

Plant Response To Organic Fertilizer In Panca Agung Village, Bulungan District**Tati Hariyati¹, Marlan Unmani Putra², Sabarudin³, Ipung Suryanta⁴, M. Fikri⁵, Rina Lesmana⁶**¹²³⁴⁵Agrotechnology, Faculty of Agriculture, Univercity Borneo North

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Corresponding Author: thariyati8@gmail.com**Abstract**

Agriculture in Indonesia generally still depends on the use of chemical fertilizers, where chemical fertilizers can increase plant productivity, but the presence of chemical fertilizers if used continuously in the long term will have an impact on damage to the soil, environment and ecosystem, resulting in the soil becoming hard due to the accumulation of waste chemicals (residues). Panca Agung Village has the potential for quite fertile agricultural land, with many types of plants being cultivated such as vegetables, fruit, rice, banana trees and coconut trees. With this potential, existing waste can be used as raw material which can be processed into environmentally friendly organic fertilizer, which can be used as plant fertilizer to replace chemical fertilizers. The aim is to determine the response of plants to the application of organic fertilizer. The method used is in three stages, namely 1) Collection of waste raw materials, 2) making organic fertilizer, 3) Application of fertilizer to plants. The results obtained by applying organic fertilizer make the plants grow more fertile, the leaves appear to grow faster and the harvest time of the plants is faster. Based on the results, it can be concluded that applying organic fertilizer is no less than using chemical fertilizer, in terms of plant growth.

Keywords: *Organic Fertilizer, Plant Growth, Environmentally Friendly, Vegetables,***Article Info**

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INTRODUCTION

Plants are plants that are cultivated so that they can benefit from them. The benefits of plants are as air purifiers that produce oxygen and absorb carbon dioxide gas and various pollutants in the air, as medicines, as air conditioners, as a source of food, and can be used to increase aesthetic value (Azzaky, 2020). The benefits of plants for humans are also as a source of vitamins A, B, C, and B2 and other substances that are beneficial for health, and contain fiber which is good for the body (Gustia. Helfi, 2017). One factor in the growth and development of plants is the process of watering and caring for the plants so that they grow optimally. The need for sufficient water is very important for plants because it can keep plants running optimally (Azzaky, 2020).

Waste is material that has no value or is no longer valuable so it is a problem that is very difficult to solve (Susi, N, 2018). One of the wastes that is rarely used by farmers is agricultural waste such as banana stems, banana peels, coconut husks. From agricultural products there are plant residues that are not utilized by the local community, but so far agriculture there still relies on the use of chemical fertilizers. In recent years the price of chemical fertilizers has become increasingly expensive, thus efforts have been made to increase agricultural production by making liquid organic fertilizer from plant waste such as banana stems, banana peels and coconut husks, where this waste contains elements that are really needed by plants such as K, Ca, and P (Hariyati, et al, 2023).

Liquid organic fertilizer is fertilizer that comes from plant waste or household waste such as banana stems and coconut husks, banana peels and is in the form of a liquid produced from the fermentation or fermentation process of organic materials using EM-4 (Effective Microorganisms 4) technology. The advantage of using EM4 technology is that organic fertilizer (compost) can be produced in a relatively short time compared to conventional methods because EM4 itself contains

Azotobacter sp., *Lactobacillus* sp., yeast, photosynthetic bacteria and cellulose decomposing fungi (Fitriyah, U, 2021)

Liquid organic fertilizer from banana stems, banana peels and coconut fiber contains nutrients that plants need, such as the elements K, Ca and P. Banana stems contain ingredients that are important for plants, both for growth and development, mineral elements contained in them such as calcium. of 16%, potassium content of 23%, and phosphorus content of 32% (Suprihatin 2011), banana stems also have lignocellylose which can make up the plant body, namely 26.6% cellulose, 20.43% hemicellulose, and 9.92% lignin (Tuo 2016, In Gultom, 2021), banana peel contains 15% more potassium and 12% phosphorus than fruit flesh (Supriadi 2007), besides that banana stems and coconut fiber contain minerals that are good for plants such as Calcium (Ca) , Magnesium (Mg), Manganese (Mn) and Copper (Cu), Potassium (K), Sodium (Na), and Phosphorus (P) (Hariyati, 2023). The use of fertilizer from banana stems has been tested on chili plants to increase fruit and the number of fruit on the plants (Aryanti, *et al* 2019).

RESEARCH METHODS

Research Location and Time

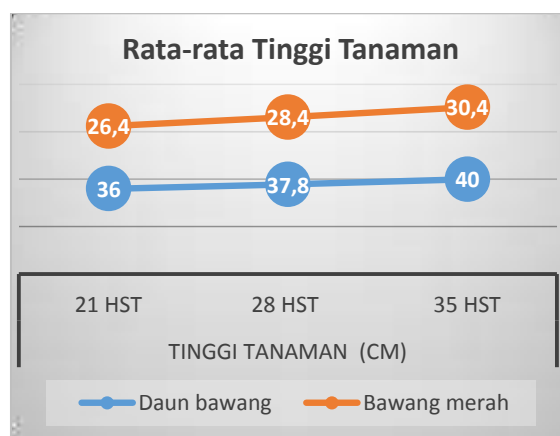
This research was carried out in Panca Agung Village, North Tanjung Palas District, Bulungan Regency starting from September to November 2023. The tools used in this research include Ph meter, TDS EC, ruler, stationery, camera, sprayer, label tape. The materials used in this research include hormone fertilizer, leek, and mustard greens. This research used a Randomized Block Design (RAK) which consisted of one treatment, which was repeated 3 times with treatment providing liquid organic fertilizer from banana stem waste, banana peel and coconut fiber. The stages in this research are divided into 3, namely collecting materials, making fertilizer and applying fertilizer.

RESULTS AND DISCUSSION

Leek and Shallot Plants

The effect of liquid organic fertilizer from waste material from banana stems, banana peels and coconut fiber on the growth of leek plants can be seen in the following data:

1. Plant height

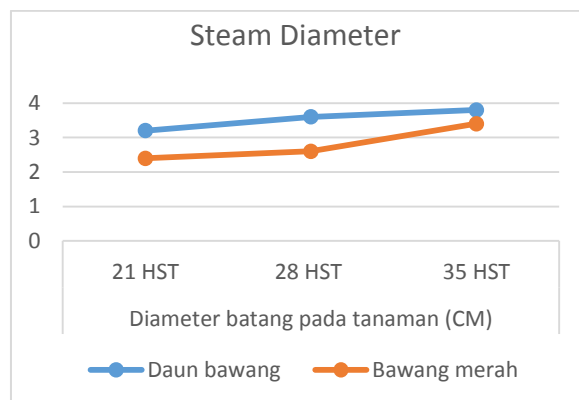


Picture of Average Plant Height

Meanwhile, after spraying using hormonal fertilizer from banana stem waste, banana peels and coconut fiber on leek plants and shallot plants, the plants can be influenced by the application of liquid organic fertilizer which is given once a week at a rate of 1L per 10L of water. The average height growth in spring onion and shallot plants starting from 21 HST is 36 cm, 28 HST is 37.8 cm and 35 HST is 40 cm.

Liquid organic fertilizer (POC) has several benefits, including helping to add the element nitrogen (N) to plants which can stimulate plant vegetative growth, especially the growth of roots, stems and leaves and as a source of amino acid minerals for plants to form plant regulatory substances (ZPT). stimulates the acceleration of the photosynthesis process in plants, improves the taste or color of plant fruit/leaves (Waqfin, 2022).

2. Stem diameter



Picture of Average Plant Diameter

In terms of stem diameter of leek and shallot plants, it can be seen that after spraying the plants once a week with a ratio of 1 liter of liquid fertilizer to 10 liters of water, it shows that the average growth in stem diameter of leek plants starting from 21 HST is 3.2 cm, 28 HST 3.6 cm and 35 HST 3.8 cm and for shallot plants starting from 21 HST 2.4, 28 HST 2.6 and on the 35th HST which is 3.4 this is due to giving Water organic fertilizer can influence growth in plant stem diameter.

The nitrogen element contained in liquid organic fertilizer (POC) waste from banana peels and coconut fiber causes the formation of amino acids as a protein framework so that the process of cell division, enlargement and elongation can run smoothly because the nitrogen element plays a role in the formation of green leaf grains which is a necessary factor for this to occur. photosynthesis is used to organize plant tissue and so on for plant metabolic activities (Sinaga, 2018).



Picture 1. planting leeks and shallots

Mustard Plants

From the results of research that has been carried out in practice fields, the following results can be obtained. Hormonal fertilizer produced from waste banana stems, banana peels and coconut fiber was tested on mustard greens, namely where the plants were sprayed using fertilizer on plants where previously the leaves were still small on mustard plants and after spraying using hormonal fertilizer on plants, namely leaves. Mustard greens are greener, brighter and wider, so organic hormone fertilizer from banana stem waste, banana peels and coconut fiber is able to provide the nutrients needed by the plants so that the plants can grow optimally.



Picture mustard plant

The advantage of organic hormone fertilizer is that it contains complete nutrients, both micro and macro nutrients, and this condition is not shared by inorganic fertilizers. Organic hormone fertilizer contains soil macro and micro organisms which have a very good function in improving the physical soil and especially the biological properties of the soil, improving and maintaining soil structure, supporting the inorganic nutrients provided, helping to maintain soil moisture and not damage the environment (Firdiani, et al, 2022).

CONCLUSION

Liquid organic fertilizer is fertilizer that comes from plant waste or household waste such as banana stems and coconut husks, banana peels and is in the form of a liquid produced from the fermentation or fermentation process of organic materials using EM-4 (Effective Microorganisms 4) technology. The advantage of using EM4 technology is that organic fertilizer (compost) can be produced in a relatively short time compared to conventional methods because EM4 itself contains *Azotobacter* sp., *Lactobacillus* sp., yeast, photosynthetic bacteria and cellulose decomposing fungi (Fitriyah, 2021) Testing of liquid organic fertilizer from waste banana stems, banana peels and coconut fiber on three plants, namely melon plants, leek plants and mustard greens, gave a wide leaf color but did not have a real effect on the size and weight of the fruit on the melon plants. This is because the production of hormonal fertilizer from waste from banana stems, banana peels and coconut fiber is not optimal, which can be seen in waste that is not sufficiently submerged in water during the fermentation process, therefore it is necessary to carry out further research regarding the effect of providing hormonal fertilizer on weight and large fruit on melon plants.

BIBLIOGRAPHY

- Aeni, S, N, & Setiawan, S, R, D, 2022. Conditions for growing rice plants: [http://agri.kompas.com/ready/2022/10/22/123500984/note these are the conditions for growing rice plants that you need to know?page=2](http://agri.kompas.com/ready/2022/10/22/123500984/note%20these%20are%20the%20conditions%20for%20growing%20rice%20plants%20that%20you%20need%20to%20know?page=2) Accessed on 14 December 2023
- Andjani, R. 2022. Analysis of compost quality from dry leaf waste using mealworms (*Tenebrio Molitor*) and Effectiveness of Microorganisms 4 (Em4).
- Firdiani, Dian, Aminullah, A., Astari, R., Sulastina, S., Mufliha, M., & Elihami, E. 2022. Utilization of banana leaf and shallot skin waste as liquid organic fertilizer for soil fertility in Bambapuang Village. *Maspul Community Empowerment Journal*, 4 (1), 96-102.
- Fitriyah, U. 2021. Application of Bokasi organic fertilizer using swallow and water hyacinth as raw materials for the growth and yield of your plants (*Barassica Oleracea* L.) THESIS. Department of Agrotechnology, Faculty of Agriculture, University North Borneo
- Gultom, Endang, AF, & Rezeqi, S. 2021. Utilization of Banana Stem Waste to make Liquid Organic Fertilizer in Kulasar Village, Silinda District, Serdang Bedagai Regency.
- Hadisuwito, S. 2012. Making Liquid Compost Fertilizer. Jakarta; PT. Agromedia Library.
- Hariyadi, D., Yetti, H., & Yoseva, S. 2015. The effect of giving several types of fertilizer on the growth and production of your plants (*Bassica Alboglabra* L.) (Doctoral dissertation, Riau University).
- Hariyati, T, Wahyudi, E, Imelda, D, Q, 2023. Utilization of Coconut Fiber and Banana Stem Waste as Organic Fertilizer in Panca Agung Village, North Kalimantan. *Journal of Community Service* Vol 3 No (1) 52-56

- Hendarto, E., Bahrin, B., & Hidayat, N. 2019. The Effect of the Levels of Liquid Organic Fertilizer from Traditional-Market Waste on the Production and Nutrient Contents of *Setaria* Grass. IOP Conference Series: Earth and Environmental Science, 372(1), 12051. <https://doi.org/10.1088/1755-1315/372/1/012051> Accessed November 29, 2023 Accessed December 14, 2023
- Huda MK, 2013. Making Liquid Organic Fertilizer from Cow Urine Using Adaptive Molasses Fermentation Method. Thesis. Semarang State University.
- Indriani, Hety Yovita. 2011. Quick fertilizer production. Jakarta: publisher of Penebar Swadaya.
- John, 2021. To Stay Fresh These are the Requirements for Growing Tias Plants Indoors: <https://www.batukita.com/2021/02/agar-tetap-indah-begini-jual-tumbuh-tanaman-hias-dalam-ruang.html> Accessed on 13 December 2023
- Kartika, Gema Juang. 2013. Organic farming and vegetables. Jakarta: Self-Help Distributor Publisher.
- Lovini, H 2012. Utilization of liquid organic fertilizer in cultivating tomato plants (*Solanum lycopersicum* L). Department of Agricultural Cultivation, Faculty of Agriculture, Gadjah Mada University.
- Mardwita, M., Yusmartini, ES, Melani, A., Atikah, A., & Ariani, D. 2019. Making compost from organic waste into liquid fertilizer and solid fertilizer using a composter. Torch Abdi, 1 (2).
- Marpaung, AE (2018). Utilization of types and doses of liquid organic fertilizer (poc) to increase the growth and yield of cabbage. Journal of Agrotechnoscience, 1(2).
- Nasution, F, (2013). Application of solid and liquid organic fertilizer from Kepok banana peels for the growth and production of mustard greens (*Bassica Juncea* L). Undergraduate program thesis. University of Northern Sumatra. Medan.
- Ranasinghe, A., Jayasekera, R., Kannangara, S., & Rathnayake, RMC . (2019). Effect of nutrient enriched organic liquid fertilizers on growth of *Albemonchus esculentus*. Journal of Environmental Protection and Sustainable Development, 5(3), 96–106. https://www.researchgate.net/profile/Ranjith_Jayasekera/publication/335927260_Effect_of_Nutrient_Enriched_Organic_Liquid_Fertilizers_on_Growth_of_Albemonchus_esculentus/links/5d8a0e21a6fdcc8fd61b8a42/Effect-of-Nutrient-Enriched-Organic-Liquid-Fertilizers-Accessibleon Accessed November 29, 2023.
- Roidah I.S. (2013). Benefits of using organic fertilizer for soil fertility. Tulungagung Bonorowo University Journal, 1 (1): 30-42.
- Setiawan, S, R, D, (2022). How to make liquid organic fertilizer from banana stem waste <http://www.kompas.com/homey/red/2022/05/151700876/simak-cara-pembuatan-pupuk-organik-cair-dari-limbah-batang-pisang> Accessed December 27, 2023.
- Sinaga, M., (2018). The effect of tofu liquid waste on the growth and yield of cucumber plants (*Cucumis sativus* L). PIPER Journal 14 (26), 308-312
- Suprihatin, 2011. Process of Making Liquid Fertilizer From Banana Tree Trunks. Journal of Chemical Engineering Vol. S, No. 2
- Susi, N., Surtinah Surtinah, and Muhammad Rizal, "Testing Nutrient Elements of Liquid Organic Fertilizer (POC) Pineapple Peel Waste" Faculty of Agriculture, Lancang Kuning University 14 (2), 46-51
- Waqfin, MSI, Rahmatullah, V., Imami, NF, and Wahyudi, MS (2022). Making mole liquid fertilizer and liquid organic fertilizer: making MOL liquid fertilizer. Community Service Journal 3, no (1), 25-28
- Wardati, M, and Alfianita. 2018. Utilization of Banana Tree Trunks as Liquid Organic Fertilizer with EM4 Activator and Fermentation Time. TEDC. 12(12).
- Winarni, E., Ratnani, RD, & Riwayati, I. (2013). The effect of organic fertilizer on the growth of coffee plants. Momentum Scientific Magazine, 9 (1.)
- Yuniarti, A., Suriadikusumah, A., & Gultom, JU (2018). Effect of inorganic fertilizer and liquid organic fertilizer on pH, n-total, c-organic, and yield of pak choy in inceptisols. Semnastan Proceedings, 213-219.