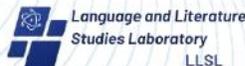




JOURNAL OF SOCIETY INNOVATION AND DEVELOPMENT

The multidisciplinary journal of society for development

JSID



www.journal.institutre.org



Supported by



The Effect of *Trichoderma* sp Fungus on the Growth and Development of Kale Plants (*Ipomoea Reptans* F)

Zefanya Aqeela^{1*}, Nurmahni Harahap², Halimatus Sakdiah³

^{1,2,3}MTsN 1 Model Banda Aceh, Indonesia

Abstract

Kale (*Ipomoea reptans* F.) is a cultivated plant that is easy to breed, has a low price, and has a delicious taste. However, currently, farmers and the public generally use chemical fertilizers to improve the growth and development of kale plants. This can certainly cause dependence on chemical fertilizers. So, the researchers conducted research on the effect of *Trichoderma* sp. The purpose is to determine the effect of *Trichoderma* sp. fungus on the growth and development of kale plants (*Ipomoea reptans* F). The method in this study is an experiment using *Trichoderma* sp. fungus mixed with compost with the composition of (P1) 45 gr *Trichoderma* sp. fungus, (P2) 50 gr *Trichoderma* sp. fungus, (P3) 55 gr *Trichoderma* sp. fungus, and (P0) without treatment as a control reference. The results showed that the P2 mixture of *Trichoderma* sp. fungus was the best composition. So, it can be concluded that the provision of *Trichoderma* sp. fungus affects the growth and development of kale plants (*Ipomoea reptans* F).

Keyword: *Trichoderma* sp fungus; Kale; *Ipomoea reptans* F; Agriculture; Fertilizer

* Corresponding author, email: zefanyaaqeela66@gmail.com

Received 24 January 2024; Received in revised form 23 February 2024; Accepted 1 April 2024; Available online 04 May 2024

<https://doi.org/10.63924/jsid.v5i2.56>

Page 131-139

© The Authors

Published by Journal of Society Innovation and Development. This is an open access article under the CC BY-SA 4.0 license (<https://creativecommons.org/licenses/by-sa/4.0/>).



INTRODUCTION

Kale (*Ipomoea reptans*) is one of the horticultural crops (cultivated plants) and is grouped into a type of vegetable that can be found almost anywhere because this plant can be cultivated easily, especially in watery (humid) areas. Kale is also one of the most popular leaf vegetables in Southeast Asia and is the most highly consumed vegetable in Indonesia. Apart from its low price and delicious taste, this vegetable also has a variety of benefits, including being a source of protein, vitamins, iron, and calcium (Mayani, Kurniawan, & Marlina, 2015; Seroja, A., 2019).

This vegetable plant is a plant that lives in the tropics and subtropics. Kale has a taproot that comes from a hollow and knobbly stem. The leaf shape is single with a pointed or blunt leaf tip, depending on the type of plant. The color of the leaves also varies; some are dark green or whitish green with purple in the middle of the leaves (Sofiari, 2009; Nugroho, F. P., Tippe, S., & Swaramarinda, D. R., 2020).

In general, kale plants have two types, namely land kale and water spinach. Both have differences when viewed from their physical form: land kale (*Ipomoea reptans*) has narrow leaves, grows in a humid soil environment, and can only be harvested once, while water spinach (*Ipomoea aquatica*) has wider leaves than land kale, adapts to a waterlogged environment, and can be harvested many times.

Kale adapts to a variety of soil conditions but requires relatively high soil moisture for maximum growth and development. Soils with high organic matter content are generally more optimal for cultivating kale plants. Kale can provide optimum results in tropical lowland conditions with high temperatures and relatively short irradiation. The ideal temperature usually ranges from 25 to 30 degrees Celsius, while below 10 degrees Celsius, the plants will be damaged (Fikri, Indradewa, & Putra, 2015; Rudi, D. A., Wijaya, T. S. I., & Murdani, T., 2021; Johan, D., 2024).

However, to increase the growth and development of kale plants, farmers and the community more often use chemical fertilizers, which aim to increase optimal kale yields, causing dependence on the use of fertilizers with inorganic chemicals. Excessive use of chemical fertilizers can harm plants because inorganic chemicals can reduce and even destroy soil fertility. This condition makes nutrient-forming organisms (soil fertilizers) reduce or even die. The use of chemical fertilizers that are not in accordance with the use of organic fertilizers can damage the balance of nutrients in the soil and can reduce soil pH (Rautaray, S., Ghosh, B., & Mitra, B., 2003; Zikrullah, M., 2023; Ibrahi, A., 2024).

If not controlled immediately and continuously using chemical fertilizers, we may become dependent on chemicals. This is, of course, dangerous and fatal. In general, plants cannot absorb 100% of chemical fertilizers, so the residue or residual use of chemical fertilizers left in the soil will become hard, dry, and sticky. One way to deal with this problem is to use biological fertilizer with a mixture of *Trichoderma* sp. fungus to increase optimal harvest and increase the growth and development of kale plants. *Trichoderma* sp. is a biological agent in the form of a good fungus that can be a biocontrol agent that is antagonistic to other fungi. The habitat of *Trichoderma* sp. is in the soil and belongs to the class of green-spored ascomycetes (Novianti, Propagation of *Trichoderma* sp. Fungi on several media, 2018; Fuazi, 2020).

Trichoderma sp. can be used as a biocontrol agent because it is antagonistic to other fungi. Besides being used as a biocontrol agent, *Trichoderma* sp. fungus can also be used as a biological fertilizer and biofungicide to increase the optimal amount of plant production with better growth and development rates. *Trichoderma* fungi grow rapidly in various places. In nature,

Trichoderma fungi are found in fertile soil containing organic matter in a humid environment that is not exposed to direct sunlight. The use of Trichoderma biological agents as biological fertilizers and biofungicides is expected to release our dependence on the use of excessive chemical fertilizers. Based on the background description above, researchers will conduct research on “The effect of Trichoderma sp. fungus on the growth and development of kale plants (*Ipomoea reptans* F.)”.

METHOD

The method used in this research is experimental. Experimental research is research conducted by researchers to determine the effect or impact caused by a treatment given intentionally by the researcher. The research design used in this study is RAL (completely randomized design), which consists of 4 treatments, and each treatment is carried out 4 times. Experiments were conducted using Trichoderma sp. fungus mixed with compost and applied to kale. With 3 compositions consisting of P1 (45 g), P2 (50 g), and P3 (55 g) as concentrations and P0 (no treatment) as control reference, the time for conducting this research is 2 weeks, starting from October 26, 2022, to November 18, 2022, and the place for conducting this research is at the researcher's house.

The tools used in this research are:

1. Shovel
2. Polybag 500 gr
3. Plant sprayer
4. Scales
5. Stationery
6. Ruler

Data collection tools based on the techniques used in this study are observation sheets and observation guides.

The materials used in this study are:

1. Kale sprouts

The population in this study was 80 kale sprouts. And the sample in this study was 16 polybags, each planted with 5 kale sprouts.

2. Compost fertilizer
3. Trichoderma sp.

Researchers used 3 different compositions, where the composition is as follows:

- 1) Using 45 g Trichoderma sp. and 400 g compost fertilizer
- 2) Using 50 g Trichoderma sp. and 500 g compost fertilizer
- 3) Using 55 g Trichoderma sp. and 450 g compost fertilizer

Data processing and analysis

The data that has been obtained after conducting the research is collected and then analyzed in tabular form with qualitative methods. The use of qualitative methods aims to analyze the data to find the focus for answering research problems precisely and accurately.

FINDING AND DISCUSSION

Finding

After conducting research and collecting data by observing the height of the stem and the number of leaf blades on kale plants, a table containing data on stem height and the number of leaf blades on kale plants has been presented. The research results can be seen in Table 4.1 below.

Table 1. Stem Height

Treatment	Week			
	Week 1(cm)	Week 2 (cm)	Week 3 (cm)	Week 4 (cm)
P0	4,85	4,45	6,50	7,85
P1	5,35	4,20	5,45	6,60
P2	6,40	5,20	6,83	8,20
P3	5,73	5,43	6,15	7,63

Based on table 4.1 above, it can be seen that, in the first week, the average stem height was P0 4.85 cm, P1 5.35 cm, P2 6.40 cm, and P3 5.73 cm; the average stem height in the second week was P0 4.45 cm, P1 4.20 cm, P2 5.20 cm, and P3 5.43 cm; and the average stem height in the third week was P0 6.50 cm P1 5.45 cm P2 6.83 cm P3 6.15 cm, the average stem height in the fourth week P0 7.85 cm P1 6.60 cm P2 8.20 cm P3 7.63 cm.

So, it can be concluded that the highest average stem height is found in P2, with a stem height of 8.20 cm. In addition to observing stem height, researchers also made observations by observing the number of leaf blades on kale plants.

Table 2. Number of leaflets

Treatment	Week			
	Week 1	Week 2	Week 1	Week 4
P0	6,50	8,00	9,25	15,25
P1	5,75	10,50	11,50	17,25
P2	6,25	10,00	13,75	22,25
P3	6,00	9,25	10,25	21,00

Based on table 4.2 above, it can be seen that, in the first week, the number of leaflets was P0 6.50 cm, P1 5.75 cm, P2 6.25 cm, and P3 6.00 cm. The average number of leaf blades in the second week of P0 8.00 cm, P1 10.50 cm, P2 10.00 cm, and P3 2 kale plants (*Ipomoea reptans* F.) was determined by observing stem growth and the number of leaf blades. Giving *Trichoderma* sp. fungus affects the growth and development of kale plants (*Ipomoea reptans* F.). The results of this study are in line with the results of research conducted by Syamsul Rizal and Titik Desi Susanti with the title "The Role of *Trichoderma* sp. Fungi Given to the Growth of Soybean Plants (*Glycine max* L.)," which shows that the provision of *Trichoderma* sp. fungi affects the height of the stem in plants.

Discussion

This study was conducted to determine the effect of *Trichoderma* sp. fungus on the growth and development of kale plants (*Ipomoea reptans* F.). This research technique is a quantitative experiment using certain samples and considerations. The purpose of this study is related to the

growth and development of kale plants grown with compost fertilizer and three different mushroom compositions. According to Hasan, Andriani, Dhahiyat, Sahidin, & Rubiansyah (2017) land kale (*Ipomoea reptans*) is one of the plants that can be an alternative biofilter because it can absorb nitrogen in the form of ammonium (NH_4^+) and nitrate (NO_3^-). Kale (*Ipomoea reptans*) is included in the kingdom Plantae, division Spermatophyte, class Dicotyledonae, and family Convolvulaceae.

This is found in research conducted by Ware and McCollum (1980). Land kale (*Ipomoea reptans*) has the characteristics of greenish-white to purplish flowers and can only be harvested once (Narka, 2017). The classification of kale plants based on their taxonomy is as follows: (Widiyanto, 1991) Genus: *Ipomoea*; species: *Ipomoea reptans* Poir.

According to Hartarti et al. (2021) *Ipomoea reptans* (land kale) is one of the horticultural plants that has economic value, so it is developed in almost all regions of the archipelago. Efforts to increase kale production still continue to rely on improving soil fertility and using effective planting media to increase kale growth. The absorption of nutrients in the soil affects plant growth. Good soil conditions will provide good kale plant yields. This is in line with research (Fayza, Azizah, Syahri, Fadlurrahman, & Arifin, 2022).

The results showed that *Trichoderma* sp. fungus has an effect on increasing the growth and development of kale because *Trichoderma* fungi can reduce infections in plants and can increase plant production up to approximately 25%. The use of *Trichoderma* sp. can stimulate plant growth as a biological agent. *Trichoderma* sp. can also absorb and decompose nutrients in the soil, produce glycotoxin and viridian antibiotics to protect seedlings from disease attacks, and secrete glucanase and chitinase enzymes that can dissolve pathogen cell walls (Melysa, Fajrin, Suharjono, & Dwiastuti, 2013). It is explained that the definition of growth is a process of changing the size of plants due to the addition of cell size that reflects the growth process (Hartarti, Azmin, Andang, & Hidayatullah, 2019).

The success of plant growth can be seen in several aspects, one of which is the growth of stem height. This is in line with research conducted by Rizal and Susanti (2018) on the role of the *Trichoderma* sp. fungus in the growth of soybean plants. The difference in plant stem height is due to differences in the concentration of *Trichoderma* sp. given. *Trichoderma* sp. has a very large role in maintaining soil fertility and has the potential as an 'active compost' that can be used to increase and stimulate the growth of plant roots, stems, and leaves. The application of *Trichoderma* sp. has a very significant effect on increasing plant growth.

CONCLUSION

From this study, it can be concluded that the application of the *Trichoderma* sp. fungus affects the growth and development of kale plants (*Ipomoea reptans*). Kale that is given fertilizer with a mixture of *Trichoderma* sp. fungus is proven to increase the growth of kale plants. The most effective dose to increase the optimal production of kale is P2, which is a mixture of 50 g *Trichoderma* sp. fungus and 500 g compost fertilizer. The introduction of *Trichoderma* sp. has a positive effect on the growth and development of kale plants.

BIBLIOGRAPHY

Aminah, I. S., Rosmiah, Hawalid, H., Yuningsih, L., & Helmizuryani. (2020). Extension of kale (*Ipomoea reptans*) vegetable cultivation through hydroponic system in Alang Alang lebar urban village, Palembang City. *Altifani*, 46-52.

- Antara, I. M., Rosmini, & Panggeso, J. (2015). Effect of Various Doses of Antagonistic Fungi *Trichoderma* sp to control layufusarium oxysporum disease in tomato plants. *Agrotekbis*, 628-629.
- Fayza, H. N., Azizah, A., Syahri, A., Fadlurrahman, F., & Arifin, R. S. (2022). Cultivation of land kale planting by utilizing home yards. *LPPM*, 2-5.
- Fikri, M. S., Indradewa, D., & Putra, E. T. (2015). Effect of composting mushroom growing media waste on the growth and yield of land kale (*Ipomoea reptans* Poir). *Vegetalika*, 80-89.
- Fuazi, A. (2020). The Correlation of Means and Infrastructure Standards on Student Achievement. *Journal of Society Innovation and Development (JSID)*, 1(2), 001-006.
- Hartarti, Azmin, N., Andang, & Hidayatullah, M. E. (2019). Effect of coffee skin waste compost on the growth of panjanh bean plants (*Vigna Sinesis* L). *Biology*, 74-78.
- Hartarti, Azmin, N., Emi, C., Bakhtiar, Nasir, M., Fahrudin, et al. (2021). The effect of the addition of husk charcoal on the growth of land kale plants (*Ipomoea Reptans*). *Oryza journal of biology education*, 1-10.
- Hasan, Z., Andriani, Y., Dhahiyat, Y., Sahidin, A., & Rubiansyah, M. (2017). Growth of three fish species and land kale (*Ipomoea reptans* Poir) reared with aquaponic system. *Indonesian Ichthyology*, 176-184.
- HS, G., Taufik, M., Triana, L., & Asniah. (2014). Morphological Characteristics of *Trichoderma* spp Indigenous to Southeast Sulawesi. *Agroteknos*, 88-94.
- Ibrahi, A. (2024). The Teumatok Culture in Aceh Singkil. *JOURNAL OF ACEH STUDIES (JOAS)*, 1(1), 1-8.
- Johan, D. (2024). The Keuneunong Dating and Acehnese Society. *JOURNAL OF ACEH STUDIES (JOAS)*, 1(1), 21-30.
- Khodijah, N., R, A., Saputra, H., & Santi, R. (2022). Growth and yield of aquaponic kale treated with different types of foliar fertilizers and stocking density of catfish in a catfish-kale budikdamber system. *Cultivation*, 105-112.
- Kusuma, M. E. (2016). Effectiveness of *Trichoderma* sp Compost on the Growth and Yield of Setaria Grass (*Setaria spachelata*). *Tropical animal science*, 76-81.
- Kusuma, M. E. (2016, 2). Effectiveness of *Trichoderma* sp compost on the growth and yield of Setaria grass (*Setaria spachelata*). *Tropical animal science*, 5(2), 76-81.
- Kusuma, M. E. (n.d.). *Effectiveness of Trichoderma sp compost on the growth and yield of Setaria grass (Setaria spachelata)*. Kusuma.

- Lathifah, A., Kustantinah, & Soesanto, L. (2011). *Utilization of Trichoderma harzianum isolates as Layufusarium biological control agents in shallot plants*. Faculty of education, 87-94.
- Mayani, N., Kurniawan, T., & Marlina. (2015). Growth of land kale (*Ipomoea reptans* Poir) plants due to different doses of straw compost decomposed by goldfish mole. *Lentera*, 59-63.
- Melysa, Fajrin, N., Suharjono, & Dwiastuti, M. E. (2013). Potential of biological agents *Trichoderma* sp as control of *Fusarium* sp pathogen of strawberry (*Fragaria* sp). *Biotropika*, 179-181.
- Narka, I. W. (2017). The effect of residual application of organic, inorganic and biological fertilizers on the growth of kale plants (*Ipomoea reptans*). *Agrotechnology*, 11-33.
- Novianti, D. (2018). Propagation of *Trichoderma* sp fungus in several media. *Sainmatika*, 35-41.
- Novianti, D. (2018). Propagation of *Trichoderma* sp fungus on several media. *Scientific journal of mathematics and natural sciences*, 36.
- Novianti, D. (2018). Propagation of *Trichoderma* sp. fungus on several media. *Sainmatika*, 36-41.
- Nugroho, F. P., Tippe, S., & Swaramarinda, D. R. (2020). The Effects of Self-Efficacy and Self-Regulated Learning to Academic Achievement. *Journal of Society Innovation and Development (JSID)*, 1(2), 011-019.
- Oktapia, E. (2021). Growth response of cayenne pepper (*Capsicum frutescens* L.) plants to the application of *Trichoderma* sp. *Indobioscience journal*, 17-25.
- Rautaray, S., Ghosh, B., & Mittra, B. (2003). Effect of fly ash, organic wastes and chemical fertilizers on yield, nutrient uptake, heavy metal content and residual fertility in a rice-mustard cropping sequence under acid lateritic soils. *Bioresource technology*, 90(3), 275-83.
- Rizal, S., & Susanti, T. D. (2018). The role of *Trichoderma* sp fungus given to the growth of soybean plants. *Sainmatika*, 14-21.
- Rizal, S., Novianti, D., & Septiani, M. (2019). The effect of *Trichoderma* sp fungus on tomato (*Solanum lycopersicum*) plant growth. *Indobioscience*, 14-21.
- Rudi, D. A., Wijaya, T. S. I., & Murdani, T. (2021). Socio-Economic Correlation of Scavenger Community in Religious Life. *Journal of Society Innovation and Development (JSID)*, 3(1), 16-20.
- Seroja, A. (2019). Health Communication in Patient Handling at The Emergency Department of The General Hospital Dr. H. Yulidin Away South Aceh District. *Journal of Society Innovation and Development (JSID)*, 1(1), 6-10.
- Setyadi, Dedik, I. M., Artha, Nengah, I., Wirya, S., & Alit, G. N. (2016). Effectiveness of *Trichoderma* Sp. Compost on the Growth of Chili Plants. *National*, 21-30.

- Soetjiningsih, d. (1995). *Child Growth and Development*. Surabaya: Airlangga.
- Sofiari, E. (2009). Characterization of kale (*Ipomoea reptans*) silk variety based on individual testing guide. *Buletin Plasma*, 49-53.
- Sundari, A., Khotimah, S., & Linda, R. (2014). Antagonistic power of *Trichoderma* sp fungus against *Diplodia* sp fungus causing stem rot of siam orange. *Journal of Protobiont*, 106-110.
- Suroso, B., & Antoni, N. E. (2016). The effect of land kale (*Ipomoea reptans*) plant growth on biboost fertilizer and ZA fertilizer. *Agritop*, 756-762.
- Suyanto, A., & Irianti, A. T. (2015). Effectiveness of *Trichoderma* sp and Local Micro Organisms (Mol) as Decomposers in Improving the Quality of Natural Organic Fertilizers from Several Agricultural Crop Wastes. *Agrosains*, 1-7.
- Syamsul Rizal, T. D. (2018). The role of *Trichoderma* sp jamjr given to the growth of soybean plants (*Glycine max* L.). *Sainmatika*, 26-29.
- Ware, G., & McCollum. (1980). *Producing Vegetable crops*. The Interstate Inc.USA, 3-224.
- Widiyanto, E. (1991). *Growing land kale*. Sinar tani, 68-77.
- Zikrullah, M. (2023). GIS Implementation to Create a Map for Waste Container Sites in Banda Aceh, Indonesia. *Journal of Society Innovation and Development (JSID)*, 4(2), 0011-00144.