which is still a small effect on rice yield improvement. Problems faced by the liquid organic fertilizer among others, the availability of which is difficult to maintain, the content and composition of the nutrients contained in them, making techniques are still modest. Liquid fertilizer used by farmers and go, do not stick with one brand only, the risk is not clear that nutrient availability can be met by the manure for crop growth.

Another problem encountered in the field is generally farmers do not know how much actual nutrient content in any liquid fertilizer that is sold in the farm shop. There are still many who have not been included fertilizer producers with certainty the exact nutrient content standards. Similarly, if the people who

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make a liquid fertilizer or MOL is also unknown type and element content of nutrient. MOL can be made from various types of waste farm very easy and cheap to obtain. MOL consists of three components, among others : (1) carbohydrate derived from rice water, stale rice, cassava, potatoes, wheat, bamboo shoots, grass and leaves *Gliricidia*, (2) glucose of brown sugar, liquid sugar and coconut water and (3) the source of microorganisms derived from snails, fruit skin, urine and shrimp paste.²

Organic fertilizer produced by circulating either large or society company still did not meet the quality standards appropriate liquid organic fertilizer issued.³ Technique of liquid organic fertilizer that is understood by the community, among others is to ferment directly in the form of a stirred solution every day. In this experiment, a long time wanted to know the effect of fermentation on nutrient composition produced during fermentation of 15 and 45 days, the composition of the material forming various fertilizers are cheap and easy to obtain in the field.

AIMS AND OBJECTIVES

To determine the composition of macro and micro nutrients of various liquid fertilizer produced by a variety of composition ratio of raw materials based on length of fermentation. Benefits, obtain excellent quality organic manure viable market to improve yield and quality of crops.

MATERIAL AND METHODS

Liquid organic fertilizer experiments have been performed in laboratory BPTPH create Padang airport from March to July 2013. The experiments were conducted by comparing the composition of raw materials such as liquid fertilizer; *C. odorata*, coconut fiber, and Micro-organism Local (MOL). Local media materials micro organisms made from coconut water, ripe papaya fruit and palm sugar. Treatment consists of P1 (20% *C. odorata*+ 70% coconut fiber+10% MOL), P2

(40% *C. odorata*+50% coconut fiber+10% MOL), P3 (60% *C. odorata*+30% coconut fiber+10% MOL), P4 (80% *C. odorata*+10% coconut fiber+10% MOL) and P5 (MOL).

MOL media materials made using coconut water fresh, ripe papaya fruit, palm sugar. Implementation, MOL made for 15 days, manufacturing techniques such as 2 kg of papaya extract, blended until smooth then taken, dumped rubbish and filth. Then put 20 L of water and put ¼ kg of coconut palm sugar and stir, then enter the fruit extract. MOL fermented up to 15 days and the pH is measured on a daily basis.

Liquid organic fertilizer by chopping all ingredients until evenly sized 1cm. The material inserted into the container during the 45 days of curing. Composition determined by treatment of the material and then mixed in the tank fermentor. Stirred liquid fertilizer everyday up to 45 days. Data were collected for nutrient content and composition at 15 and 45 days after the nutrient content of the macro nutrients, N, P, K, C-organic, pH. Content analysis of micro elements includes Fe, Mn, Cu, Co, Zn and B. Analysis of data obtained from laboratory showed in the form of tables and graphs as well adapted to the provisions of the applicable standard criteria.

RESULTS AND DISCUSSION

This suggests that the MOL during fermentation, the pH range in the span of about 3 to 3.8 MOL (**Fig. 1** and **Fig. 2**) also physically change the direction of a reddish color based on the main ingredient used. Odor changes arising after the passage of the fermentation process up to 15 days with a sour smell. MOL solution of physical changes during the fermentation process.⁴ Fermentation causes the color change in the solution MOL, before fermentation is green and turned into a brownish green after fermentation. There were changes in the urine odor of urine to sour smell, *Gliricidia* leaf texture becomes soft and there is a white froth on the surface of the MOL solution.

Media materials used are given coconut water and papaya extract, all contain sugar. The more sugar content in the media, usually resulting lower pH, as more acid is produced during fermentation activity. The factors that played an important role in the fermentation process among other fermentation media, raw material or substrate concentration, pH, temperature, time, shape and nature of the active microorganisms in the fermentation process and the ratio of C/N in the material.⁵ Coconut water was used in the manufacture of medium MOL

was a good medium for the growth of microorganisms during the fermentation process because coconut water contains 7.27% carbohydrate, 0.29% protein, some minerals such as 312 mgL⁻¹ potassium, 30 mgL⁻¹ magnesium, 0.1 mgL⁻¹ iron 37 mgL⁻¹ phosphorus, 24 mgL⁻¹ of sulfur and 183 mgL⁻¹ chlorine.⁶ Sugar was given and sugars contained in the papaya fruit and carbo-hydrates contained in coconut water affects the pH changes based on the length of fermentation. (Fig. 1 and Fig. 2)

Fig. 1 : Out growth medium pH, the manufacture of MOL

P1= 20% *C. Odorata* + 70% coconut fiber + 10% MOL, P2= 40% *C. Odorata* + 50% coconut fiber + 10% MOL, P3= 60% *C. Odorata* + 30% coconut fiber + 10% MOL, P4= 80% *C. Odorata* + 10% coconut fiber + 10% MOL, P5 = MOL

Fig. 2 : Out growth liquid fertilizer solution pH up to 15 days of fermentation

It has been proved that uses sugar as a medium in the fermentation with a 15% concentration, pH of the solution is lower than the media which only use 10% sugar.⁷ This is in line with the increasing number of acid formed by fermentation. Fermentation time also affects the pH of the solution. The longer the fermentation is done, then the lower the pH, both at 10% sugar content and the media who were given sugar 15%.

In general, during the manufacture of fermented liquid organic fertilizer, pH changes are not very significant. A decrease in pH of the solution during the first week of the first fermentation and subsequently an increase in pH after entering the 2nd week of fermentation.

MOL generally has higher acidity than organic all types of liquid fertilizers derived from a variety of compositions. Results of analysis of chemical constituents in the liquid fertilizer after 15 weeks in fermentation (**Table 1**) and after 45 days fermented. (**Table 2**) Levels of micro-nutrients contained in a liquid organic fertilizer of various types that have been made, all categorized according to criteria that escaped from the Minister of Agriculture, but only the C-organic content. It can be seen from the provisions of the standard criteria set by the Regulation of the Minister of Agriculture, regarding the content and nutrient content in any liquid fertilizer that will be circulated in the market.

Table 1 : The results of chemical analysis, organic fertilizer done after 15days of curing (fermentation)

S/N	Nutrients	Treatments					Standard *)
		P1	P2	P3	P4	P5	
1	Nitrogen (%)	2.22	1.88	0.77	1.89	0.28	< 2
2	P ₂ O ₅ (%)	2.01	2.36	2.34	2.56	2.54	< 2
3	K ₂ O (%)	1.94	2.32	2.08	2.11	2.35	< 2
4	C-organic (%)	0.22	0.35	0.39	0.45	0.13	≥ 4
5	pH	5.6	5.5	5.5	5.5	4.4	4 - 8
6	Micronutrients	----- (ppm)-----					
i	Fe total	2.07	2.29	2.93	2.95	1.03	Min 0, max 800
ii	Mn	2.15	3.54	3.96	3.79	1.96	Min 0, max 1000
iii	Cu	0.72	2.07	2.74	2.33	0.54	Min 0, max 1000
iv	Zn	1.25	1.88	2.07	3.19	0.99	Min 0, max 1000
v	B	0.22	0.28	0.35	0.33	0.20	Min 0, max 500
vi	Co	0.14	0.15	0.17	0.20	0.12	Min 0, max 5

*) Standard under terms of the minister of agriculture, No.: 28/Permentan/SR.130/5/2009 date: May 22th, 2009

The results of chemical analysis for the determination of nutrient content of manure bargaining after 2 weeks of curing or fermentation, the P4 fertilizer generally higher nutrient content than some other treatments (**Tables 1** and **Table 2**). If the observed composition of the material, were found to contain the highest *C. odorata* in fertilizers. *C. odorata* was able to increase the N content in the liquid fertilizer. *C. odorata* containing 3.46% N and almost as many with levels of potassium. Potassium content higher in the P1

treatment with 70% coconut fiber composition and the highest compared to all other treatments. Nutrient content contained in bio-urine solution *Gliricidia* leaves consisting of 2.8% N, 48.11 mg L⁻¹ P, 14.469 mg L⁻¹ K, 520 mg L⁻¹ S, 48.5 mg L⁻¹ Ca, 224 mg L⁻¹ mg, 125 mg L⁻¹ Na, 3.75 mg L⁻¹ Fe, 54.60 mg L⁻¹ Mn, 0.83 mg L⁻¹ Zn, 0.241 mg L⁻¹ Cu and 7455 mg L⁻¹ Cl. When compared with the findings the liquid fertilizer *C. odorata* + coconut fiber still higher quality than liquid bio fertilizer urine *Gliricidia* leaves.⁸⁻¹¹

Table 2 : The results of chemical analysis, organic fertilizer done after 45 days of curing (fermentation)

S/N	Nutrients	Treatments					Standard *)
		P1	P2	P3	P4	P5	
1	Nitrogen (%)	1.47	4.69	4.69	4.05	0.77	< 2
2	P ₂ O ₅ (%)	2.04	2.52	2.28	3.28	2.36	< 2
3	K ₂ O (%)	1.94	1.56	1.29	1.85	1.37	< 2
4	C-organic	0.32	0.52	0.84	1.30	0.19	≥ 4
5	pH	5.59	5.51	5.92	6.22	3.59	4 - 8
6	Micronutrients	------(ppm)-----					
i	Fe total	2.45	3.19	2.64	3.64	1.05	Min 0, max 800
ii	Mn	3.96	4.63	3.79	3.54	2.18	Min 0, max 1000
iii	Cu	2.74	3.19	2.07	2.93	0.74	Min 0, max 1000
iv	Zn	1.88	2.95	1.83	4.22	0.98	Min 0, max 1000
v	B	0.26	0.33	0.38	0.28	0.22	Min 0, max 500
vi	Co	0.17	0.18	0.14	0.12	0.19	Min 0, max 5

Nutrient content of liquid organic fertilizer after fermented for 45 days (**Table 2**) an increase level of nutrients, especially N and significantly reduced levels of K compared with fermented liquid organic fertilizer after 15 days. However, if the nutrient content of manure composts solid organic fertilizer there is a striking difference to the levels of C-organic and P₂O₅ fertilizer. The nutrient content of organic manure composting of solid results (50%) *C. odorata* + (50%) manure, among others, pH of 8.57; 26.65% C-organic; 5.06% P₂O₅; 1.86% K₂O; 2.14%N.

Provision of nutrient content by PenMenPan has been fulfilled in general, but there are some nutrients that still need to be corrected is a C-organic content. A striking difference from C-organic content obtained because the fermentation process directly through the immersion of organic matter, producing anaerobic overhaul activities. Overall of the system was not providing increased effectiveness of C-organic fertilizer in solution. These conditions allow for the next phase of research opportunities that liquid organic fertilizer that is made must first be composted under aerobic conditions, because the process of renovation aerobic and anaerobic alternating with an expected reshuffle will be able to improve the content of C-organic liquid fertilizer.

Proved also in **Table 1** shows that the higher the composition of coconut fiber in the manufacture of liquid fertilizer mixture, the lower the C-organic content in the liquid fertilizer. This indicates that the fiber material reshuffle still takes a long time. This answer habit of people who have popularized the use of organic liquid fertilizer through a process of fermentation is done only 15 days of curing, still not sufficient. Therefore, liquid fertilizer with direct fermentation by immersion technique that has been done many farming communities' needs to be modified through composting first.

Microelement content in liquid manure greatly assists the growth of plants in nutrient needs for growth. According Purwasasmita, MOL solution is after mented solution-based range of resources available. The MOL solution is containing macro nutrients, micro nutrients and microorganisms containing potentially as the decomposition of organic matter, growth stimulants and pest and disease control agent crop so well used as decomposers, bio fertilizers and organic pesticides.

CONCLUSION

The results prove that in general all liquid organic fertilizers made by various types of qualified composition according to provisions Kep Tan Men 2009, except for levels of C – organic. Needs to be a combination of decom-

position between aerobic and anaerobic process alternately to meet the target C – organic > 4% Thus aroma liquid fertilizer is better and do not interfere as long as its application in the field of health.

ACKNOWLEDGEMENT

A big thank to Director, Litabmas which has funded this research activity. Thanks is also extended to the X Kopertis, Coordinator who has been mediating agency activities in order to get to the Higher Education colleges in the West Sumatra Riau and Jambi. Likewise, thanks LP3M submitted to the Tamansiswa University, Indonesia who have supported this event through attention and funds transfer as early as possible so that these activities can be carried out properly. Similarly to all team members who have spoken the success of this activity many thanks.

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