

## **The Effect of Goat Biourin Liquid Fertilizer with Banana Hump Decomposer on Chemical Properties of Ultisol**

*Pengaruh Pupuk Cair Biourin Kambing dengan Dekomposer Bonggol Pisang terhadap Sifat Kimia Ultisol*

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### **ABSTRAK**

Ultisol termasuk tanah yang memiliki hara yang sangat rendah, kandungan tersebut dapat cepat menurun setelah dilakukan pembukaan lahan. Oleh karena peneliti melakukan upaya agar ultisol dapat meningkatkan ketersediaan hara tanah. Upaya tersebut adalah melakukan pemupukan dengan menggunakan pupuk organik cair bio urin kambing dengan dekomposer bonggol pisang. Pupuk organik cair mempunyai banyak keunggulan yaitu kemudahan dalam pengaplikasian ke tanah dan tanaman, yaitu tinggal menyiramkan saja. Penelitian ini dilakukan di Rumah Kaca Jurusan Tanah Fakultas Pertanian Universitas Sriwijaya. Analisis Tanah dilakukan di Laboratorium Kimia, Biologi dan Kesuburan Tanah Fakultas Pertanian Universitas Sriwijaya. Tujuan dari penelitian ini adalah mengetahui pengaruh pemberian pupuk cair Biourin kambing terhadap pH, C/N rasio dan N-total di Ultisol dan Untuk mengetahui pengaruh dosis pupuk cair Biourin kambing yang terbaik terhadap pH, C/N rasio dan N-total di Ultisol. Bahan baku pupuk organik cair dari biourine kambing adalah urine kambing, sedangkan bahan dikomposernya adalah bongkol pisang. Penelitian ini menggunakan Rancangan Acak Lengkap dengan 4 perlakuan dan 3 ulangan. Perlakuan terdiri dari perbandingan biourine dengan air yaitu : A (control), B (1:1), C (1:2), dan D (1:3). Parameter yang diamati dan diukur dalam penelitian adalah C/N Rasio, N Total, dan pH tanah. Berdasarkan hasil penelitian didapat kesimpulan bahwa jenis dan dosis pupuk cair Biourin kambing dapat meningkatkan pH tanah, N-total dan C/N rasio.

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Kata kunci: biourin kambing, bonggol pisang, dekomposer

### **ABSTRACT**

Ultisols include soils that have very low nutrients, these contents can quickly soil acidity is high, and poor macro nutrient content. Therefore, researchers are making efforts so that ultisols can increase the availability of soil nutrients. The effort is to fertilize using liquid organic fertilizer goat biourin with banana hump decomposer. Liquid organic

fertilizer has many advantages, namely the ease of application to soil and plants, which is all you have to do is apply it. This research was conducted in the Greenhouse of the Department of Soil, Faculty of Agriculture, Sriwijaya University. The purpose of this study was to determine the effect of goat Biourin liquid fertilizer on pH, C/N ratio and N-total in Ultisol and to determine the effect of the best dose of goat Biourin liquid fertilizer on pH, C/N ratio and N-total in Ultisol. The raw material for liquid organic fertilizer from goat biourine is goat urine, while the composted material is banana hump. This study used a completely randomized design with 4 treatments and 3 replications. The treatment consisted of the ratio of biourine to water, namely: A (control), B (1:1), C (1:2), and D (1:3). Parameters observed and measured in the 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.

Keywords: banana hump, decomposer, goat biourin

## INTRODUCTION

Ultisols have an advanced level of weathering and leached bases so that the soil reacts acidly and has a fairly high Al saturation. Nutrients of macrophosphorus (P), potassium (K), calcium (Ca), magnesium (Mg) and organic matter are very low in Ultisol (Nurmasyitah et al., 2013). Ultisol has a fairly low pH so that it can inhibit plant growth. Inorganic fertilizers are one of the factors that are urgently needed by farmers for plant cultivation, 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 (Oktavianti, et al, 2017). 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. One of the liquid organic fertilizers that can be used to increase the availability, adequacy, and efficiency of plant nutrients so as to reduce the use of inorganic fertilizers is biourine (Nathania et al., 2012) and Setiatma et al. (2017). Goat urine liquid fertilizer contains certain hormones that can stimulate plant development and contains more N and K compared to solid cow manure (Rojaka et al., 2016).

Biourine can improve the chemical, physical and biological properties of soil by

increasing soil nutrients, increase soil CEC, improve soil structure, and enrich soil macro and micro-organisms. Biourine can be produced through underutilized waste on goat farms. Besides being easy to obtain and apply, Livestock waste also has the amount of nutrients that plants need (Hani, 2016). The purpose of this study was to determine the effect of goat Biourin liquid fertilizer on pH, C/N ratio and N-total in Ultisol and to determine the effect of the best dose of goat Biourin liquid fertilizer on pH, C/N ratio and N-total in Ultisol. The objectives of this research are to determine the effect of goat biourin liquid fertilizer on pH, C/N ratio and N-total in Ultisol, and to determine the effect of the best dose of goat Biourin liquid fertilizer on pH, C/N ratio and N-total in Ultisol.

## MATERIALS AND METHODS

### Place and Time of Implementation

The materials used in conducting the research were: 1) Water, 2) *Goat Biourine*, 3) NPK Fertilizer, 5) Ultisol, 6) Banana Hump, This research was conducted in the Greenhouse of the Department of Soil, Faculty of Agriculture, Sriwijaya University. Soil analysis was carried out at the Laboratory of Chemistry, Biology and Soil Fertility, Faculty of Agriculture, Sriwijaya University from April to July 2021. The method used in this research was a Completely Randomized Factorial Design (RALF) which consists of 2 factors, the first factor was the type of organic

liquid fertilizer and the second factor was the dose. This treatment consisted of 3 treatments, 3 doses and 3 repetitions as follows:

Factor 1 (type)

P<sub>0</sub> : control,

P<sub>1</sub> : Organic liquid fertilizer (POC 1) (pure goat biourin),

P<sub>2</sub> : Organic liquid fertilizer (POC 2) (goat biourin + banana hump)

Factor 2 (dose)

D<sub>1</sub> : 100 ml/5kg ultisol,

D<sub>2</sub> : 200 ml/5kg ultisol,

D<sub>3</sub> : 300 ml/5kg ultisol

### **Making Organic Liquid Fertilizer MOL Banana Hump**

Department of Animal Husbandry and Animal Health (2020) and Risnandar (2014). one of the advantages of liquid organic fertilizer was that the concentrate was more easily absorbed by plants, liquid organic fertilizer was also more effective for increasing plant growth. 1 kg of banana hump was mashed and mixed with 1 liter of rice washing water and 1 kg of brown sugar. Furthermore, it was stored in bottles and fermented for 14 days. After the fermentation process was complete, the MOL banana hump was filtered again and the MOL banana hump was ready to be used for the manufacture of liquid organic fertilizer. The role of organic liquid fertilizer (POC) in banana weevil in growth was to play a role during vegetative growth of plants and plants tolerant to diseases with high levels of phenolic acid could help to increase Al, Fe and Ca ions so that there was availability of P in the soil for the development process and formation in fruit (Chaniago et al., 2017).

### **Preparation of Ultisol as a Growing Medium**

In taking the soil taken was the soil that was in the top layer (top soil). Ultisol as much as 5 kg/polybag measuring 30 cm x 30 cm.

### **Fertilizer Application**

The application of this liquid fertilizer was applied after the soil was ready for use, that was, it was applied by sprinkling it into the soil according to the treatment to be studied.

### **Observed Variables:**

C/N Ratio, N-Total, pH

## **RESULTS AND DISCUSSION**

### **C/N Ratio of Soil**

This was in accordance with Rahmi and Biantary (2014) which states that vegetation and the rate of decomposition of C-Organic could increase N in the soil. Based on the results of the analysis of the average value of the pure goat Biourin treatment (P1), the highest soil C/N ratio with a dose of 100 ml was 9.58 and the lowest soil C/N ratio at a dose of 300 ml was 7.67. Rizqiani et al. (2017) Effect of dose and frequency of liquid organic fertilizer. In goat biourin mixed with banana hump (P2). The highest C/N soil ratio was at 300 ml, which was 9.21, the lowest C/N soil ratio was at a dose of 200 ml, which was 7.58. For all treatments, the highest soil C/N ratio was 10.13 without treatment and the lowest soil C/N ratio was 7.58 with 200 ml banana hump goat Biourin treatment.

### **N-Total**

Based on the analysis, it was obtained 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 goat Biourin liquid fertilizer mixed with banana hump (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.

### **Soil pH**

Based on the results of the analysis, the highest average pH of H<sub>2</sub>O in the 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. 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 the lowest 300 ml at a dose of 100 ml was 3.73.

### C/N Ratio

The mean value of the highest soil C/N ratio was at a dose of 300 ml. This was because organic matter in the soil decomposes quickly. Based on the Regulation of the Minister of Agriculture No.70/Permentan/SR 104/10/2011 and SNI 19-7030-2004 the content of a good C/N ratio was 10-20 (Table 1). In accordance with Puspawati et al. (2016), where the higher the C/N ratio in the soil, the lower the nutrients, and vice versa, the lower the C/N ratio, the higher the nutrients. Plants could absorb organic matter if the C/N ratio was 12–15 (Budiyanti et al., 2020).

This was in accordance with the research of Madusari, (2015) which states that Liquid Fertilizer banana weevil contains more decomposing microorganisms in the soil and mycorrhizae as maximum

absorption of nutrients and produces N in the soil.

### N-Total

Nitrogen was one of the essential elements that were important for plant growth (Purnomo et al., 2017). The main source of N in the soil was organic matter, if the organic matter was low, the N element was also low and vice versa. Based on the results of the analysis presented in Table 2, that goat Biourin liquid fertilizer mixed with banana hump moles could increase the total N in the soil compared to pure goat Biourin liquid fertilizer. This was in accordance with the research of Kesumaningwati (2015) and Perdana et al. (2015), which states that the maximum increase in total N in the banana hump mole was thought to be due to the maximum micro-organism activity in the banana hump mole and sufficient oxygen supply, resulting in an increase in nutrient N. Elemental N could be absorbed by the soil in the form of NO<sub>3</sub><sup>-</sup> and NH<sub>4</sub><sup>+</sup> (Faridah et al., 2014). The element N was very important in helping the generative and vegetative growth of soybeans. Elemental N could be absorbed by the soil in the form of NO<sub>3</sub><sup>-</sup> and NH<sub>4</sub><sup>+</sup> (Faridah et al., 2014).

Table 1. C/N-soil ratio biourin on ultisol

Treatment	C/N Soil Rasio				Average
	Test				
	1	2	3	4	
P <sub>0</sub> D <sub>0</sub>	12.26	9.23	9.18	9.86	10.13
P <sub>1</sub> D <sub>1</sub>	11.8	8.49	7.72	10.32	9.58
P <sub>1</sub> D <sub>2</sub>	9.53	8.94	8.11	7.72	8.57
P <sub>1</sub> D <sub>3</sub>	7.7	6.94	8.53	7.53	7.67
P <sub>2</sub> D <sub>1</sub>	9.11	8.67	8.2	7.87	8.46
P <sub>2</sub> D <sub>2</sub>	9.19	7.95	6.58	6.62	7.58
P <sub>2</sub> D <sub>3</sub>	9.8	7.96	9.29	9.81	9.21

Note: P<sub>0</sub>: control, P<sub>1</sub>: Pure goat Biourin organic liquid fertilizer, P<sub>2</sub>: goat Biourin organic liquid + banana hump, D<sub>1</sub>: 100 ml, D<sub>2</sub>: 200 ml, D<sub>3</sub>: 300 ml

Table 2. N-total soil biourin on ultisol

Treatment	N-Total				Average
	Test				
	1	2	3	4	
P <sub>0</sub> D <sub>0</sub>	0.27	0.3	0.34	0.36	0.32
P <sub>1</sub> D <sub>1</sub>	0.31	0.36	0.39	0.47	0.38
P <sub>1</sub> D <sub>2</sub>	0.36	0.34	0.46	0.51	0.42
P <sub>1</sub> D <sub>3</sub>	0.36	0.55	0.38	0.43	0.43
P <sub>2</sub> D <sub>1</sub>	0.45	0.49	0.5	0.44	0.47
P <sub>2</sub> D <sub>2</sub>	0.37	0.48	0.48	0.5	0.46
P <sub>2</sub> D <sub>3</sub>	0.41	0.48	0.34	0.37	0.40

Note: P<sub>0</sub>: control, P<sub>1</sub>: Pure goat Biourin organic liquid fertilizer, P<sub>2</sub>: goat Biourin organic liquid + banana hump, D<sub>1</sub>: 100 ml, D<sub>2</sub>: 200 ml, D<sub>3</sub>: 300 ml

Table 3. pH analysis biourin on ultisol

Treatment	pH H <sub>2</sub> O				Average	pH KCl				Average
	Test					Test				
	1	2	3	4		1	2	3	4	
P <sub>0</sub> D <sub>0</sub>	3.85	3.75	3.98	4.08	3.91	3.71	3.57	3.62	3.71	3.65
P <sub>1</sub> D <sub>1</sub>	4.78	4.75	4.06	4.61	4.55	3.58	3.91	3.74	3.82	3.76
P <sub>1</sub> D <sub>2</sub>	4.5	5.24	5.52	4.91	5.04	3.84	4.13	4.44	3.91	4.08
P <sub>1</sub> D <sub>3</sub>	5.2	4.65	4.7	4.82	4.84	4.11	3.93	3.98	3.92	3.98
P <sub>2</sub> D <sub>1</sub>	4.08	3.68	4.24	4.5	4.12	3.68	3.62	3.78	3.84	3.73
P <sub>2</sub> D <sub>2</sub>	4.45	4.98	4.87	5.24	4.88	3.9	4.16	4.05	4.24	4.09
P <sub>2</sub> D <sub>3</sub>	5.05	4.95	4.99	5.25	5.06	4.88	4.19	4.01	4.35	4.36

Note: P<sub>0</sub>: control, P<sub>1</sub>: Pure goat Biourin organic liquid fertilizer, P<sub>2</sub>: goat Biourin organic liquid + banana hump, D<sub>1</sub>: 100 ml, D<sub>2</sub>: 200 ml, D<sub>3</sub>: 300 ml

### Soil - pH

Soil pH plays a role in indicating soil acidity, and determines whether or not nutrients were easily absorbed by plants. pH analysis was presented in Table 3. The soil used in this study has acidic properties. pH affects the absorption of nutrients in the soil. In general, nutrients will be easily absorbed by plants at a pH of 6-7, because nutrients will easily dissolve in water.

Soil was said to be fertile if the soil has a neutral pH (Hardjowigeno & Widiatmaka, 2015). Even though the pH has increased, it was still quite acidic. This was in accordance with the research of Amin et al. (2021) which stated that in the banana wee there were microbes that use organic acids, causing an increase in pH. The pH in the soil was very important to contain nutrients that will be absorbed by plants to grow up to production. One way to increase soil pH could be done by liming.

### CONCLUSION

There was an effect of type and dosage of goat Biourin liquid fertilizer on pH in Ultisol soil. There was no effect of type and dosage of goat biourin liquid fertilizer on C/N ratio and N-total in Ultisol soil. Based on the results of research conducted, it was found that the type and dose of liquid fertilizer Goat Biourin could increase soil pH, N-total and C/N ratio. Further research was needed on the best dose and type of goat biourin liquid fertilizer with other types of decomposers besides banana hump in Ultisol to find out more about the dosage and type that was better for plants.

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## REFERENCES

- Amin AN, Arifin AZ, Sulistyawati S. 2021. Utilization of rice straw, (*Oryza sativa*), banana weevil (*Musa paradisiaca*) and goat's urine for making organic fertilizer with addition of beka decomposer. *Journal of Agrotechnology Merdeka Pasuruan*. 5(1). DOI:10.25047/agriprima.v2i2.65.
- Budiastuti MTS, Pujiasmanto B, Sulistyo TD, Nurmalasari AI, Setyaningrum D. 2020. Utilization of indigofera tinctoria L. extraction waste as organic fertilizer in natural dye Batik Business in Sukoharjo. *PRIMA: Journal of Community Empowering and Services*. 4 (2): 109–119.
- Chaniago N, Purba DW, Utama A. 2017. Response to the Application of liquid organic fertilizer (POC) banana weevil and jatropha system on the growth and production of mung beans (*Vigna radiata* L.). *Jurnal Penelitian Pertanian BERNAS*. 13 (1): 1–8. DOI: 10.52045/jimfp.v1i1.56.
- Department of Animal Husbandry and Animal Health. 2020. How to Make Liquid Fertilizer from Goat Manure Easily. Berita Dinas. Nusa Tenggara Barat.
- Hani A. 2016. The effect of three spacing and goat urine application on early growth of manglid. *Jurnal Wasian*. 3 (2): 51–58. DOI: 10.20886/jwas.v3i2.1879.
- Faridah A, Sumiyati S, Handayani DS. 2014. Comparative study of the effect of addition of agri simba activator with banana weevil mole on macro nutrient content (Cnpk) compost from blotong (Sugarcane Filter Cake) with the addition of coffee skin variations. *Journal of Environmental Engineering*. 3 (1): 1–9. DOI: 10.26858/ijfs.v5i2.11110.
- Madusari S. 2015. Study of cation exchange capacity (CEC) and C/N ratio in liquid fertilizer application of banana weevil (*Musa* sp.) and mycorrhizae in early seedlings of oil palm plants (*Elaeis guineensis* Jacq.). *Journal of Citra Widya Edukasi*. 7 (2): 45–55. DOI: 10.5455/faa.64828.
- Nathania B, Sukewijaya IM, Sutari NWS. 2012. Effect of elephant biourine application on the growth and yield of mustard greens (*Brassica juncea* L.). *E Jurnal Agroekoteknologi Tropika*. 1 (1): 72–85. DOI: 10.1234/ijsegce.v4i2.184.
- Nurmasyitah N, Syafruddin S, Sayuthi M. 2013. Effect of soil type and dosage of arbuscular mycorrhizal fungi on soybean plants on soil chemical properties. *Jurnal Agrista*. 17 (3): 103–110. DOI: 10.1590/1678-4324-2021190323.
- Oktavianti A, Izzati M, Parman S. 2017. Effect of manure and NPK mutiara on growth and production of long beans (*Vigna sinensis* L.) in Sandy Soil. *Anatomy and Physiology Bulletin*. 2 (2): 236–241. DOI: 10.14710/baf.2.2.2017.236-241.
- Perdana SN, Dwi WS, Santoso M. 2015. Effect of application of biourin and fertilizer on growth and yield of shallots (*Allium ascalonicum* L.). *J. Prod. Tan*. 3 (6): 457–463. DOI: 10.29244/jhi.9.2.103-110.
- Puspadewi S, Sutari W, Kusumiyati K. 2016. Effect of concentration of liquid organic fertilizer (POC) and dose of NPK on growth and yield of sweet corn (*Zea mays* L. var *Rugosa Bonaf*) talent cultivar. *Kultivasi*. 15 (3): 208–216. DOI: 10.24198/kultivasi.v15i3.11764.
- Rahmi A, Biantary MP. 2014. Characteristics of soil chemical properties and soil fertility status of home gardens and farmland in several villages in West Kutai Regency. *Ziraa'ah Agricultural Scientific Magazine*. 39 (1): 30–36. DOI: .31602/zmip.v39i1.33.
- Rojaka O, Patty J, Nendissa J. 2016. The effect of dosage and time interval of bmw organic liquid fertilizer on the growth and production of palm plants (*Brassica juncea* L.). *Journal of Agriculture*. 12 (2): 66–73.

- Rizqiani NF, Ambarwati E, Yuwono NW. 2017. Effect of dosage and frequency of liquid organic fertilizer on growth and yield of beans (*Phaseolus Vulgaris* L.) lowland. *Journal of Soil and Environmental Science*. 7 (1): 43–53 DOI: 10.22146/ipas.59920.
- Risnandar. 2014. How to make liquid organic fertilizer. Jakarta: Penebar Swadaya.
- Setiatma TF, Koesriharti, Herlina N. 2017. Effect of goat and vermicompost biourin on growth and yield of Kailan plants. *Plant Production Journal*. 5 (4): 608–615. DOI: 10.29244/jhi.9.2.103-110.
- Hardjowigeno, Widiatmaka. 2015. *Evaluation of Land Suitability and Land Use Planning*. Gadjah Mada University Press: Yogyakarta.
- Kesumaningwati R. 2015. The use of banana hump mole (*Musa paradisiaca*) as a decomposer for composting empty palm oil bunches. *Ziraa'ah Majalah Ilmiah Pertanian*. 40 (1): 40–45. DOI: 10.31602/zmip.v40i1.96.
- Purnomo EA, Sutrisno E, Sumiyati S. 2017. Effect of variation of C/N ratio on compost production and content of potassium (K), phosphate (P) from banana stems with a combination of cow dung in the vermin composting system. [Ph.D. thesis]. University of Diponegoro.