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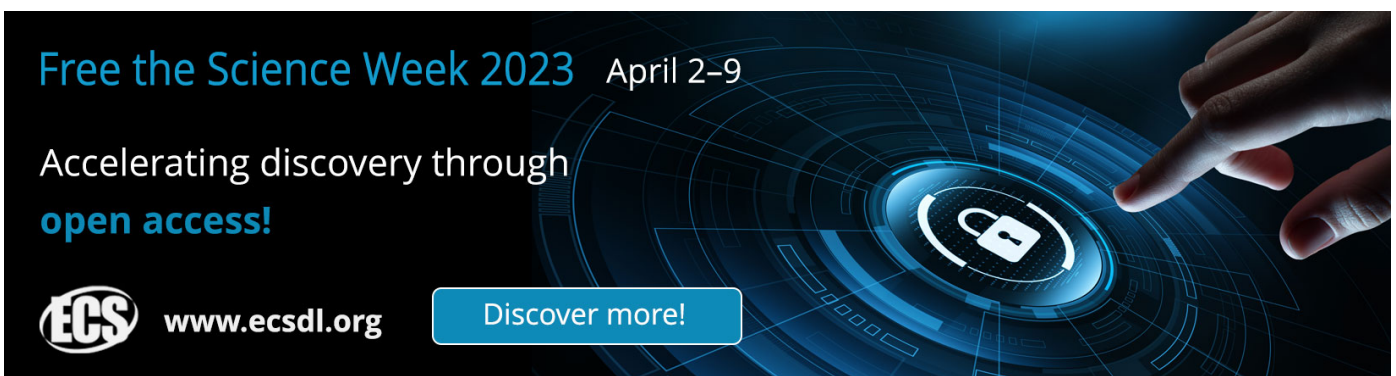
The effect of Biofertilizer Application and Shoot Pruning on the Production of chili plants on sandy media

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The effect of Biofertilizer Application and Shoot Pruning on the Production of chili plants on sandy media

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Abstract. Red chili as one of the important horticultural crops cultivated commercially, this is because in addition to chili has a fairly complete nutritional content, it also has a high economic value which is widely used both for household consumption and for the food industry. Therefore, it is necessary to apply intensification technology to increase chili production. These technologies include the application of Plant Growth Promoting Rhizobacteria (PGPR) to increase soil fertility and the application of shoot pruning to increase branching of chili plants. The purpose of this study was to determine the effect of PGPR and *Trichoderma* sp. And the treatment of shoot pruning on the production of red chili plants. This research was conducted at the Jember State Polytechnic Greenhouse, Summersari District, Jember Regency with an altitude of ± 89 masl. This study used a complete randomized block design (CRD) factorial consisting of 2 factors. The first factor was the provision of biological agents consisting of 4 levels of treatment. The second factor was the time for cutting shoots, consisting of 3 levels of treatment. The observation variables is productivity of chili. The results showed that branch pruning and biological agent treatment did not significantly increase the production of chili plants. However, there is a tendency for better treatment with pruning and without biological agents.

1. Introduction

Puger is the center of sandy land agribusiness in Jember Regency, Chili is a potential commodity to be developed in Puger because it has wide adaptability, short life and has high economic value with good market opportunities [1] [2] so this plant is considered very potential to be developed and cultivated by the Puger community.

Sandy soil in Puger District belongs to the Udipsamments soil type with characteristics characterized by sandy soil texture, very fast soil drainage, very shallow to moderate effective depth, very low salinity, low CEC, acidic to neutral pH, very low organic C, Total N is very low and phosphate is moderate [3] [4]. To increase tolerance and adaptability of plants to stress, including climate change, it is necessary to optimize the use of coastal land, one of which is the use of biological agents.

Biological agent is any organism that includes all species or varieties of insects, nematodes, protozoa, bacteria, fungi, viruses, microplasm, and other organisms which in all stages of development can be used as pest control in a process of plant cultivation and processing of agricultural products [5]. Biological agents that function as soil fertility enhancers are PGPR and *Trichoderma* sp.

PGPR can directly produce growth regulators and increase nutrient uptake by plants. Indirectly, rhizobacteria are associated with the production of metabolites such as antibiotics and siderophores, which can function to reduce the growth of phytopathogens [6].



Trichoderma sp. is one of the useful microorganisms and is a harmless symbiotic fungus, even mutually beneficial between soil-borne fungi and plant roots. *Trichoderma* sp. Acts as a root growth stimulant, because *Trichoderma* sp. Has the ability to increase plant growth hormones such as auxins and cytokinins [7]. In addition to functioning to improve the root structure of plants, *Trichoderma* sp. Also has a role as an antagonist fungus against pathogens. *Trichoderma* sp. can inhibit the growth of several disease-causing fungi in plants, including *Rigidiforus lignosus*, *Fusarium oxysporum*, *Rizoctonia solani*, *Sclerotium rolfsi* [8]

Increased production of chili plants can also be done through pruning which aims to streamline plant growth and development in a more productive direction. Another goal is to increase the efficiency of nutrient use [9]. Therefore, it is necessary to conduct research on the provision of biological agents and shoot pruning to find out how they affect the productivity of chili plants on sandy media.

2. Material and Methods

2.1. Material

Chili seeds, organic fertilizers, anogranics, mulch, PGPR, *Trichoderma* sp. Ruler, calipers, scissors, colling box, calipers, stationery, sprinkler, cameras, wires, hoes, buckets, analytical scales, gauges and knives.

2.2. Methods

This study used a complete randomized block design (CRD)

Factor I : Pruning times :

- P0 : Without Pruning
- P1 : Pruning 14 Day After Planting
- P2 : Pruning 21 Day After Planting

Factor II : Provision Biological Agents

- H0 : Control
- H1 : PGPR
- H2 : *Trichoderma* sp
- H3 : PGPR + *Trichoderma* sp

3. Result and Discussion

The results showed that branch pruning and biological agent treatment did not significantly increase the production of chili plants (Table 1). However, there is a tendency for better treatment with pruning and without biological agents (Figures 1 and 2).

Table 1. Lists of various types of PGPR enrichment and pruning on plant height and number of chili branches

Source of Diversity	Production
P	ns
H	ns
P x H	ns

Noted: P = Pruning, H = PGPR enriched, * = Significant, ** = Very Significant, ns = Non Significant
WAP = Week After Planting

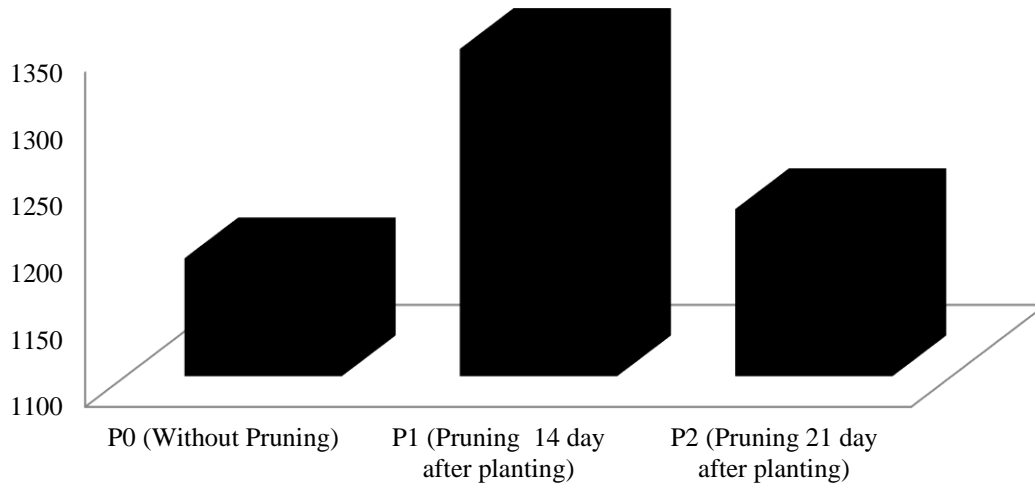


Figure 1. Effect of pruning on chili production

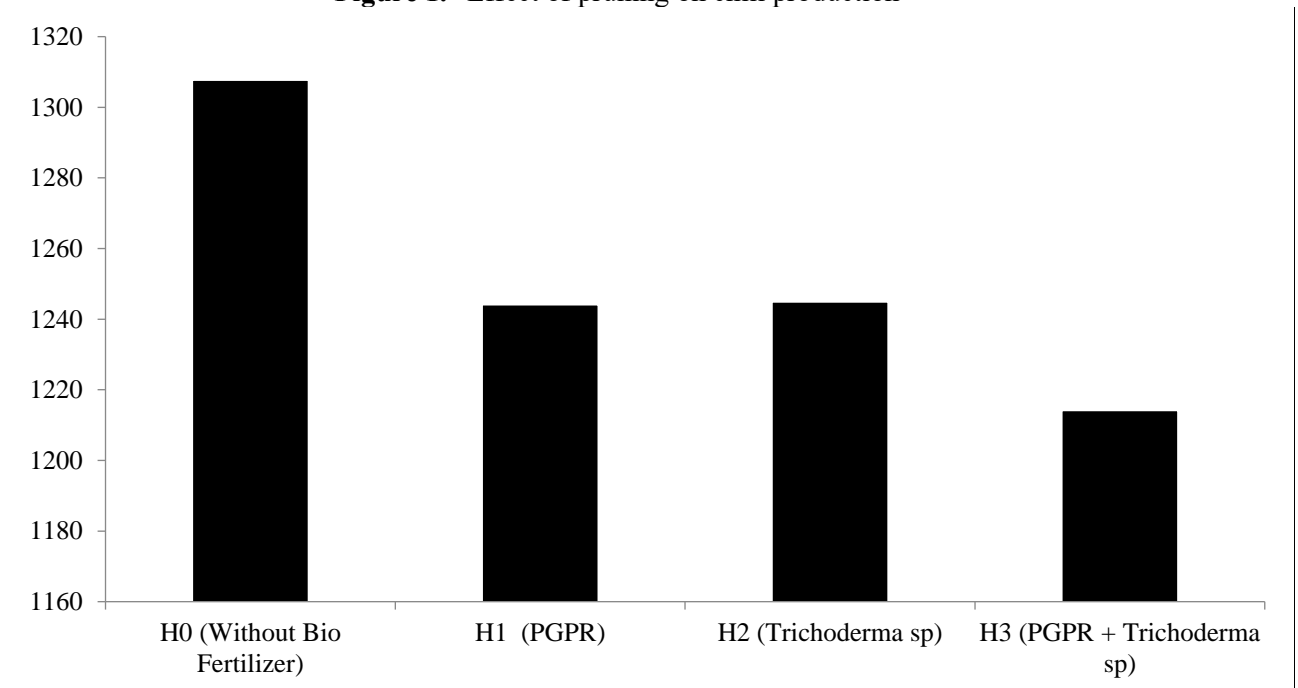


Figure 2. Effect of biological agents on chili production

The phenomenon of growth in the shoot or canopy is more dominant than the lateral or other parts which are influenced by the hormone auxin, causing the growth of lateral/axillary shoots to become dormant and stunted. These shoots will start their growth after the primary apical shoot meristem/principal becomes a permanent organ, such as a flower or flowering meristem [10]. This has an impact on the low production per plant. Therefore, to stimulate the growth of lateral shoots, the influence of apical dominance needs to be inhibited. According to [11] one way in which restricted lateral shoot growth can be increased is the removal of the apical portion of the shoot by cutting or pruning. Therefore, there is a tendency for better production, presumably because chili plants that have

been pruned vegetatively become inhibited so that the intake of photosynthetic products becomes focused on the needs of the generative process of chili plants.

Application of biofertilizers such as PGPR enriched with *Trichoderma* sp. is part of an effort to increase soil fertility. PGPR which has been enriched with *Trichoderma* sp. is expected to play a role in spurring growth plants and play a role in direct or indirect mechanisms through control disease to maintain plant productivity. The direct mechanism occurs through nitrogen fixation, phosphate solubilization, and production of siderophores, phytohormones, and 1-aminocyclopropane-1-carboxylate deaminase, while the indirect mechanism is through the production of antibiotics, hydrogen cyanide (HCN), and siderophores; ecological niche competition (environment growth/ecological niche), and induction of systemic resistance. The results that do not significantly affect the application of biofertilizers are thought to be because the successful use of beneficial living organisms in agriculture is not only influenced by the quantity of cells present in the inoculants, but is also influenced by energy sources, application of inoculants, environmental factors (temperature, rainfall). and methods of storing the product before use. This is also in accordance with the opinion of [12] that the life activities of soil organisms are strongly influenced by climate, soil and vegetation factors. In addition, the use of doses that have not met the needs is also suspected to cause the effect given to plants is not optimal because the number of microorganisms is not enough to significantly increase the productivity of the planting media which has an impact on plant growth.

4. Conclusion

The conclusion of this study is that pruning and application of biological fertilizers and their interactions have not been able to increase the production of chili plants. Therefore, it is necessary to do further on these two studies, because there is a tendency for better results to be found.

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References

- [1] Surtadi C A, and Wirasti 2017 *J Pengkajian dan Pengembangan Teknologi Pertanian* **20** 125-139
- [2] Supriadi D R, Susila A D, and Sulistyono E 2018 *J. Hort. Indonesia* **9** 38-46
- [3] Sukri M Z, Firgiyanto R, Sari V K, Basuki. 2019 *J Penelitian Pertanian Terapan* **19**142-146
- [4] Irawanata M H Y 2017 *Evaluasi kesesuaian lahan pasir pantai untuk Pengembangan tanaman wijen (Sesamum Indicum L.) di Kecamatan Puger Kabupaten Jember [Skripsi] Fakultas Pertanian (Yogyakarta Indonesia: Universitas Muhammadiyah Yogyakarta)*
- [5] Sopilena 2018 *Pengendali hayati dengan memberdayakan mikroba* Mulawarman University Press Samarinda 98 hal
- [6] Kloepper J W, Ryu C M, and Zhang S 2004 *Phytopatology* **94** 1259-1266
- [7] Syahri 2011 *Potensi Pemanfaatan Cendawan Trichoderma Spp. sebagai Agens Pengendali Penyakit Tanaman Di Lahan Rawa Lebak Balai pengkajian teknologi pertanian (BPTP) Sumatera selatan*
- [8] Herlina L, and Pramesti D 2009 *Penggunaan Kompos Aktif Trichoderma sp. dalam Meningkatkan Pertumbuhan Tanaman Cabai Semarang (ID) Universitas Negeri Semarang*
- [9] Tony H 2003 *Berkebun Hidroponik Secara Murah Penebar Swadaya Jakarta* 96 hlm.
- [10] Shimizu S S and Mori H, 2001 *J. Plant Physiology* **127**.
- [11] Wilkins Malcolm B 1984 *Advanced Plant Physiology*. Pitman Publishing Inc. London

- [12] Hakim N M, Nyapka Y, Lubis A M, Nugroho S G, Rusdi S M, Hong G, H Hailey 1986 *Dasar-dasar Ilmu Tanah* Universitas Lampung Press Lampung