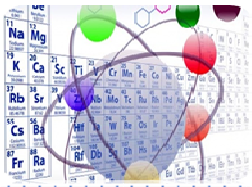
Indonesian Journal of Chemical Science and Technology (IJCST)

State University of Medan, https://jurnal.unimed.ac.id/2012/index.php/aromatika

IJCST-UNIMED 2023, Vol. 06, No. 2 Page; 100 – 105
Received : Dec 18th, 2022 Accepted : Feb 11st, 2023 Web Published : July 31st, 2023



The Jasmine Plant Growth Effect Supplemented with Liquid Organic Fertilizer from Banana Peels

Rini Selly*, Angel Shylvia Panjaitan, Dinda Natalisa Br. Gurusinga, Dira Khairunissa, Santa Maria Manalu, and Siti Rahmah

Department of Chemistry, Faculty of Mathematics and Natural Sciences, Medan State University, Medan 20221, Indonesia
**Corresponding author: rini.selly@unimed.ac.id*

ABSTRACT

Liquid organic fertilizer (LOF) is a solution resulting from the decomposition of organic matter originating from plant residues, agro-industrial waste, animal waste, and human waste containing more than one nutrient. LOF can be made from liquid organic matter (liquid organic waste), by composting and providing composting activators so that a LOF that is stable and contains complete nutrients can be produced. The use of LOF has the advantage that although it is often used it does not damage the soil and plants, the use of organic waste as fertilizer can help improve soil structure and quality, because it contains nutrients and other organic matter. The process of adding different fertilizers to the plants for 10 days showed that there were different height changes for each plant. With only water, the plants only reach 0.1 cm difference in 7 days. The plants that were given LOF and NPK (Chemical Fertilizer) gained height in only 4 days with heights 15.6 cm and 16 cm respectively. The growth percentage between LOF and NPK showed a significant difference in 4 days with 0.6% and 3.2 % respectively.

Keywords: Liquid Organic Fertilizer, Bio-Based, Waste, Jasmine Plant

1. INTRODUCTION

Banana fruit is a food that is widely consumed by the public because it is known as a source of nutrition and a source of antioxidants which are useful as an antidote to free radicals. Banana (Musa, sp.) is a fruit commodity that can be cultivated throughout the tropics, including Indonesia. Apart from being consumed directly after the bananas are ripe, bananas can also be processed into various foods, such as banana dodol, banana chips, and others. Banana peels contain dietary fiber in the amount of 50g/100g, so it is a potential source of dietary fiber. However, even though bananas have many benefits, consumption of bananas will leave organic waste, namely banana peels. It is necessary to process banana peels so that they become more useful products so that the use value of bananas will increase.[1]

e-ISSN : 2622-4968, p-ISSN : 2622-1349

Banana peel contains nutrients much needed by plants, one of which is nitrogen element. Nitrogen is an element important component in protein synthesis. Most of the total nitrogen in water can bound as organic nitrogen, i.e. in protein ingredients. Nitrogen is present in dissolved form as suspended material. Types of nitrogen in water include organic nitrogen, ammonia, nitrites, and nitrate. The main role of nitrogen for plants is to stimulate growth whole, especially stems, branches and leaves. In addition, nitrogen also plays an important role in the formation of very useful green leaves in another process. Another function is to form proteins, fats, and various other organic compounds.[2]

Banana peel waste fertilizer is a potential source of potassium fertilizer with a K_2O content of 46-57% on a dry basis. Apart from containing phosphorus and potassium, banana peels also contain elements of magnesium, sulfur and sodium. Banana peels also rich in other substances, namely protein, calcium, phosphorus, magnesium, sodium and sulfur, so banana peels have good potential to be utilized as organic fertilizer.[3] Potassium is a micro-nutrient that helps the formation of proteins, carbohydrates and sugars, and helps transport sugars from leaves to fruit, strengthens plant tissues and increases disease resistance. Magnesium is an element whose existence is because apart from being needed in the formation of chlorophyll it also acts as a catalyst in the uptake of the elements P(Phosphorus) and K(Potassium) by plants. Sodium can easily absorb water and hold water quite strongly, so plants are resistant to drought.[4]

To produce high-quality, fertile flower plants, in this case healthy, to accelerate growth, fertilizers are often used in the form of chemical fertilizers or organic fertilizers. Chemical fertilizers do have several advantages, including the elements they contain quickly decompose, more quickly absorbed by plants, and fertilization is relatively easy to do. However, not many farmers or the public know that over time, chemical fertilizers can inhibit plant growth and cause crop failure. Besides that, Long-term use of chemical fertilizers can also cause an imbalance of nutrients in the soil and cause a decrease in pH and soil conditions become critical.[5]

Organic fertilizers are the best and natural soil amendments than artificial/synthetic amendments. In general, organic fertilizers contain low macro-nutrients N, P, K but contain sufficient amounts of micro-nutrients that are needed by plant growth. Applying organic fertilizers to the soil can be done like chemical fertilizers. Organic fertilizers are not to replace the role of chemical fertilizers but rather complement to the function of chemical fertilizers. Organic fertilizers and chemical fertilizers will be more optimal and more efficient when used together. The addition of organic fertilizers can reduce the negative impact of chemical fertilizers and simultaneously improve the physical, biological and chemical properties of the soil.[4]

LOF (Liquid Organic Fertilizer) is a solution resulting from the decomposition of organic matter from waste plants, agro-industrial waste, animal waste, and human waste containing more than one nutrient. LOF can be made from liquid organic matter (liquid organic waste), by composting and providing composting activators so that liquid organic fertilizer can be produced which is stable and contains complete nutrients. The use of LOF has the advantage that although it is often used it does not damage soil and plants, the use of organic waste as fertilizer can help improve soil structure and quality, because it contains nutrients (NPK) and other organic matter.[6]

Jasmine (Jasminum sambac L.) is plant included in the group of ornamental shrubs native to regions such as Asia, Africa and Australia. The potential for jasmine production is large, so the production of jasmine requires improvement of plant propagation techniques fast and high yield.[7]

Previous research has proven the benefits of using banana peel fertilizer on fruit plants such as Namdokmai mango and Longan aroma durian plants.[4] Moreover another research on vegetable also shown

e-ISSN : 2622-4968, p-ISSN : 2622-1349

good result such as on green mustard[8] and kale[2]. This paper describes the growth of a flowering plant, jasmine, with the use of LOF made from banana peels

2. EXPERIMENTAL

2.1. Chemicals, Equipment and Instrumentation

The equipment we used in this study were rags, scales, bowls, cutters, cutting boards, and plastic bottles. The materials we used in this study were banana peels, water, EM4 (effective microorganism 4) solution, and sugar.

2.2. Research Procedure

Mix 0.5 kg of banana peels that have been cut into small pieces with 0.5 liters of water. Then the banana peel is mixed with 0.15 kg of sugar solution which has been mixed with 5 ml of EM4 solution. Then the solution is soaked for 6 days.

After 6 days liquid organic fertilizer is ready to use. The resulting solution was filtered to separate the banana peels from liquid organic fertilizer. Then every 1 liter of skin organic fertilizer Liquid bananas dissolved in 10 liters of water. Then it is applied to the flowers by watering the LOF around the plants or spraying it and applied every 1 week 2 times as a plant maintenance program.

3. RESULTS AND DISCUSSION

3.1. Analysis of Characterization Results

This experiment used water, LOF and also NPK fertilizer as a comparison. The plant uses was the jasmine plant with the same age, 3 months. In the making of LOF fertilizer, it is carried out using organic waste, in this case we use banana peels which are processed into liquid organic fertilizer. Fertilizer production is carried out from April 29 to May 4. After settling for 6 days liquid organic fertilizer is ready to be used on plants.

Figure 1. Research Process

The first plants will be watered using only water without any fertilizer. The second plants will be using LOF with the comparison using NPK fertilizer.

e-ISSN : 2622-4968, p-ISSN : 2622-1349

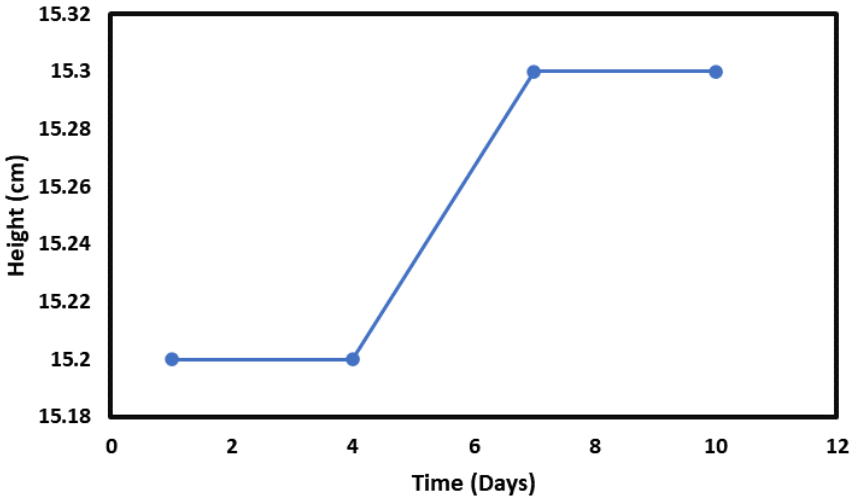


Figure 2. Jasmine Plant Growth without Fertilizer

From Figure 2, as can be seen, with only water, the Jasmine plant grew slowly and it only reached a 0.1 cm difference in 7 days. From Figure 3, the plants that were given LOF and NPK gained height in only 4 days with heights 15.6 cm and 16 cm respectively. From Figure 4, the growth percentage between LOF and NPK showed a significant difference in 4 days with 0.6% and 3.2 % respectively.

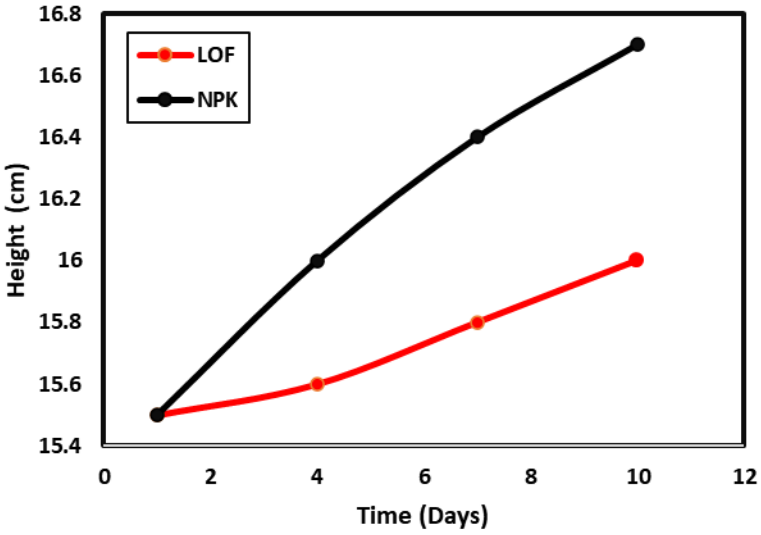


Figure 3. Jasmine Plant Growth with LOF and NPK Fertilizer

The plants that were given LOF showed changes, where on the first day the plant height was 15.5 cm. Then it increased to 15.6 cm on the fourth day. On the seventh day, it increased to 15.8 cm and then increased to 16 cm on the tenth day. With NPK fertilizer, it was seen that the changes were greater. The plant

e-ISSN : 2622-4968, p-ISSN : 2622-1349

height from 15.5 cm increased by 0.5 cm on the fourth day to 16 cm, then increased by 0.4 cm to 16.4 cm on the seventh day and increased by 0.3 cm on the tenth day, so that the final plant height is 16.7 cm.

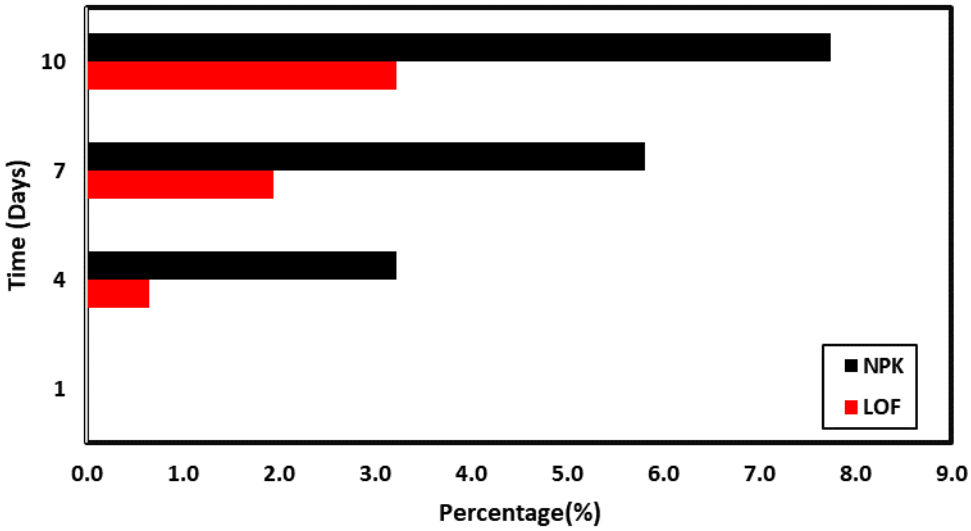


Figure 4. Jasmine Plant Percentage Growth with LOF and NPK Fertilizer

The growth percentage comparison between LOF and NPK were a significant difference in 4 days with 0.6% and 3.2 % respectively. Chemical fertilizer grew the plant higher than organic fertilizer. However, considering the way of making the organic is quite easy and the staple material used is banana skin waste which is no longer used and more beneficial as mentioned in previous research[4] it is still recommendable.

4. CONCLUSION

LOF can be made from liquid organic matter (liquid organic waste), by composting and providing composting activators so that a liquid organic fertilizer that is stable and contains complete nutrients can be produced. With only water, the plants only reach 0.1 cm difference in 7 days. The plants that were given LOF and NPK (Chemical Fertilizer) gained height in only 4 days with heights 15.6 cm and 16 cm respectively. The growth percentage between LOF and NPK showed a significant difference in 4 days with 0.6% and 3.2 % respectively. The use of liquid organic fertilizer has the advantage that although it is often used it does not damage the soil and plants, the use of organic waste as fertilizer can help improve soil structure and quality, because it contains nutrients (NPK) and other organic matter. The process of adding different fertilizers to the plants for 10 days showed that there were different height changes for each plant.

REFERENCES

1. Aryani, T., Mu'awanah, IAU, & Widyantara, AB **(2018).** Physical Characteristics, Nutritional Content of Banana Peel Flour and Its Comparison with the Requirements for the Quality of Wheat Flour. JRST (Journal of Science and Technology Research), 2(2), 45. https://doi.org/10.30595/jrst.v2i2.3094

e-ISSN : 2622-4968, p-ISSN : 2622-1349

2. Manis, I., Supriadi & Said, I., **(2017)** Pemanfaatan Limbah Kulit Pisang Sebagai Pupuk Organik Cair Dan Aplikasinya Terhadap Pertumbuhan Tanaman Kangkung Darat (Ipomea reptans Poir), Jurnal Akademika Kimia, Universitas Tadulako, 6(4), 219-226.
3. Masese, Z. A. D., and Yatim, H., **(2017)** Respon Tanaman Tomat (Solanum lycopersicum L.) terhadap Pemberian Pupuk Organik Cair Kulit Pisang, Agrominansia, 2 (2) 170-180. doi:10.34003/271994.
4. Rasmito, A., Hutomo, A., & Hartono, AP **(2019).** Production of Liquid Organic Fertilizer by Fermentation of Tofu Liquid Waste, Starter Filtrate of Banana and Cabbage Peels, and EM4 Bioactivator. Journal of Science and Technology, 23(1), 55–62. https://doi.org/10.31284/j.iptek.2019.v23i1.496
5. Widad, P.P., S., Putra Hidayat, R., Nirmala Sari, D., Rahadiansyah Afandi, A., & Oktavina Radianto, D., **(2023)**. Inovasi Pupuk Organik Cair Dari Alerine (Air Kelapa, Air Leri, Dan Urine) Sebagai Upaya Meningkatkan Pertumbuhan Tanaman. *Koloni*, *2*(2), 41–48. https://doi.org/10.31004/koloni.v2i2.454
6. Tuapattinaya, P., & Tutupoly, F. **(2014).** Application Of King Banana Peel (Musa Sapientum) Fertilizer On The Growth And Production Of Chili Chili (Capsicum Frutescens L.). Biopendix: Journal of Biology, Education and Applied, 1(1), 13–21. https://doi.org/10.30598/biopendixvol1issue1page13-21
7. Eviyati R., Riana, A.Y., Dukat, **(2022)** Pengaruh Konsentrasi Ekstrak Bawang Merah dan Bahan Setek Terhadap Pertumbuhan Tanaman Melati (Jasminum sambac L.), PASPALUM, 10(2), 125-131. http://dx.doi.org/10.35138/paspalum.v10i2.411
8. Ibrahim, Y., & Tanaiyo, R. **(2018)**. Respon Tanaman Sawi (Brasicca Juncea L.) terhadap Pemberian Pupuk Organik Cair (POC) Kulit Pisang Dan Bonggol Pisang. Agropolitan, 5(1), 63-69.

e-ISSN : 2622-4968, p-ISSN : 2622-1349