

# The Effect of liquid organic fertilizer (LOF) goat biourin with various decomposers on some chemical properties of ultisol

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## The Effect of liquid organic fertilizer (LOF) goat biourin with various decomposers on some chemical properties of ultisol

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**Abstract.** This study aims to improve soil quality, so that the soil used can be maintained against the availability of soil nutrients. Efforts are made to apply fertilizers that are in accordance with the needs of plants and in a balanced manner. Organic fertilizer is one of the efforts to improve the physical and chemical properties of the soil, so that it is expected to increase the growth and production of plants to be applied. Liquid organic fertilizer has many advantages, namely the ease of application to soil and plants, all you need to do is water it. The raw material for liquid organic fertilizer from goat biourin is goat urine, while the decomposers are banana hump, feces and EM4. This research was conducted in a greenhouse, was carried out for 4 months, Department of Soil and Laboratory of Chemistry, Biology and Soil Fertility, Department of Soil, Faculty of Agriculture, Sriwijaya University. The study using a completely randomized design with 4 treatments and 3 replications. The treatment consisted of the ratio of biourin to water, namely: A (control), B (1:1), C (1:2), and D (1:3). Parameters observed and measured in this study were C/N Ratio, Total N, and soil pH. Based on the results of the study, it was concluded that the type and dosage of goat Biourin liquid fertilizer could increase soil pH, N-total and C/N ratio.

### 1. Introduction

In Indonesia, Ultisol is one type of soil which has an area of 45,794,000 ha or about 25% of the total land area of Indonesia. The widest distribution is in Kalimantan (21,938,000 ha), followed by Sumatra (9,469,000 ha), Maluku and Papua (8,859,000 ha), Sulawesi (4,303,000 ha), Java (1,172,000 ha) and Nusa Tenggara (53,000 ha). [1]

Ultisols in Indonesia generally have not been handled properly. On a large scale, this land has been used for oil palm plantations, rubber and industrial forest plantations, but on a farmer scale economic constraints are one of the reasons why this land is not managed properly. Constraint of using Ultisol in agricultural development are high acidity and Al saturation, low nutrient and organic matter content and sensitivity to erosion. The addition of organic fertilizer to Ultisol soil can increase the pH of the soil and meet the macro and micro nutrients needed by plants. Ultisol has a fairly low pH so that it can inhibit plant growth. The addition of organic fertilizer to Ultisol can increase the pH of the soil and meet the macro and micronutrients needed by plants.



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Inorganic fertilizers are one of the factors that are urgently needed by farmers for plantcultivation, but farmers' awareness of the dangers of inorganic fertilizers is still very lacking. Excessive use of inorganic fertilizers will clearly damage the chemical, physical and biological properties of the soil so that this can reduce dependence on the use of inorganic fertilizers,namely the use of organic fertilizers.[2]

Organic fertilizers generally come from animal waste, vegetable residues and agricultural waste. Organic fertilizers are able to maintain land balance and can increase productivity on agricultural land. Organic fertilizers are friendly to the environments othattheycanreducetheimpact of the use of inorganic fertilizers [3]. Organic farming systems apply environmentally friendly technologies to achieve a sustainable and sustainable agricultural system to build soil fertility in the longterm.

Livestock waste such as goat urine can be used as organic liquid fertilizer (POC) which is friendly to the environment. Goat biourin has advantages such as the content of nutrients N, P and K which are easily absorbed by plants[4]. Biourin liquid organic fertilizer made by fermentation contains higher organic N, P and C-nutrients compared to unfermented biourin[5]. Biourin added to the growing media can improve the chemical properties of the soil.

### 1.1. Research Purposes

- a. Knowing the quality of the physical properties of goat's liquid fertilizer (biourin) withthe additionofvarious types ofdecomposers.
- b. To determine the effect of giving goat Biourin liquid fertilizer on pH, C/N ratio and N-total in Ultisol

## 2. Research Methodology

This research was carried out for 4 months at the Green House, Department of Soil andLaboratoryofChemistry,BiologyandSoilFertility,DepartmentofSoil,FacultyofAgriculture,Sriwijaya University.

The method used in this research is a Completely Randomized Factorial Design (RALF)which consists of 2 factors, the first factor is the type of organic liquid fertilizer based on thedifferent types of decomposers (P1, P2, P3, P4) and the second factor is the dose (D1, D2, D3).Thistreatmentconsistedof4treatments,3dosesand4repetitionsasfollows:

Factor1(type)P0:Control  
 P1:Liquidorganicfertilizer(LOF1)(puregoatbiourin)  
 P2:Liquidorganicfertilizer(LOF2)(goatbiourin+bananahump)  
 P3:Liquidorganicfertilizer(LOF3)(goatbiourin+goatfeces)  
 P4 : Liquid organic fertilizer (LOF 4) (goat biourin + EM4)  
 Factor2(dose)  
 D1 : 100 ml / 5kg soil  
 D2 : 200 ml / 5kg soil  
 D3:300ml/5kgsoil

So that this experiment has 12 types of treatment with each treatment repeated 4 times, sothat52experimentalunits areobtained

### 2.1. Making Liquid Organic Fertilizer with MOL (liquid containing microorganisms that are useful in accelerating the decomposer of organic materials) Goat Fecesand MOL Banana Hump Liquid organic fertilizer Mol Goat Feses

1 kg of brown sugar and fresh goat feces each and 1 liter of water are mixed and thenfiltered and put into bottles. Furthermore, fermentation is carried out for 14 days. After completion of the fermentation process, the MOL of goat feces is filteredagain and the MOL is readytouse.

## 2.2. Liquid organic fertilizer (LOF) Mol (liquid containing microorganisms that are useful in accelerating the destruction of organic materials) Banana Hump

1kg of mashed banana hump and mixed with 1 liter of rice washing water and 1kg of brown sugar. Further more, it is stored in bottles and fermented for 14 days. After completing the fermentation process, the MOL banana hump is filtered again and the MOL is ready to use.

Next, take a sample of goat biourine from each replication for physical and chemical analysis for each 4 treatment

### 2.2.1. Fertilizer Application

The application of this liquid organic fertilizer is applied to the soil, which is applied by watering into the soil according to the treatment under study before planting.

### 2.2.2. Observed Variables

The variables observed in this study areas follows:

#### 2.2.2.1. Determination of C/N Ratio

The calculation of the C/N ratio was carried out by determining the C-Organic content and nitrogen determination.

#### 2.2.2.2. Determination of N-Total Content

Analysis of N-Total Content was carried out using the walkley and black method.

#### 2.2.2.3. pH analysis

pH analysis was carried out by the electrometric method.

#### 2.2.2.4. Data analysis

The data that has been obtained is processed statistically using the diversity test (ANOVA) at the 5% test level.

## 3. Result and Discussion

### 3.1. C/N ratio of Soil

The C/N ratio plays an important role for the soil to determine soil nutrients. Based on the results of the variance, it was found that the type of decomposer and the dose of liquid organic fertilizer Goat Biourin had no significant effect on the C/N ratio in the soil, presented in table 1 below:

Table 1. The effect of the type of decomposer and the dose of liquid organic fertilizer of goat biourin on the C/N-ratio of ultisol soil.

Treatment	C/N ratio of Soil				Average
	Test				
	1	2	3	4	
<b>P0D0</b>	12.26	9.23	9.18	9.86	<b>10.13</b>
<b>P1D1</b>	11.8	8.49	7.72	10.32	<b>9.58</b>
<b>P1D2</b>	9.53	8.94	8.11	7.72	<b>8.57</b>
<b>P1D3</b>	7.7	6.94	8.53	7.53	<b>7.67</b>
<b>P2D1</b>	9.11	8.67	8.2	7.87	<b>8.46</b>
<b>P2D2</b>	9.19	7.95	6.58	6.62	<b>7.58</b>
<b>P2D3</b>	9.8	7.96	9.29	9.81	<b>9.21</b>

<b>P3D1</b>	7.33	9.84	7.95	10.48	<b>8.90</b>
<b>P3D2</b>	6.91	10.56	10	9.66	<b>9.28</b>
<b>P3D3</b>	10.97	7.53	9.48	9.6	<b>9.39</b>
<b>P4D1</b>	9.53	9.82	9.79	8.68	<b>9.45</b>
<b>P4D2</b>	10	8.56	7.79	11.79	<b>9.53</b>
<b>P4D3</b>	11.41	11.2	9.16	7.79	<b>9.89</b>

Source of data analysis results in the Laboratory of Chemistry, Biology and Soil Fertility, Faculty of Agriculture UNSRI

Description:

P0D0 : Control,

P1 D1 : Pure goat biourine liquid organic fertilizer Dose 100 ml, P1 D2 : Pure goat biourine liquid organic fertilizer Dose 200 ml

P1 D3 : Pure goat biourine liquid organic fertilizer Dose 300ml

P2 D1: Goat biourine liquid organicfertilizer + banana hump Dose 100ml,

P2 D2: Goat biourine liquid organicfertilizer + banana hump Dose 200ml

P2 D3: Goat biourine liquid organicfertilizer + banana hump Dose 300ml

P3 D1 : Goat biourine liquid organic fertilizer + goat feces Dose 100 ml

P3 D2 : Goat biourine liquid organic fertilizer + goat feces Dose 200 ml

P3 D3 : Goat biourine liquid organic fertilizer + goat feces Dose 300

mlP4D1:Goatbiourineliquidorganicfertilizer+EM4, Dose100ml

P4 D2 : Goat biourine liquid organic fertilizer + EM4, Dose 200 ml

P4 D3 : Goat biourine liquid organic fertilizer +EM4, Dose300ml

Based on the analysis results, the average value of pure goat Biourin treatment (P1)resulted in the highest soil C/N ratio at a dose of 100 ml, which was 9.58 and the lowest C/Nsoil ratio at a dose of 300 ml, which was 7.67. In goat biourin mixed with banana hump (P2)C/N the highest soil ratio was at 300 ml, which was 9.21, the lowest C/N soil ratio was at adose of 200 ml, which was 7.58. For goat biourin mixed with goat feces (P3), the highest C/Nsoil ratio at a dose of 300 ml was 9.39 and the lowest soil C/N ratio was at a dose of 100 ml,which was 8.90. The C/N ratio of soil in goat biourin mixed with EM4 (P4) was highest at adose of 300 ml, which was 9.89, and the lowest C/N ratio was soil at a dose of 100 ml, whichwas 9.45. For all treatments, the highest soil C/N ratio was 10.13 without treatment and the lowest soil C/N ratio was7.58 with 200 ml banana hump goat Biourin treatment.

The C/N-ratio of soil was obtained by dividing the C-organic and N-total values. There sultsof the analysis showed that the C/N ratioof control was higher than the addition of goat biourin. The mean value of the highest soil C/N ratio was at a dose of 300 ml. This is because organic matter in the soil decomposes quickly. According to the Minister of Agriculture No.70/Permentan/SR 104/10/2011 and SNI 19-7030-2004 the content of a good C/N ratio is10-20. Based on these regulations, the results of the analysis of the C/N ratio are classified aslow, the low C/N ratio indicates a decrease in the amount of carbon by microbes as an energysource in decomposing organic matter in the soil. If the value of the C/N ratio is too low, it can cause the activity of organic matter to be difficult to decompose.In accordance with[6] where the highertheC/N ratio in the soil, the lower the nutrients, and viceversa, the lower the C/N ratio, the higher the nutrients. Plants can absorb organic matter if the C/N ratio is 12-15 [7].

### 3.2. N-Total of Soil

Nitrogen is one of the essential elements that are important for plant growth [8]. The main source of in the soil is organic matter,if the organic matter is low,then the element is also low and viceversa.Based on there sults of the variance,it was found that giving the type and dose of liquid organic fertilizer Goat biourine has no significant effect on total N in the soil, is presented in table 2. below:

Table 2. Effect of decomposer type and dosage of goat biourin liquid organic fertilizer on N-Total in soil.

Treatment	N-Total				Average
	Test				
	1	2	3	4	
P0D0	0.27	0.3	0.34	0.36	<b>0.32</b>
P1D1	0.31	0.36	0.39	0.47	<b>0.38</b>
P1D2	0.36	0.34	0.46	0.51	<b>0.42</b>
P1D3	0.36	0.55	0.38	0.43	<b>0.43</b>
P2D1	0.45	0.49	0.5	0.44	<b>0.47</b>
P2D2	0.37	0.48	0.48	0.5	<b>0.46</b>
P2D3	0.41	0.48	0.34	0.37	<b>0.40</b>
P3D1	0.49	0.38	0.44	0.35	<b>0.41</b>
P3D2	0.44	0.34	0.35	0.38	<b>0.38</b>
P3D3	0.38	0.43	0.44	0.43	<b>0.42</b>
P4D1	0.36	0.33	0.35	0.43	<b>0.37</b>
P4D2	0.41	0.52	0.49	0.39	<b>0.45</b>
P4D3	0.39	0.39	0.38	0.5	<b>0.41</b>

Source of data analysis results in the Laboratory of Chemistry, Biology and Soil Fertility, Faculty of Agriculture UNSRI

#### Description:

P0 D0 : Control,

P1 D1 : Pure goat biourine liquid organic fertilizer Dose 100 ml

, P1 D2 : Pure goat biourine liquid organic fertilizer Dose 200 ml

P1 D3: Pure goat biourine liquid organic fertilizer Dose 300ml

P2 D1: Goat biourine liquid organic fertilizer + banana hump Dose 100ml,

P2 D2: Goat biourine liquid organic fertilizer + banana hump Dose 200ml

P2 D3: Goat biourine liquid organic fertilizer + banana hump Dose 300ml

P3 D1 : Goat biourine liquid organic fertilizer + goat feces Dose 100 ml

P3 D2 : Goat biourine liquid organic fertilizer + goat feces Dose 200 ml

P3 D3 : Goat biourine liquid organic fertilizer + goat feces Dose 300 ml

P4 D1 : Goat biourine liquid organic fertilizer + EM4, Dose 100ml

P4 D2 : Goat biourine liquid organic fertilizer + EM4, Dose 200 ml

P4 D3 : Goat biourine liquid organic fertilizer + EM4, Dose 300ml

Based on the results of the analysis, it was found that the highest average N-total was found in the treatment of pure goat Biourin fertilizer (P1) at a dose of 300 ml at 0.43 and the lowest N-total at a dose of 100 ml at 0.38. In the treatment of liquid organic fertilizer, goat Biourin mixed with banana weevil (P2), the highest average N-total was found at a dose of 100 ml at 0.47, the lowest N-total at a dose of 300 ml at 0.40. The highest average N-total in goat biourin mixed with goat feces (P3) was found at a dose of 300 ml, which was 0.42, while the lowest N-total was at a dose of 200 ml, which was 0.38. In goat urine bio added EM4 the highest average N-total at a dose of 200 ml is 0.45, the lowest N-total is at a dose of 100ml, which is 0.37.

Based on the results of the analysis of N-total in the soil has increased. From Table 2, N-total is included in the moderate criteria. Bio liquid fertilizer goat urine mixed with banana hump mole can increase the total N in the soil compared to pure organic liquid fertilizer goat biourine, goat feces and EM4. This is in accordance with research [9], stated that the maximum increase in total N in the mole of banana hump was thought to be due to the maximum activity of micro-organisms in the mole of banana weed and sufficient oxygen supply resulting in an increase in nutrient N. Elemental N can be absorbed by the soil in the form of  $\text{NO}_3^-$  and  $\text{NH}_4^+$  [10].

### 3.3. Soil pH

Table 3. Average effect of decomposer types and doses of goat biourine liquid organic fertilizer on Ultisol soil pH

Treatment	pHH <sub>2</sub> O					pH KCl				
	Test				Average	Test				Average
	1	2	3	4		1	2	3	4	
P0D0	3.85	3.75	3.98	4.08	<b>3.91</b>	3.71	3.57	3.62	3.71	<b>3.65</b>
P1D1	4.78	4.75	4.06	4.61	<b>4.55</b>	3.58	3.91	3.74	3.82	<b>3.76</b>
P1D2	4.5	5.24	5.52	4.91	<b>5.04</b>	3.84	4.13	4.44	3.91	<b>4.08</b>
P1D3	5.2	4.65	4.7	4.82	<b>4.84</b>	4.11	3.93	3.98	3.92	<b>3.98</b>
P2D1	4.08	3.68	4.24	4.5	<b>4.12</b>	3.68	3.62	3.78	3.84	<b>3.73</b>
P2D2	4.45	4.98	4.87	5.24	<b>4.88</b>	3.9	4.16	4.05	4.24	<b>4.09</b>
P2D3	5.05	4.95	4.99	5.25	<b>5.06</b>	4.88	4.19	4.01	4.35	<b>4.36</b>
P3D1	4.06	4.38	4.7	4.3	<b>4.36</b>	3.74	3.7	3.86	3.93	<b>3.81</b>
P3D2	5.07	4.87	4.85	4.09	<b>4.72</b>	4.17	4.06	4.07	3.71	<b>4.00</b>
P4D3	5.08	4.58	4.51	4.77	<b>4.73</b>	4.04	3.8	3.98	4.07	<b>3.97</b>
P4D1	5.34	4.78	3.95	4.4	<b>4.62</b>	4.42	4.09	3.68	3.81	<b>4.00</b>
P4D2	4.68	4.93	4.19	4.52	<b>4.58</b>	3.79	4.11	3.85	3.88	<b>3.91</b>
P4D3	4.21	4.35	4.11	4.85	<b>4.38</b>	3.91	3.78	3.77	4.01	<b>3.87</b>

Source of data analysis results in the Laboratory of Chemistry, Biology and Soil Fertility, Faculty of Agriculture UNSRI

Description:

P0D0:Control,

P1 D1 : Pure goat biourine liquid organic fertilizer Dose 100 ml,

P1 D2 : Pure goat biourine liquid organic fertilizer Dose 200 ml

P1 D3:PuregoatbiourineliquidorganicfertilizerDose300ml

P2 D1: Goat biourine liquid organicfertilizer + banana hump Dose 100ml

,P2 D2: Goat biourine liquid organicfertilizer + banana hump Dose 200ml

P2 D3: Goat biourine liquid organicfertilizer + banana hump Dose 300ml

P3 D1 : Goat biourine liquid organic fertilizer + goat feces Dose 100 ml

P3 D2 : Goat biourine liquid organic fertilizer + goat feces Dose 200 ml

P3 D3 : Goat biourine liquid organic fertilizer + goat feces Dose 300 ml

P4D1:Goatbiourineliquidorganicfertilizer+EM4, Dose100ml

P4 D2 : Goat biourine liquid organic fertilizer + EM4, Dose 200 ml

P4 D3:Goatbiourineliquidorganicfertilizer+EM4,Dose300ml



Soil pH plays a role in indicating soil acidity, and determines whether or not nutrients are easily absorbed by plants. Based on the results of variance on the effect of the type and dose of goat biourin liquid organic fertilizer on the chemical properties of the soil in soybean cultivation (*Glycine max*) in ultisol at pH H<sub>2</sub>O soil, the results showed that the treatment had no significant effect on the treatment, but for pH KCl it had a significant effect.

Based on the results of the analysis, the highest average pH of H<sub>2</sub>O in treatment (P1) was found at a dose of 200 ml, which was 5.04 and the lowest pH was at a dose of 100 ml, which was 4.55. For treatment (P2) the highest average pH at a dose of 300 ml was 5.06, the lowest pH at a dose of 100 ml was 4.12. In treatment (P3) the highest average pH was 4.73 at a dose of 300 ml, the lowest pH was 4.36 at a dose of 100 ml. and in (P4) the highest average pH was 4.62 at a dose of 100 ml, the lowest was 4.38 at a dose of 100 ml. for pH KCl the highest average dose at (P1) was 4.08 at a dose of 200 ml, the lowest was 3.76 at a dose of 100 ml. in the treatment (P2) the highest average was 4.36 at a dose of 300 ml, the lowest at a dose of 100 ml was 3.73. For (P3) the highest average at a dose of 200 ml was 4.00 and the lowest was

3.81 at a dose of 100 ml. And at (P4) the highest average pH at a dose of 100 ml was 4.00 and the lowest was 3.87 at a dose of 300 ml.

The soil used in this study has acidic properties. pH affects the absorption of nutrients in the soil. Nutrients will generally be easily absorbed by plants at a pH of 6-7, because nutrients will easily dissolve in water. Soil is said to be fertile if the soil has a neutral pH [11]. The highest average soil pH (H<sub>2</sub>O) in treatment (P2) at a dose of 300ml was 5.06, the lowest was in treatment (P0D0) at 3.91. For the highest average KCl pH at P2 with a dose of 300 ml of 4.36 and the lowest at P0D0 of 3.65. The results of the pH analysis increased compared to the initial pH analysis.

Even though the pH has increased, it is still acidic. The pH in the soil is very important to contain nutrients that will be absorbed by plants to grow up to production. One way to increase soil pH can be done by liming.

#### 4. Conclusion

1. There is an effect of the type of decomposer and the dose of liquid organic fertilizer Goat Biourin on the pH of KCl in Ultisol.
2. There is no effect of decomposer type and dosage of liquid organic fertilizer Goat Biourin on C/N ratio and N-total in Ultisol.
3. Based on the results of research conducted, it was found that the type of decomposer and the dose of liquid organic fertilizer Goat biourin can increase soil pH, N-total and C/N ratio

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# The Effect of liquid organic fertilizer (LOF) goat biourin with various decomposers on some chemical properties of ultisol

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ORIGINALITY REPORT

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SIMILARITY INDEX

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