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The Effect of Trichoderma on The Growth and Yield of Red Chili Plants In Andisol

Vinny Pratiwi[1]*, Zaitun Ritaqwin[2], M.Azizi [3] Hanim Rahayuani Ratnaningsih[4]

[1] Universitas Islam Kebangsaan Indonesia, Indonesia
[2] Universitas Islam Kebangsaan Indonesia, Indonesia
[3] Universitas Islam Kebangsaan Indonesia, Indonesia
[4] Universitas Jenderal Soedirman, Indonesia

*Corresponding author. Email: zaitunritaqwin@gmail.com

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Abstract
Red pepper plants (Capsicum annum L.) are one of the most important horticultural commodities in Indonesia. One effort to increase the growth and yield of red pepper is by using biological soil fertilizers, namely Trichoderma, sp. Andisol is a type of soil with loose and fragile texture conditions, making this type of soil very easily carried away by rainwater, wind and landslides or experiencing erosion. This study aims to see the effect of Trichoderma sp on the growth and yield of red chili plants (Capsicum annum L.) on Andisol soil, which was carried out at the Experimental Garden of the Faculty of Agricultural and Animal Husbandry Sciences UNIKI and the UNIKI Faperta Laboratory, the study used a Randomized Block Design Factorial Pattern (RAK) 3 × 3 with 3 replications, so that it has 9 with a combination of treatments of 20 grams, 25 grams and 30 grams. The best growth of chili plants was found at a dose of 30 grams of Trichoderma and the best chili plant results were found at a Trichoderma dose of 25 grams.

Keywords: Red pepper, Trichoderma, Andisol, Chilli Growth

1. Introduction

Red pepper (*Capsicum annuum* L.) is a horticultural crop that belongs to the *Solanaceae* family [1}. Red pepper has high economic value and nutrition. The nutritional content contained in red pepper plants such as protein, fat, carbohydrates, calcium, vit (A and C) makes red pepper a commodity needed by the community for cooking ingredients [2]. The development of chili production predictions for the next five years is expected to increase with a growth rate of 3.03%, from 3.02 million tons in 2022 to 3.51 million tons in 2027. The estimated results between the production produced and the required consumption are still in excess so that there is a surplus of chili production. The development of the predicted results of the calculation of the chili balance from 2022 to 2027 with an average growth rate of 3.03%. Predicted in 2022 there was a surplus of 1.10 million tons, in 2023 a surplus of 2.52 million tons and until 2027 a surplus of 3.94 million tons [3].

The increasing demand for red pepper emphasizes farmers to produce red pepper in high quantities, in order to meet the needs of all consumers chili production can be done, among others,

through the expansion of planting areas. One of them is in the type of Andisol soil, Andisol soil is black, porous, contains organic matter and amorphous type clays, especially allophane and a little silica, alumina or iron hydroxide [4]. Andisol is essentially a fertile soil, especially those with rather low to high base saturation [5]. Soils with this texture can be a problem because the loose and crumbly texture conditions make this type of soil very easy to be carried away by rainwater, wind and landslides or erosion as well as less than optimal cultivation land conditions due to low soil fertility [6]. In general, farmers apply synthetic (inorganic) fertilizers in an effort to improve soil fertility, but the use of chemical fertilizers on the land can damage the soil structure (soil becomes hard) [7]. If not addressed properly, this can reduce red chili production. To improve soil fertility, one of them is by enriching the planting media using microbes. One of the microbes that are widely used is Trichoderma which is capable of symbiotic mutualism with roots and is not harmful to plants [8]. *Trichoderma sp*. is the most widely used antagonistic fungus for soil pathogen control [9]. The antagonistic properties of *Trichoderma* sp. can be utilized as an alternative in controlling pathogens that are environmentally friendly [10]. *Trichoderma sp*. fungus also helps plants absorb certain nutrients, especially phosphate [11]. This is because *Trichoderma sp.* has a role in increasing soil microbes that will accelerate the composting process and maintain soil fertility. Apart from being a decomposing organism *Trichoderma sp.* also functions as a stimulator for plant growth [12].

Based on the description and problems above, information about the use of Trichoderma fertilizer, especially in Bireuen Regency, is still limited, therefore it is necessary to conduct research to determine the optimum dose of Trichoderma fertilizer and objectives to be achieved in this study are to obtain information about the response of red chili plants to the application of Trichoderma in the planting media. The benefits of this research are to provide information obtained so that it becomes a reference for chili farmers, especially in increasing the yield of chili plants, and is also expected to increase the economic value of the community.

2. Materials and Methods

2.1 Location and time of research

The study was carried out from May to November 2024. This research conducted at the Experimental Farm of the Faculty of Agricultural and Animal Sciences of the Islamic National University of Indonesia and the Laboratory of Faperta UNIKI.

2.2 Tools and materials

The tools used in this study were hoes, soil sieves, paddles, marker stakes, stationery, plastic ropes, scissors, sacks, *autoclaves*, sugar plastics and 10 kg polybags. The materials used in this study were *Trichoderma Harzianum* species, obtained from the soil biology laboratory of Syiah University and 800 kg of Andisol soil from Bener Meriah Regency. The design used in this experiment is a 3 × 3 Non Factorial Randomised Group Design (RAK) with 3 replications, so it has 9 treatment combinations consisting of treatments: The first factor is *Trichoderma* (V) which consists of 3 levels: V_1 = 20 grams, V_2 = 25 grams V_3 = 30 grams.

From these factors, 9 treatment combinations were obtained, as follows: If the results of the F test show a significant effect, then the analysis continues with further tests using the Honest Real Difference test (BNJ) at the 5% level (BNJ $_{0.05}$). With the formula:

$$BNJ_{0.05} = q_{0.05}(p;dbA)\sqrt{\frac{KTA}{r}}$$

Description:

BNJ 0.05 : Real Honest Difference at 5% level

q0.05(p;dbA) : Standard Value q at 5% Level:number of treatments P and degree random free

p : Number of Treatments

KTA : Randomised Centre Square

r : Number of replicates

The soil used for planting chillies is Andisol, soil removal using a hoe by taking the top soil about 0-25 cm from the soil surface, the soil that has been sieved and cleaned of impurities and then the soil is put into polybags with 2 different sizes. Small polybags of 500 g for nursery and large ones of 10 kg for planting until harvest. Trichoderma spwas sown evenly in the planting hole when moving the chilli plants. Then covered with soil as much as the dose. Plant maintenance includes watering the plants, replanting, weeding and controlling plant pest organisms. The watering process is carried out twice a day, namely in the morning and evening. Replanting is done if there are plants that do not grow or die.

Harvesting was carried out at the age of 90, 95, 100, 105 and 110 days after planting which was marked by red coloured fruit. Harvesting is done by picking the fruit along with the stalk. Plant height measurements were taken when the plants were 15, 30 and 45 HST, plant height was measured from the base of the stem that had been marked to the tip of the highest leaf. Observations were made on sample plants in each polybag. Measurement of plant height using a meter, then the measurement results of sample plants were averaged in the observation table.

Measurement of stem diameter was carried out when the plants were 15, 30 and 45 HST using a push rod. The method is to place the vernier on the base of the stem that has been marked for measuring the diameter of the stem base.The number of leaves was calculated when the plants were 15, 30 and 45 HST by counting the number of leaves on each stem of the chilli plant. The number of primary branches was calculated when the plants were 45 HST by counting the number of primary branches on each plant. Observations were made at harvest time at the age of 90, 95, 100, 105 and 110 HST days after planting by counting the number of all red pepper.

3. Results and Discussion

3.1 Effect of Trichoderma on growth and yield of chilli plants in Andisol soil

The results of the analysis of variance showed that the effect of *Trichoderma* chilli had a very significant effect on the observation variable of stem diameter 15 HST and the number of fruits, and the results of the F test also had a significant effect on the observation variable of plant height 15 HST, stem diameter 30 HST and fruit weight per plant 110 HST.

1. Plant height (cm)

The results of the F test in the analysis of variance showed that *Trichoderma* had a significant effect on plant height at 15 HST and had no significant effect at 30 and 45 HST. The average plant height at 15, 30 and 45 HST on various treatments of *Trichoderma* chilli can be seen in Table 1.

Table 1.
Average plant height at 15, 30 and 45 HST on various treatments of *Trichoderma* Red pepper

Trichoderma (gram)	Plant Height (cm)		
	15 HST	30 HST	45 HST
20	5,64 a	11,01	22,49
25	7,91 b	11,77	24,21
30	7,85 b	13,11	23,14
BNJ 0.05	0,55	-	-

Table 1 shows that the average height of chilli plants at the age of 15 HST on *Trichoderma* 25 grams was higher but not significantly different from Trichoderma 30 grams and significantly different from *Trichoderma* 20 grams, at the age of 30 HST the height of chilli plants was higher in *Trichoderma* and at the age of 45 HST the height of chilli plants was higher in *Trichoderma* 25 grams although statistically not significantly different from other treatments. This statement is in line with [13], stating that *T. harzianum* is a soil fungus that plays a role in decomposing soil organic matter, where this soil organic matter contains several components of substances such as N, P, S and Mg and other nutrients needed by plants in their growth. *T. harzianum* functions to break down organic materials such as N contained in complex compounds, Nitrogen is used by plants in stimulating plant growth and giving green colour to the leaves. [14], states that T. virens also produces the hormone auxin in the form of IAA (Indole Asetic Acid) which plays a role in elongation of cells of plant roots, thus causing the occurrence of nutrient uptake to be wider and higher.

2. Stem diameter (cm)

The results of the F test in the analysis of variance showed that *Trichoderma* had a very significant effect on the diameter of the stem at the age of 15 HST and had no significant effect at 30 and 45 HST. The average stem diameter at 15, 30 and 45 HST on various *Trichoderma* treatments can be seen in Table 2.

Table 2.
Average plant diameter at 15, 30 and 45 HST on various *Trichoderma* chilli treatments

Trichoderma (gram)	Stem diameter per plant (cm)		
	15 HST	30 HST	45 HST
20	1,27 a	1,41	2,98
25	1,43 b	1,81	3,13
30	1,50 c	1,96	3,10
BNJ 0.05	0,04		

Table 2 shows that the average diameter of chilli stems at the age of 15 was highest in *Trichoderma* 30 which was significantly different from other Trichoderma, at 30 HST tended to be greater in *Trichoderma* 30, and at 45 HST tended to be greater in Trichoderma 25 grams, although statistically not significantly different from other *Trichoderma*. Compost enriched with *T. harzianum* can increase plant growth.

3. Number of leaves per plant (blade)

The results of the F test in the analysis of variance showed that *Trichoderma* chilli had no significant effect on the number of leaves at 15, 30 and 45 HST. The average stem diameter at 15, 30 and 45 HST on various Trichoderma treatments can be seen in Table 3.

Table 3.
Average number of leaves at 15, 30 and 45 HST in various treatments of *Trichoderma*

Trichoderma	Number of leaves per plant (blade)		
	15 HST	30 HST	45 HST
20 grams	6,47	8,77	19,70
25 grams	6,08	8,69	20,61
	6,67	9,25	21,55

Table 3 shows that the average number of chilli leaves at the age of 15, 30 and 45 HST which tends to be more found in *Trichoderma* 30, although statistically not significantly different from *Trichoderma*. It is suspected that local *Trichoderma* type 30 is able to compete with other *Trichoderma*. This is evidenced in several parameters on the growth of *Trichoderma* 30 competing with *Trichoderma* 25gram with a small difference in numbers. According to [15], that *T. harzianum* functions to break down organic materials such as N contained in complex compounds, Nitrogen is used by plants in stimulating plant growth and giving green colour to the leaves. One of the other studies that support these results was conducted by [16], the addition of *Trichoderma sp*. on grape plants increases plant growth and the number of leaves, and improves the quality of grapes produced. These findings are in line with the results of previous studies that in the treatment of 15 grams / plant also showed the highest average plant. In line with the results of research reported by [17], that from the results of measuring the average number of leaves from the treatment addition of *Trichoderma sp*. Indicates the addition of the number of leaves along with the increase in the concentration of *Trichoderma sp*. given with the highest results at 75 grams of *Trichoderma sp*./kg soil pellets which produced average number of leaves 15 strands, compared with number of leaves on control plants with only 8.75 leaves. Report [18], also supports the results of this study, showing that the application of 25 grams of *Trichoderma sp*./2 kg soil pellets has been able to increase the growth of plant height and the number of leaves on tomato (*Solanum lycopersicum*) plants.

4. Root Infection Analysis

The results of the F test in the analysis of variance showed that *Trichoderma* had no significant effect on root infection at 45 HST. The average 45 HST infection in various *Trichoderma* treatments can be seen in Table 4.

Table 4.
Average number of root infections 45 HST in various treatments of *Trichoderma* red pepper

Trichoderma (gram)	Root infection per plant 45 HST
20	75,42
25	80,00
30	70,50

Table 4 shows that the average root infection at the age of 45 HST is better found in *Trichoderma* 25 grams although statistically not significantly different from other Trichoderma. this is because *Trichoderma sp* is able to maintain soil fertility, *Trichoderma sp* if infecting plant roots it will help the absorption of certain nutrients, especially phosphorus [2]. In addition, colonies of *Trichoderma sp.* can enter into the root epidermis layer even more deep again which then produces or releases various substances that can stimulate the formation of the body's defence system in the plant so it is clear that this fungus is not pathogenic or parasitic for its host plants [19]. *Trichoderma sp*. also affects microorganisms in the soil so that the application of

Trichoderma sp. affects soil structure, soil binding capacity, water binding capacity and increases nutrient availability and reduces the threat of drought, improves soil aeration and soil micro air system, the result of which is seen in better plant growth [20].

5. Fruit weight per plant (g)

The results of the F test in the analysis showed that *Trichoderma* had a significant effect on the weight of fruit per plant. The average fruit weight per plant on various *Trichoderma* treatments can be seen in Table 5.

Table 5.
Average fruit weight per plant on various treatments of *Trichoderma* red pepper

Trichoderma (gram)	Fruit weight per plant (g)
	110 HST
20	38,71 b
25	54,53 c
30	31,88 a
BNJ 0.05	4,02

Notes: Numbers followed by the same letter in the same column are not significantly different at the 5% level (BNJ test 0.05)

Table 5 shows that the heaviest average weight of chilli fruit per plant was found in the treatment of *Trichoderma* 25 grams which was significantly different from the other two *Trichoderma*The same thing was found in research (21) which stated that the highest dose of *Trichoderma sp.* application also showed a positive effect on vegetative growth and generative development of plants and plant production. This is also supported by research (20) that the combination of planting media and the application of *Trichoderma sp.* showed a significant interaction on vegetative growth (height and stem diameter) and generative growth (number and weight of fruits/plant). The results of the study (2) showed that the application of *Trichoderma* sp. at the rate of 75 grams / polybag had a significant effect on the number of fruits per plant and fruit weight. (22) also reported that the use of *Trichoderma sp*. differed significantly on the height of chili plants aged 15, 30 and 45 days after planting, the number of fruits per plant, the weight of fruits per plant and the production of red chili fruit. These research results show the potential of using *Trichoderma sp.* in increasing plant growth and productivity. The mutual relationship between *Trichoderma sp.* and plants is mutualism.

6. Number of productive branches per plant (branches)

The results of the F test in the analysis of variance showed that *Trichoderma* had no significant effect on the number of productive branches 45 HST. The average number of productive branches 45 HST in various *Trichoderma* treatments can be seen in Table 6.

Table 6.
Average number of productive branches at 45 HST on various *Trichoderma* chilli treatments

Trichoderma (gram)	Number of productive branches per plant
	45 HST
20	5,14
25	6,04
30	5,61

Table 6 shows that the average number of productive branches at the age of 45 HST which tends to be more found in *Trichoderma* 25 grams although statistically not significantly different from other *Trichoderma*. According to (23) he number of primary branches is also related to the

ability of plants to utilise their genetic potential optimally if the growing environment conditions are in accordance with the requirements of plant growth in terms of nutrients, water and climate. Plant vegetative growth indicators become one of the measuring instruments to determine the growth process due to environmental influences or manipulation of the growing environment (treatment).

The results of the F test in the analysis of variance showed that *Trichoderma* had a very significant effect on the number of fruits per plant. The average number of fruits at 110 HST on various *Trichoderma* treatments can be seen in Table 7.

Table 7.

Average number of fruits on various treatments of *Trichoderma* red pepper

Trichoderma chilli (gram)	Number of pieces
	110 HST
20	14,00 b
25	16,41 c
30	11,75 a
BNJ 0.05	0,79

Table 7 shows that the highest average number of fruits per plant was found in *Trichoderma* 25 grams which was significantly different from the other two *Trichoderma*. This is thought to be an environmental factor that affects the number of fruits with *Trichoderma* treatment, this is in line with the results of research by (25), which states that high populations are due to adequate food or energy supply plus appropriate temperature, adequate water availability, and other ecological conditions that support plant growth and yield. The results of research by (26) reported that *Trichoderma sp*. also had a positive effect on the growth of vegetative and generative development of plants and crop yields.

4. Conclusion

Based on the results of the study, it can be concluded that the application of *Trichoderma sp*. positively affects the growth and yield of chilli plants. The dose of *Trichoderma* had a very significant effect on the diameter of the stem 15 HST, on the weight of wet stems 110 HST, on the number of fruits per plant 110 HST and the dry weight of fruits per plant 110 HST, the dose of *Trichoderma* also had a significant effect on plant height 15 HST, on the diameter of the stem 30 HST and the weight of fruits per plant 110 HST. The best chilli plant growth was found at a dose of 30 grams of *Trichoderma* and the best chilli plant yield was found at a *Trichoderma* dose of 25 grams.

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References

[1]. Rindani, M. 2015. *Kesesuaian lahan tanaman cabai merah di lahan jorong kota Kenagarian Lubuak Batingkok, Kecam*atan. *Harau, Kabupaten. Lima Puluh Kot Payakumbuh.* Nasional Ecopedon*, 2(2),* 28-33.

[2]. Thesiwati AS. 2019. *Pengaruh Pemberian Thrichoderma sp Terhadap Pertumbuhan dan Hasil Tanaman Cabai Merah (Capsicum annum L.*). Natural Science, *5(2)*, 810-816. DOI: 10.15548/nsc.v5i2.895

[3]. Badan Pusat Statistik. (2019). produksi cabai di Provinsi Aceh 2018. Aceh

[4]. Sholeha, N. 2018. *Aplikasi Vermikompos Dan Blotong Tebu Terhadap Sifat Kimia Tanah Kritis Dengan Indikator Pertumbuhan Tanaman Tomat (Lycopersicum Esculentum Mill.)*. (Doctoral dissertation, Universitas Brawijaya). http://repository.ub.ac.id/id/eprint/164939

[5]. Prijono, S., Hanuf, A. A., Saputri, J. Y., Khoirunnisak, A., Nurin, Y. M., & Yunita, D. M. 2021. *Pengelolaan Tanah di Kebun Kopi*. Universitas Brawijaya Press.

[6]. Putri Nurfadilah, S. (2022). *Pengendalian Erosi Dan Sedimentasi Di Sub-Sub Das Solo Hulu Desa Wonoharjo, Kecamatan Nguntoronadi, Kabupaten Wonogiri, Provinsi Jawa* Tengah (Doctoral dissertation, UPN" Veteran" Yogyakarta).

[7]. Suwardi, H. Wijaya. 2013. *Peningkatan produksi tanaman pangan dengan bahan aktif asam humat dengan zeolit sebagai pembawa. J. Ilmu Pertanian Indonesia*. *18(2*): 79-84.

[8]. Subhan, N. Sutrisno, R. Sutarya. 2012. *Pengaruh cendawan Trichoderma sp. terhadap tanaman tomat pada tanah andisol*. Berita Biologi. *11(3):* 389-400.

[9]. Dwiastuti, M.E., M.N. Fajri, Yunimar. 2015. *Potensi Trichoderma spp. sebagai agens pengendali Fusarium spp. penyebab penyakit layu pada tanaman stroberi (Fragaria x ananassa Dutch.)*. J. Hort. *25(4)*: 331-339.

[10]. Gusnawati, H.S., M. Taufik, L. Triana, Asniah. 2014. *Karakterisasi morfologis Trichoderma spp. indigenus Sulawesi Tenggara*. J. Agroteknos. *4(2*): 87-93. Doi: http://dx.doi.org/10.56189/ja.v4i2.211

[11]. Shah, M.,M. 2019. Trichoderma: The Most Widely Used Fungiside. Kano: Intechopen.

[12]. Lahati, B., Kaddas, F., Fatmawati, M. 2022. *Pkm Pelatihan Pembuatan Pupuk Biofungisida Trichoderma Sebagai Stimulator Pertumbuhan Tanaman Dikelompok Tani Lou Rai Kecamatan Pulau Ternate*. J-Abdi: Jurnal Pengabdian kepada Masyarakat, *2(3*), 4587-4592. https://doi.org/10.53625/jabdi.v2i3.3248

[13]. Marianah, L. 2013. Analisa pemberian *Trichoderma sp*. terhadap pertumbuhan kedelai. Balai Pelatihan Pertanian Jambi.

[14]. Castro, Ortiz, R.H.A., Cornejo, C.L., Rodriguez. M. and Bucio, J.L. 2009. *The role of microbial signals in plant growth and development*. Journal Plantsignaling & Behavior;*4 (8)*: 701-712.

[15]. Sepwanti,C., Rahmawati, M., Kesumawati, E. 2016. *Pengaruh Varietas Dan Dosis Kompos Yang Diperkaya Trichoderma Harzianum Terhadap Pertumbuhan Dan Hasil Tanaman Cabai Merah (Capsicum Annuum L.)*. Jurnal Kawista. *1(1*):68-74.

[16]. Martinez-Medina, A., Fernandez, I., Lok, G. B., Pozo, M. J., & Pieterse, C. M. J. 2016. *Shifting from priming of salicylic acid-to jasmonic acid-regulated defences by Trichoderma protects tomato against the root knot nematode Meloidogyn incognita*. New Phytologist, *212(2)*, 669–681.

[17]. Oktapia, E. 2021. *Respons pertumbuhan tanaman cabai rawit (Capsicum frutescens L.) terhadap pemberian jamur Trichoderma sp. Jurnal Indobiosains*, *3(1)*, 17–25. https://doi.org/10.31851/indobiosains.v3i1.5301

[18]. Septariani, D. N., Herawati, A., Mujiyo, M. 2019. *Pemanfaatan berbagai tanaman refugia sebagai pengendali hama alami pada tanaman cabai (Capsicum annumL.).* PRIMA: Journal of Community Empowering and Services, *3(1*), 1–9.

[19]. Esrita,E., Ichwan, B., Irianto, I. 2011. *Pertumbuhan dan hasil tomat pada berbagai bahan organik dan dosis Trichoderma. Jurnal Penelitain Universitas Jambi Seri Sains*, *13(2)*, 37–42 https://repository.unja.ac.id/id/eprint/35202

[20]. Kurniastuti, T., Puspitorini, P., Febrin, R. 2021. *Respon tanaman cabai rawit (Capsicum frutescensL.) terhadap aplikasi Trichoderma sp. pada beberapa media tanam*.Jurnal Ilmu-Ilmu Pertanian, *15(2*), 79-87.

[21]. Rizal, S., Novianti, D., Septiani, M. 2019. *Pengaruh jamur Trichoderma sp terhadap pertumbuhan tanaman tomat (Solanum lycopersicum L.).* Jurnal Indobiosains, *1(1)*, 14-21. https://doi.org/10.31851/indobiosains.v1i1.2297

[22]. Arsensi, I.2014. *Respon tanaman cabai merah varietas prabu terhadap penggunaan Trichoderma sp dalam mengendalikan penyakit layu fusarium*. Jurnal Dinamika Pertanian, *XXXIX (4)*, 153–158.

[23]. Fitria, E., Kesumawaty, E., Basyah, B. 2021. *Peran Trichoderma harzianum sebagai Penghasil Zat Pengatur Tumbuh terhadap Pertumbuhan dan Produktivitas Varietas Cabai (Capsicum annuum*

L.). Jurnal Agronomi Indonesia (Indonesian Journal of Agronomy*), 49(1),* 45-52. https://doi.org/10.24831/jai.v49i1.34341

[24]. Hanafiah, K. A. 2005. Dasar-dasar Ilmu Tanah. PT. Raja Grafindo Persada. Jakarta. 360 hal.

[25]. Balai Pengkajian dan Pengembangan Teknologi (BPPT). 2002. Biopestisida *Trichoderma sp*. Teknologi. Suara Merdeka. Edisi 25 Maret.