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Effect of cow Manure and Antagonistic Fungus (Trichoderma sp.) on the Intensity of Rhizoctonia solani Kuhn's sheath Blight Attack on Paddy (Oryza sativa)

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ABSTRACT

This study aims to determine the effect of fertilizer application cattle pen and antagonistic fungus Trichoderma sp. in suppressing the intensity of attack of R. solani sheath blight on rice plants in greenhouses.pi, and the antagonistic fungus Trichoderma factor. The results of research in the laboratory showed that the macroscopic symptoms of R. solani were initially brownish-white hyphae, then changed to light brown and when the culture was old it would have a dark brown color, while microscopically it was known that this fungus does not have spores, fungal hyphae are insulated, at first transparent white then turns brown, and the branches form elbows. The results of the research in the greenhouse were that the application of cow manure had a significant effect on the attack intensity of R. solani, namely the highest attack intensity was in the treatment without fertilizer (control) of 9.82% and the lowest attack intensity was in treatment 2.5 of 4 .75%, while the administration of antagonistic fungi did not significantly affect the intensity of R. solani attacks, as well as the interaction between the two treatments did not have a significant effect. Symptoms of attack from R. solani in the field are white mycelium, and brownish-gray spots on the leaf midribs close to the soil surface, these spots then expand to form blight, if the attack continues the base of the stem will rot and the leaf sheaths wither.

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1. INTRODUCTION

Rice is a plant in the form of clumping grass. Ancient agricultural crops originated on two continents namely Asia and tropical and sub-tropical West Africa. Historical evidence shows that rice cultivation in Zhejhiang (China) began in 3,000 BC. Apart from China and India, some areas of origin of rice are Northern Bangladesh, Burma, Thailand, Laos and Vietnam. The centers of rice cultivation in Indonesia cover the islands of Java, Bali, Madura, Sulawesi and Kalimantan.

In 1992 the harvested area of rice reached 10,869,000 ha, with an average yield of 4.35 tonnes/ha/year. The production produced by rice plants is rice. Rice is a staple food for the majority of Indonesia's population whose level of needs continues to increase, but the number of requests cannot be fulfilled (Adjid, 1999). One of the causes of the decline in rice production is sheath blight caused by Rhizoctonia solani.

Sheath blight disease caused by the fungus Rhizoctonia solani can result in a yield reduction of up to 20% if the disease progresses to the flag leaf (Kadir and Moeljopawiro, 1986). Colonies of Trichoderma sp. grows rapidly within 5 days, on PDA media with a temperature of 25 °C colonies will appear white hyphal threads. The conidia formed are scattered with a greenish-blue to greenish-yellow color which is sometimes in the form of concentric circles (Anonymous, 2003). Sheath blight develops well, especially in irrigated paddy fields both in the rainy and dry seasons.

Sheath blight does not cause problems in dry land. Sheath rot in rice plants is caused by the fungus R. Solani (Thanatephorus cucumeris) which microscopically has the characteristics of a fungus that does not form spores, insulated fungal hyphae, initially white and later turns brown. The branches form a right angle to each other and the branches are notched at the base (Semangun, 1991).

This fungus spreads and persists by forming sclerotia. Sclerotia are formed mainly to overcome critical conditions, such as unavailability of nutrients, extreme temperatures and so on. Factors that influence the development of sheath blight are plant variety, plant density, fertilizer and sanitation.

The use of the antagonistic fungus Trichoderma harzianum is known to be able to control various root pathogens such as Rhizoctonia solani (Sugianto, 2000). To avoid environmental pollution due to the use of fungicides which are likely to be used to control these pathogens, it is necessary to search for biological control agents capable of inhibiting the growth of Rhizoctonia solani. Trichoderma sp. and Gliocladium sp.

The use of solid cow manure is an alternative because considering the condition of agriculture in recent times, which uses a lot of inorganic chemicals in the production process, this causes environmental damage and decreases land productivity. In addition, the microorganisms in cow compost are also useful as substrates. for antagonistic fungi so as to increase the ability of Trichoderma sp. in antagonizing Rhzoctonia solani. The effect of excess nitrogen fertilizer will get worse if nitrogen fertilizer is not balanced with other types of fertilizers such as Phosphorus (P) fertilizer and Potassium (K) (Kranz, 1977). Cow manure contains 40% N, 20% P2O5 and 10% K2O4. Cow manure is a cold fertilizer that decomposes slowly so heat is not formed, because the organic matter can decompose completely (Budiono, 2003).

2. METHOD

2.1 Types of research

The research method used in this study is the experimental method. The experimental method is a form of observation under artificial conditions, where these conditions are created and regulated by the researcher. That is, basically conducting an experiment to see the results, and the results of the experiment will confirm how the causal position is between the variables being investigated.

2.2 Research variable.

The observed variables were the morphology of R. solani Kuhn and Trichoderma sp on the shape, color and size of the colonies on PDA media and the effect of morphology on the symptoms and intensity of R. solani attacks on rice plants.

2.3 Research design

The experiment was also carried out in a greenhouse by planting rice in polybags. This experiment used RALF (Completely Randomized Factorial Design) and there were 20 treatments with 2 factors, namely the cow manure dose factor, and the Trichoderma antagonist fungus factor. Each treatment was repeated 3 times.

2.4 Sampling location

The study used samples of morphological isolation of R. solani and Trichoderma sp cow manure related to rice plants.

2.5 Time and Place of Research.

This research was carried out at the Laboratory of Plant Diseases and the greenhouse of the Department of Plant Pests and Diseases, Universitas Brawijaya from March to July 2006.

2.6 Tools and Materials

The tools used were Petri dishes, autoclaves, ovens, binocular microscopes, glass objects, cover glass objects, inoculating needles, Bunsen, scales, haemocytometers, scissors, tweezers,

cork borer, bottles of sterile media, injections, laminar air flow, trays. plastic, sprayer and 100 ml measuring cup.

The materials used were isolates of Rhizoctonia solani, Trichoderma sp. isola, streptomycin, rice seed variety IR 64, solid cow manure, PDA media, 70% alcohol, bayclin, sterile tissue, sterile aquadesh, spirits, soil media and polybags.

2.7 Research procedure

Isolation of pathogenic fungi and antagonistic fungi was then carried out to obtain the isolation of Trichoderma sp. by taking soil samples around the rice plantations. After obtaining the soil sample, isolation of Trichoderma sp. using the dilution plate method, namely 1 gram of soil is put into a test tube then added 10 ml of aquadesh and shaken until homogeneous and the test begins with the preparation of planting media and seeding and preparation of suspensions of R. solani and Trichoderma sp as well as the effectiveness of antagonists against sheath rot disease on rice plants.

2.8 Data analysis.

Data obtained from observations were tested using the F test with an error rate of 5%. If the data shows a significant difference, continue with the BNT test with an error rate of 5%.

3. RESULTS AND DISCUSSION

3.1 Research result

3.1.1 The isolation results of R. solani and Trichoderma sp.

The R. solani mushroom isolates used in this study were isolated from diseased midribs of rice plants suspected of being attacked by R. solani. Taken from farmer's agricultural land in the Sumbersari area, Malang.

The pure culture of the R. solani mushroom from the isolation results on PDA media has the characteristics that initially it is brownish white, then turns light brown and when the culture is old it will turn dark brown. Meanwhile the isolated Trichoderma sp fungus obtained from the soil around the roots rice plants found 5 isolates of Trichoderma sp. The 5 have different colony morphology from one another.

3.1.2 Antagonist test results in the laboratory

From the isolation of Trichoderma sp. on the soil around the roots of the rice plants, 5 isolates of Trichoderma sp were obtained. The results of the analysis of variance of the 5 isolates of Trichoderma sp. Against R. solani in observation 1 to 5 after inoculation (hsi) showed that the administration of the 5 antagonist fungi (Trichoderma sp.) had a percentage of inhibition that was not significantly different on the development of R. solani in the laboratory. It is suspected that the isolate of Trichoderma sp. used had the same ability to inhibit R. solani even though the isolates used were different.

Based on the results of the antagonist test, the Trichoderma isolate selected for use in future studies was Trichoderma II isolate. This is because Trichoderma II isolates have a greater inhibition percentage than other Trichoderma isolates, namely 57.778%. While the average inhibition percentage of Trichoderma sp. against R. solani

Table 1. The average percentage of inhibition of Trichoderma sp. on the growth of R.solani, at 5 dai.

No	No Isolate Trichoderma sp.	drag
1	Trichoderma sp. I	54,337
2	Trichoderma sp. II	57,778
3	Trichoderma sp. III	49,964
4	Trichoderma sp. IV	49,498
5	Trichoderma sp. V	51,003

Note: Numbers followed by the same letters in the same column indicate not significantly different in the 5% BNT Test.

3.1.3 Test for Antagonism in a Greenhouse.

Greenhouse testing with attention to several changes during testing such as the initial symptoms of R. solani attack on rice plants was that there was white mycelium, and there were brownish gray spots on the leaf sheaths close to the ground surface and based on the results of the analysis of the intensity of R attack solani on rice plants in the greenhouse at 0-60 hsi observation rice plants still did not show symptoms of R. Solani attack.

Table 2. The average percentage of attack intensity of R. solani in greenhouses on the 1st observation is at 0-30 dai.

Fertilizer treatment	Mold			
	0ml	50ml	100ml	150ml
0 tonnes/ha	0.707	0.707	0.707	0.707
2.5 ton/ha	0.707	0.707	0.707	0.707
5 tonnes/ha	0.707	0.707	0.707	0.707
7.5 tonnes/ha	0.707	0.707	0.707	0.707

Note: The data obtained is tested for transformation with a logarithmic transformation.

Based on the results of the analysis of various intensity attacks of R. solani on rice in a greenhouse at 60-90 hsi, the application of cow manure, administration of antagonistic fungi, as well as interactions between the two did not have a significant effect on the intensity of attack of R. solani on rice plants at home glass

3.2 Discussion

The results of isolation from the fronds of diseased rice plants suspected of being attacked by R. Solani. taken from farmers' agricultural land in the Sumbersari area, Malang. The pure culture of the R. solani fungus from the isolation results on PDA media has the following characteristics, namely initially brownish white, then turns light brown and when the culture is old it will turn dark brown. Pure culture only reaches a maximum area in a 9 cm Petri dish after the culture is 4-5 days after inoculation at the temperature, humidity and light conditions in the laboratory. A pure culture of Trichoderma I on PDA media has the following characteristics, namely initially the hyphal threads were white, then spread to form circles with a light green to yellowish color.

The cultures do not show concentric circles but irregular circles. Pure cultures only reach the maximum area in a 9 cm petri dish after the culture is 4-5 days old after inoculation in the laboratory. Microscopically, Trichoderma I has hyaline, upright, and branched conidiophores. The fialids are short and thick. Conidia are hyaline, globose or subglobose, and single. This is in accordance with the anonymous opinion (2003) which states that colonies of Trichoderma sp. grow rapidly within 5 days on PDA media with a temperature of 250 C with white hyphae threads and form concentric circles that spread with a greenish, light green to dark green color. Barnett (1969) stated that microscopically Trichoderma sp. It has the characteristics of hyaline conidiophores, upright, branched, single or grouped fialids.

Against R. solani in observation 1 to 5 after inoculation (hsi) showed that the administration of the 5 antagonist fungi (Trichoderma sp.) had a percentage of inhibition that was not significantly different on the development of R. solani in the laboratory (Table. It is suspected that Trichoderma isolates sp. sp. used has the same ability to inhibit R. solani although the isolates used are different. Based on the results of the antagonist test, the Trichoderma isolate chosen for use in future studies is Trichoderma II isolate. This is because Trichoderma II isolate has a higher percentage of inhibition greater than other Trichoderma isolates, namely 57.778%, while the average inhibition percentage of Trichoderma sp.

4. CONCLUSION

Based on the results of the study, it was concluded that all the isolates tested were able to inhibit the growth of R. solani mushroom colonies on PDA media, although the inhibition was weak and in the antagonist test in the greenhouse, the application of cow manure had a significant effect on the intensity of R. solani attacks, while the administration of antagonistic fungi Trichoderma sp. did not have a significant effect on the attack intensity of R. solani, as well as the interaction between the administration of cow manure and antagonistic fungi did not have a significant effect on the intensity of R. solani attack on rice plants in the greenhouse. At each increase in the application of N (ZA) fertilizer with a Kw/Ha dose it will speed up.

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It is necessary to carry out further research on the effective dose of antagonistic fungus and the dose of cow manure that can inhibit the intensity of R. solani attacks.

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