CONTROL OF FUSARIUM WILT DISEASE IN ONION PLANTS (*Allium Ascolonicum*) USING TRICHODERMA BIOFUNGICIDE

Diding Rachmawati[1], Eli Korlina[2] and Baswarsiati[3]

[1,2,3] Agriculture Institute for Assesment Technology Jawa Timur. Jl Raya Karangploso Km. 4 Malang
Email: didingracmawati@gmail.com

ABSTRACT

One of the obstacles by farmers at each planting season is the high pests and diseases, but the control of pests and diseases is done using chemical pesticides. It is therefore necessary to find an alternative to chemical pesticides by using biopesticides. The assessment carried out in the laboratory of Pests and Diseases IAAT East Java to create Trichoderma powder. Assessment of field experiments conducted in the garden Karangploso Starting in January-May 2014, varieties Super Philip, a randomized block design with five treatments, each treatment was repeated three times, the treatment consists of (A) Trichoderma powder dose of 1 g / l , (B) Trichoderma powder dose of 2 g / l , (C) Trichoderma powder dose of 3 g / , (D) Pro chip the recommended dose (5g / 40 l) , (E) Controls. The assessment aims to the effectiveness of Trichoderma powder doses in controlling fusarium wilt. Results showed that root length, number of tillers per hill and wet weight per plot obtained the highest in treatment C (Trichoderma powder dose of 3 g / l) respectively by 9.15 cm and 8.63 kg 12.16 tillers, Trichoderma powder treatment dose 1-3 g / l had no effect on plant height and leaf number equivalent to the Pro chip application the recommended dose (5g / 40 l , the percentage of fusarium wilt disease attacks the lowest obtained in treatment C (Trichoderma powder dose of 3 g / l).

Keywords

Onion, fusarium wilt, trichoderma biofungicide

INTRODUCTION

To reduce the environmental pollution caused by the use of fertilizers and pesticides in excess need to develop a system of farming by utilizing the existing natural resources wisely and consider all aspects that exist to preserve nature, so it can happen a sustainable agricultural systems.

Sustainable agricultural systems can be developed by applying environmentally friendly technologies by utilizing the existing natural resources. One of the efforts towards sustainable agricultural systems is the cultivation technology using biological agents as biopesticides for pest management and disease. According Budianto (2002) Indonesia has much potential in terms of development of organic pertaniak, because it is supported by the availability of land, bio-diversity and abundance of sunshine.

Onion is one of the leading commodity in East Java , with the development of planting area fluctuates widely from year to year , this is caused by

several factors, such as climatic conditions , price and attack of plant pests. Onion farming is have a high risk because of the many obstacles that must be overcome to save the production.

One of the problem by farmers at each planting season is the high pests and diseases , but the control of pests and diseases is done using chemical pesticides . It is therefore necessary to find an alternative to chemical pesticides by using biopesticides . Pest problems in the main onion crop is fusarium disease , which causes the plants can not perfectly, because the root or base of tubers affected fungus Fusarium , which over time will become rotten tubers.

Visual symptoms are yellowing leaves and tend to be twisted (rotated). Plants are very easily uprooted because of impaired root growth and even rot . , The cause of the disease is the fungus *Fusarium oxysporum* that is able to survive long in the soil without host plants , because it can form chlamydospores . Pathogens can spread through irrigation water from contaminated soil , infections occur at the end of the tuber that occur in the crop will carry over until the tubers are stored in the warehouse (Udiarto , et al 2005).

Chemical pesticides have not been able to solve the problem of fusarium wilt in the field. Over the past two decades has been a lot of research into fusarium wilt control using biological agents (Widodo , 2004) .Trichoderma spp . Is one of the microorganisms that already exist in nature and can be used as a biocontrol agent . Its presence can play a role in the control of soil borne pathogens such as fusarium wilt , as well as decomposers because the microorganisms have the ability to decompose organic materials (Korlina et al., 2006), especially natural materials containing cellulose and lignin is high (Mala , 1994). Trichoderma spp success in controlling soil borne pathogens especially widely reported , both carried out in the laboratory and greenhouse.

The assessment aims to the effectiveness of Trichoderma powder doses in controlling fusarium wilt.

MATERIALS AND METHODS

The assessment carried out in the laboratory of Pests and Diseases IAAT East Java to create Trichoderma powder. Assessment of field experiments conducted in the garden Karangploso Starting in January-May 2014, varieties Super Philip, appropriate crop management recommendation. Beds measuring 1.5 mx 10 m spacing of 15 cm x 20 cm and 1 meter distance between beds . Provision of basic organik fertilizers at a dose of 10-15 t / ha. An organic fertilizer SP - 36 as much as 300 kg / ha are given by way of sprinkled evenly on each bed. The first fertilization is done by sprinkling evenly NPK fertilizer as much as 50 kg / ha and ZA as much as 100 kg / ha during the 15 days after planting . The second fertilization is done age 25-30 days after planting, using KCl as much as 100 kg / ha and 300 kg Urea / ha. Supplementary fertilization is done by putting fertilizer on the array between the rows and buried and covered with soil, the plants immediately watered when the soil begins to dry . Applications Trichoderma by dranching in onion seedlings planted after the age of 1 day. Observations carried out extensive

attacks against fusarium wilt , another pest , plant growth and production of onion.

During the experiment the plants are maintained as well as possible include weeding , watering done once a day in the morning or evening , since planting to harvest and control of plant diseases by using fungicides.

Experiments using a randomized block design (RBD) with five treatments, each treatment was repeated three times, the treatment consists of:

(A) Trichoderma powder dose of 1 g / l
(B) Trichoderma powder dose of 2 g / l
(C) Trichoderma powder dose of 3 g / l
(D) Pro chip recommended dose
(E) Controls (no Trichoderma)

RESULTS AND DISCUSSION

The observation of the performance of the growth of the onion are presented in Table 1, plant height and number of leaves was not significantly different between treatments but significantly different from control, plant height ranged between 20.80 cm and 26.19 cm leaf number ranged between 25.95 to 33 , 33 strands. Number of tillers were significantly different between treatments, the highest number of tillers shown by treatment with Trichoderma powder application dose of 3 g / l as many as 12.16 tillers. While the application of Trichoderma powder treatment dose of 1 g / l and 2 g / l equivalent of Pro chip application the recommended dose (5g / 40 l). This is because Trichoderma spp. an antagonist fungus that is essential for biological control mechanism of control Trichoderma spp. the specific targets, rapidly colonized the rhizosphere and protect the roots from pathogenic fungi attack, accelerating plant growth and increase crop production (Arwiyanto, 2003).

Table 1. Average High Crop , Leaf Number and amount of onion seedlings

Treatment	High Plant	Number of leaves	Number of tillers
A (Trichoderma powder 1 g/l)	23,85 b	30,00 b	10,0 b
B (Trichoderma powder 2 g/l)	24,89 b	31,10 b	10,5 b
C (Trichoderma powder 3g/l)	26,19 b	33,33 b	12,16 c
D (Pro Chip Soil recommendation)	25,01 b	31,28 b	10,5 b
E (control)	20,80 a	25,95 a	8,67 a

*) Figures in one column followed by the same letter are not significantly different at LSD test at confidence level 95%

Emerging disease in addition to fusarium is powdery mildew disease (Perenospora destructor). The two diseases appear when the onion plants aged two

weeks after planting. Fusarium wilt attack the highest contained in the control treatment that is equal to 7%, which was significantly different from the other treatments (Table 2). At the time of onion crop was 4 weeks after planting wilt attacks has decreased almost in all treatments except control. Powdery mildew disease is quite high at 68.32%, especially in the control treatment, but attacks can be overcome until 25 days old plants. In observation to 3 or 3 weeks after planting decreased the percentage of disease, it is due to be lifted affected plants wilt disease. Because biofungicides Trichoderma can destroy disease-causing pathogens or turn off the source of the development of the disease, prevent disease-causing pathogens form colonies (fused) and grow back into the soil, protecting the seed germination and plant roots from disease-causing infection (Harman, 2000)

Table 2. Size disease Fusarium attack (%)

Treatment	Observations treatment to		
	1	2	3
A (Trichoderma powder 1 g/l)	1,60 ab	3,00 a	2,33 b
B (Trichoderma powder 2 g/l)	1,06 a	3,00 a	1,33 ab
C (Trichoderma powder 3g/l)	0,53 a	1,00 a	0,33 a
D (Pro Chip Soil recommendation)	1,33 ab	2,66 a	1,00 ab
E (control)	3,47 b	6,33 b	7,00 c

*) Figures in one column followed by the same letter are not significantly different at LSD test at confidence level 95%

Harvesting is done when the onion crop has experienced a 80 % of lodging leaves and tubers are already evident appear above the soil surface . When connected between root length and wet weight obtained that treatment C (Trichoderma powder dose of 3 g / l) having an average wet weight of the highest per plot are as many as 8.63 kg , and the highest root length is equal to 9.15 cm , significantly different from the control treatment .While the application of Trichoderma powder treatment dose of 1 g / l and 2 g / l equivalent of Pro chip application the recommended dose (5g / 40 l) . (Table 3). Because Trichoderma has benefits facilitate the growth of plant roots , soil retain water longer and increase the water holding capacity of the soil , the soil becomes loose and can not be , good soil aeration , retention of nutrients by plants becomes easier , increase water absorption and mikroorganise improve life in the soil .

Table 3 . Root length , and wet weights per plot

Treatment	Root Length (cm)	Production per plot (kg)
A (Trichoderma powder 1 g/l)	7,30 ab	7,62 ab
B (Trichoderma powder 2 g/l)	8,23 ab	7,99 ab
C (Trichoderma powder 3g/l)	9,15 b	8,63 b
D (Pro Chip Soil recommendation)	8,40 ab	7,50 ab
E (control)	5,18 a	6,57 a

Root length , number of tillers per hill and wet weight per plot obtained the highest in treatment C (Trichoderma powder dose of 3 g / l) respectively by 9.15 cm and 8.63 kg 12.16 tillers. Trichoderma powder treatment dose 1-3 g / l had no effect on plant height and leaf number equivalent to the Pro chip application the recommended dose (5g / 40 l). The percentage of fusarium wilt disease attacks the lowest obtained in treatment C (Trichoderma powder dose of 3 g / l) .

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