Stater *Trichoderma* SP. as Biological Agent

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Abstract

Stater Trichoderma sp. as a biological agent. The implementation of this activity was carried out at the Rukun Sentosa Farmer Group, Pulau Atas Urban Village, Sambutan Sub District, Samarinda City. The purpose of this study is for farmers and students to understand the function of the Trichoderma sp. stater. both success in terms of manufacturing and how to apply it to plants, especially food plants. This is very profitable for farmers and students, because the raw materials used can be in the form of rice or corn, so that the cost of making it is fairly cheap, very environmentally compared to other chemical fertilizers. The manufacture of this stater Tricoderma sp. succeeded after four days the culture medium was green.

Keywords: Stater Tricoderma sp., biological agent, environmentally

1. Introduction

This research is the implementation or application of the use of biological agents as environmentally friendly pest management based on the concept of Integrated Pest Control. Integrated Pest and Disease Control (IPM) is the mandate of Law No. 12 (Concerning Plant Cultivation Systems) as the soul of plant protection, while the control of environmentally friendly Plant Disturbing Organisms is the mandate of Law No. 13 of 2010 concerning Horticulture. Biological control shows alternative controls that can be carried out without having to negatively affect the environment and its surroundings [1]Untung, 1996.

Dependence on chemicals (chemical fertilizers) of a toxic nature (insecticides, fungicides, bactericides) should be abandoned immediately. Unwise use of pesticides often causes health problems, environmental pollution and disruption of ecological balance and results in increased residues in farm products. Therefore attention to more environmentally friendly control alternatives is growing to reduce the use of synthetic chemical pesticides. One of the uses of biological control agents in the form of fungi that have the potential to be biological agents from pathogenic fungi is *Trichoderma* sp. that is preventive against pest attacks of plant diseases as well as a soil biological fertilizer and biofungicide. *Trichoderma* sp. In addition to being a decomposing organism, it can also function as a biological agent and stimulator of plant growth.

In terms of operations in the field, the IPM team has the availability of human resources and biological agent laboratory facilities that can be utilized in the development of biological agents and application at the farmer level. The application of biological control in the control of Plant Disturbing Organisms at the farmer level is still very lacking, , for this reason, it is necessary to take steps, including: Coordination and involvement of each stakeholder, especially in terms of their respective authorities and responsibilities regarding the use of biopesticides as an environmentally friendly pest management biological agent, socialization of biological control at the farmer level, opportunities and challenges [2] Regnault-Roger at al., 2008). IPM activities involving farmer groups who have agricultural land but in their farming business experience many obstacles to pest and disease attacks. Limited knowledge and weak information about the use of biopesticides as biological agents at the farmer level so that the control taken by farmers in controlling pests is more on the control of synthetic chemical pesticides.
Unwise pesticide control results in polluting the environment due to the presence of pesticide residues. Therefore, it is necessary to have a form of concern from related parties in both local governments and universities in an effort to increase food crop production. Nowadays, agriculture is a tranding topic because of the insistence on people's food needs and food imports. This is certainly a dilemma for community needs and the condition of natural resources that are increasingly being eroded. Productive agricultural land is also important to be supported by the availability of soil microorganisms so that metabolic processes in the soil can take place optimally.

The presence of microorganisms in the soil is influenced by several things such as nutrients, the impact of the use of chemical fertilizers and soil ecosystems. One of the efforts to maintain the soil ecosystem is by making and applying biological agent fertilizers such as *Trichoderma* sp. [3] Alison Stewart and Robert Hill. 2014.

Making biological agent fertilizer can actually be said to be easy and difficult. Easy to do when we already know the key to success of making fertilizer, , and it's hard when we don't have knowledge related to fertilizer. The standard

standard of success of biological agent fertilizer is actually at the sterile level of the tool and the use of clean water. It would be even better when the water used is brought to a boil first so that the water is free of pathogenic microbes [4] Dantje T. Simbel, 2010.

The existence of this study aims to make farmers and students understand the function of the *Trichoderma* sp Director. in terms of its manufacture to how it is applied to plants, especially panga plants. Fungus *Trichoderma* sp. is the most common fungus found in soils, especially soils with a high content of organic matter. Jamur *Trichoderma* sp. akan tumbuh dengan baik jika lingkungan menguntungkan. However, it has the ability to survive unfavorable environmental conditions by forming resistant structures, such as chlamydospora [5] Sudantha, 1997.

Objectives of the research were (1) to provide practical guidelines to farmers and students on how to make of *Trichoderma* sp.; (2) to observe the physical appearance of success in making *Trichoderma* sp.; and (3) to provide practical guidelines to apply the *Trichoderma* sp.;

Farmers and students can practice directly how to make it and how to apply it to plants, in addition, the manufacture of *Trichoderma* sp. This is very profitable for farmers and students, because the raw materials used can be in the form of rice or corn, so the cost of making it is fairly cheap. In addition, *Trichoderma* sp. very environmentally friendly compared to other chemical fertilizers.

2. Literature Review

The fungus can live both saprophytically and parasitically on other fungi, and development asexually by producing germinated conidium forms new individuals [5] Sudantha, 1997. The optimum temperature for the growth of this fungus is 15-35ºC, with its maximum temperature of 30-36 ºC. *Trichoderma* sp. belongs to the type of soil fungus, so that it is very easy to get in various kinds of soil, on the surface of the roots of various kinds of plants, can also be isolated from rotten wood or organic matter [6] Suwahyono dan Priyo, 2000.

Utilization of *Trichoderma* sp. benefiting, either directly or indirectly in aiding plant growth is a huge opportunity in preserving soil fertility and productivity. One of the components of the soil ecosystem is microbes, which play an important role in helping plant growth [7]Anonim, 2018).

Various living microbes are symbiotic with plants forming root nodules (*Rhizobium*), colonizing roots (rhizobacteria), or living inside plant tissues (endophytic diazotrophs) and in the soil. These microbes play a role in nitrogen tethering (*Rhizobium*, *Azotobacter*, growth hormone producers (*Bacillus*, *Pseudomonas*, *Flavobacterium*), phosphate solvents (*Bacillus*, *Pseudomonas*)[8]Nurasiah Djaenuddin dan Amran Muis, 2015.

Administration of the fungus *Trichoderma* sp. such as *T. harzianum* into the soil can accelerate the decomposition of organic matter, because this fungus can produce three enzymes, namely 1) the enzyme *celobiohidrolase* (CBH), which actively remodels natural cellulose; 2) *endoglyconase* enzymes that actively remodel dissolved cellulose; and 3) the active glucosidase enzyme hydrolyzes the cellobiose unit into glucose molecules.

This enzyme works synergistically, so that decomposition can take place faster and more intensively [9] Salma dan Gunarto, 1996). *Trichoderma* sp. known as a biocontrol agent fungus that has a wide host range. Pathogens that can be controlled by Trichoderma sp., include: *Rizoctonia solani, Fusarium oxysporum, Candida albicans, Armillaria mellea,* and *Pythium aphanidermatum* [10]Loekas, 2008).

The possibility of the production of growth-promoting hormone compounds by the fungus Trichoderma sp. based on the opinion of [3]Alison Stewart and Robert Hill. 2014, which states that the presence of hormones and plant growth regulators is not only obtained in higher plant tissues, but can also be synthesized at the microbial level.which states that the presence of hormones and plant growth regulators is not only obtained in higher plant tissues, but can also be synthesized at the microbial level. According to the results of the study [3]Alison Stewart and Robert Hill. 2014, fungus *Trichoderma* sp. able to promote plant growth as in cucumbers (*Cucumis sativus*), pepper (*Piper nigrum* L.), tobacco (*Nicotiana* sp.), and tomatoes (*Lycopersicum esculentum* L.)

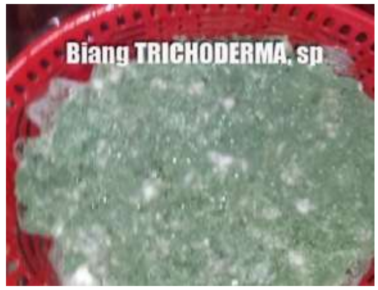

Figure 1. The culprit of *Trichoderma* sp. (Source: [7]Anonim, 2018)

Trichoderma sp. is a type of fungus that is known to kill other fungi and can avoid environmental pollution by chemical fungicides. How it works?: Spores of *Trichoderma* sp. can attach to the body of other fungi and then form hyphae (spore threads) that will bind and roll other fungi until the fungus dies.

Several types of pathogenic fungi that can be inhibited by breeding by *Trichoderma* sp.: *Rigdifarus lignosus* (white root fungal disease), *Fusarium oxysporum* (stem blight fusarium), *Rizoctonia solani* (midrib blight in corns), *Fusarium monilifome* (fusarium wilt disease), Stem rot disease of the fungus *Sclerotium rolfsii* as well as the fungus *Sclerotium rilfisil*[11]Rini Sriwati. 2017.

3. Methods

This research was carried out at the Biological Agent Manufacturing Clinic of Banyusari in Sambutan sub-district, Jalan Sindang Sari Pulau Atas Samarinda. This clinic was subordinate of the Food Crop Protection and Horticulture Jl. PM. Noor No.7A, Sempaja South, North Samarinda, Samarinda City, East Kalimantan.

Materials used in the manufacture of stater *Trichoderma* sp. is: rice 2 kg, white sugar 200 grams, alcohol 70%, isolate/inoculum *Trichoderma* sp., clean water, spritus. The tools used are: a large pot for steaming rice, and boiling water, a large basin for washing rice, a gas stove for cooking rice and boiling water, a large basin for washing rice, a gas stove for cooking rice and boiling water, a tray where to cool steamed rice, tablespoon for stirring/mixing rice with sugar, 0.5kg size sugar plastic for the culture place *Trichoderma* sp., a syringe needle size of 10 ml to inject the inoculum *Trichoderma* sp. into the plastic already containing rice and sugar, scales for weighing rice 100 grams, mini incubator for inoculum injection *Trichoderma* sp., fan for cooling the medium (rice).

The working procedure for making a stater *Trichoderma* sp. as follows:

1) Clean water boiled in a large saucepan until boiling. Rice is cleaned in a large basin 3 times with clean running water.
2) Then the rice is washed again with boiling water 2 times
3) After that, rice is steamed in a dandang until half cooked for about 30 minutes
4) Before wearing trays, pots and spoons should be sterilized by spraying 70% alcohol
5) Rice is then removed and cooled in a tray and then cooled with a fan in a sterile room After cooling, it is mixed with granulated sugar as much as 200 grams for 2 kg grams of rice that has been steamed and put in a plastic size of 500 grams as much as 100 grams and tied or distaples so that air does not enter
6) Then this medium is steamed again for 20 minutes and after that it is lifted and cooled in a tray with room temperature until it cools and to speed up wear with a fan
7) The media is cooled so that the inoculum *Trichoderma* sp. the one to be injected is not rotten/not finished
8) Inoculum injection Trichoderma sp. in the incubator and to distort the syringe by passing it over the lamp and our hands must also be sterilized with 70% alcohol
9) The substrate is put in an incubator for inoculation with *Trichoderma* sp. and than media containing 100 grams of sterilized rice that already contains sugar in 3 ways from above, left and right edges each inoculated with Trichoderma sp., as much as 3.3 ml
10) After completion of inoculation then the culture is placed in a tray for 4 days with a room temperature of 26-28ºC
11) Students / farmers who will each enter the mini laboratory of making stater *Trichoderma* sp. Should sterilize hands with alhohol 70 %
12) If successful manufacture of Stater *Trichoderma* sp. light green to dark green

13) The stater *Trichoderma* sp. can be applied as much as 100 grams for 10 kg of compost. *Trichoderma* sp. it may inhibit the growth of *Pyricularia oryza in vitro*.

4. Results and Discussion

Manufacture of stater *Trichoderma* sp. it works if during its manufacture from cleaning the material and the initial medium to the injection of the inoculum all must be sterile (starting from the place / container, the media and the tools. Farmers/students who inject *Trichoderma* sp. Inoculum should also be sterile..

Figure 2. Making a Stater *Trichoderma* sp. at Biological Agent Clinic in Sambutan, Samarinda

Figure 3. Participants who make the Stater *Trichoderma* sp.

Figure 4. Rice washing with clean water and hot water

Figure 5. Filtering rice after washing, then steamed in Dandang

Figure 6. Steaming rice with large Dandang for 30 minutes

Figure 7. Cooling the rice after steaming

Figure 8. Mixing sugar into rice that has cooled

Figure 9. Inject inoculum *Trichoderma* sp. in a mini-incubator

Figure 10. Results of making Stater *Trichoderma* sp. and it left for 4 days

Figure 11. Results of Stater *Trichoderma* sp. after 4 days, and the emerge of dark green color.

4.1 Proposed Improvements

The standard standard of success of biological agent fertilizer is actually at the sterile level of the tool and the use of clean water. It is even better when the water used is brought to a boil first so that the water is free of pathogenic microbes. There are actually many types of biofertilizers. One of them is *Trichoderma* sp. and Plant Growth Promoting Rhizobacteria (PGPR). There is fertilizer application that is carried out before planting.

5. Conclusion

1) The making of stater *Trichoderma sp*. will be guaranteed success if during its process from cleaning the material and the initial medium to the injection of the inoculum all must be sterile, including place/ container, the media, and the tools, as well as farmers/students who inject *Trichoderma* sp. inoculum. should also be sterile.
2) The level of cooking for the rice with dandang should not be too cooked.
3) Stater *Trichoderma* sp. which succeeded will be shown with the appearance of a light green color
4) The application of stater *Trichoderma* sp. was 100 grams of stater Trichoderma sp. for 10 kg of compost.
5) The making of inoculum from the fungus *Trichoderma* sp. can be taken from various other ingredients apart from rice, for example from potatoes.

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