

## The Implementation of *Mimosa Pudica* Root Extract for Anthracnose Disease On Red Chili to Increase Productivity

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**Abstract.** Red chili is one of the important horticultural crops, both for domestic consumption and export commodity. Referring to the Indonesian agricultural information sistem (2016), the national consumption of red chili increases 2 % annually. Problems that occur in the cultivation of red chili plants in Indonesia is a disruption of pests and diseases. One of the diseases found in red chili plants is anthracnose disease caused by the fungi *Colletotrichum sp* marked spots. To control this disease, farmers usually use liquid chemical fungicide which is sprayed on red chili fruit continuously. A permanent use of the chemical fungicides can lead to pathogenic resistance, environmental damage and is harmful to consumers' health. It means that we need to establish a sustainable agriculture of-which the developed products are not only renewable but also environment friendly. Therefore, in this research have a purpose to analyze the effect of *Mimosa pudica* root extract for anthracnose disease on red chili to increase farmers productivity. This research use method field study, which conducted on the chili land owned by farmer in Sukoharjo, Central Java. Which is done by giving *Mimosa pudica* root extract to the chili affected by anthracnose marked by spots, then compare after giving *Mimosa pudica* root extract. The study was conducted by spraying the extracts of *Mimosa pudica* root extract with concentration 0%, 25%, 50%, 75% and 100% (repeated 3 times) to the chilies. These results showed that the concentration of 25% was best result, proven by the results average spotting size before being given *Mimosa pudica* root extract is 2 cm then after being given *Mimosa pudica* root extract reduced to 1.3 cm. So the conclusion is *Mimosa pudica* root extract with concentration 25% can be an alternative vegetable fungicide to control anthracnose disease in red chili to increase productivity.

**Keywords:** Anthracnose, Chili, *Mimosa pudica*, productivity, spot size.

### INTRODUCTION

Red chili is one of the important horticultural crops, both for domestic consumption and export commodity. As we know the national need of chilies has been growing dramatically from year to year. Referring to the Indonesian agricultural information system (2016), the national consumption of red chilies increases 2 % annually. Recently, the demand of red chilies increases and makes this commodity becomes one of the potential plants to be developed in Indonesia. Problems that occur in the cultivation of red chilies in Indonesia is a disruption of pests and diseases. One of the diseases found in red chili plants is anthracnose disease caused by the fungi *Colletotrichum sp*. To control this disease, farmers usually use liquid chemical fungicide which is sprayed on red chili fruit continuously. According to Rusdiana (2014), 76% of farmers in coastal sand in Yogyakarta spray this chemical fungicide to anticipate pest attack on red chili plants. A permanent use of the chemical fungicides can lead to pathogenic resistance, environmental damage and is harmful to consumers' health. Therefore, an alternative method to control the disease is badly needed. In fact, currently Indonesia is dealing with the challenges of the 2030 SDGs number 2 namely overcoming hunger, achieving food security and improving nutrition, and encouraging sustainable agriculture. It means that we need to establish a

sustainable agriculture of-which the developed products are not only renewable but also environmentally friendly.

An alternative method for controlling the disease is vegetable fungicide. Yusuf et al. (2016) vegetable fungicides are fungicides whose active ingredients come from plants or parts of plants such as roots, leaves, stems or fruit. These materials are processed into various forms, including extracts or resins which are the result of taking secondary metabolite fluids from plant parts or plant parts burned for ashes and used as fungicides. The advantages of plant-based fungicides are easy to decompose residues, easily available materials and relatively cheap prices. One of the plants that can be used as a vegetable fungicide, one of which is the root of the *Mimosa pudica* in Indonesia called putri malu. According to Syaiful (2009) the abundance of *Mimosa pudica* in Indonesia is very much this thing because *Mimosa pudica* are a weed in the world of agriculture that grows wild on the side of roads, fields, and in open areas exposed to sunlight. Mycek et al. (2014) *Mimosa pudica* contain mimosan as an antifungal, which is classified as alkaloid which function to damage the cell wall of the fungus *Colletotrichum sp*. Alkaloids cause damage to cell membranes. Alkaloids will bind strongly with ergosterol to form holes that cause cell membrane leakage. This results in permanent damage to cells and cell death in fungi.

In this study, trying to apply the *Mimosa pudica* extract to the chili fruit that was requested anthracnose by applying the *Mimosa pudica* root extract to the chilli fruit still applied to the plant. The location of this research is in the area of Sukoharjo, Central Java. The information obtained from this study is expected to provide an overview of giving *Mimosa pudica* root extracts to chillies containing anthracnose disease, so increasing yields will significantly help increase the productivity of chilli farmers in Indonesia.

## MATERIALS AND METHODS

### Study area

The main ingredients used in the research are among others the *Mimosa pudica* root, 90% ethanol solution and aquades. The research method was carried out experimentally using the Completely Randomized Design (RAL). This study uses five treatments and three repetitions. The treatments were *Mimosa pudica* root as a control, *Mimosa pudica* root extract with concentrations of 25%, 50%, 75% and 100%.

### Procedures

#### *Making Mimosa pudica root powder*

*Mimosa pudica* root cleaned up immediately remove the dirt that clings later dried in a drying cabinet at 40°C until dry to avoid spoilage by bacteria or fungi, also more easily mashed to make powder. *Mimosa pudica* root already dry mashed into fine powder.

#### *Mimosa pudica root extraction*

*Mimosa pudica* root extraction was carried out at the Plant Pest and Disease Laboratory, Faculty of Agriculture, Sebelas Maret University, Surakarta. Extraction is done by maceration method *Mimosa pudica* root powder is extracted by maceration method for 24 hours with 90% ethanol solvent. During maceration immersion, the extract is stirred every 6 hours and allowed to stand for the next 18 hours (Pal, Datta, Basnett, Shrestha, & Mohanty, 2015). The filtrate distributed using Whatmann filter paper and then dried with a rotary evaporator at 50°C, 500 mmHg, then the remaining residue is removed. This process will produce a thick methanol extract with 100% content. The extract was stored at chilling temperature for further use. Then dilution is carried out to get the various concentrations needed.

#### *Making concentration Mimosa pudica root extract*

The concentration used was made by dissolving 5 ml extract in 20 ml aquadest for a concentration of 25%, 10 ml extract in 20 ml aquadest for a concentration of 50%, and 20 ml extract in 20 ml aquadest for a concentration

of 100%. The making of the *Mimosa pudica* root extract refers to the research of Anggraini, Hamidah and Moehammadi (2013), using the dilution formula  $N_1V_1 = N_2V_2$ . The study uses 3 concentrations with aquadest as the solvent extract.

#### *Giving Mimosa Pudica root extract to chili plants*

Furthermore, *Mimosa pudica* root extract on chili which has been affected by anthracnose disease. And carried out observations for 10 days after application (hsa) by looking at the symptoms of anthracnose, namely spots on the surface of chillies. The parameters observed were the percentage of disease severity based on the area of symptoms that appeared on the surface of chili before and after being given *Mimosa pudica* root extract. Chili fruit that shows symptoms of spots, tightly wrapped in clear plastic wrap and the symptoms that appear on the fruit are drawn with markers on a plastic wrap that wraps the chili. Then the plastic wrap that has drawn a broad symptom of the symptom area (cm) is calculated using millimeter block paper.

### Data analysis

The analysis used in this study was analysis of variance (Analysis of Variance) and continued with the Least Significant Difference Test (LSD).

## RESULTS AND DISCUSSION

**Table 1.** Distributes the mean diameter spots of the chili extracted with *Mimosa pudica* root.

Days to	0% (cm)	25 % (cm)	50% (cm)	75% (cm)	100% (cm)
1	1.5	2	1.8	0.9	1.1
2	1.5	2	0.9	0.9	1.1
3	1.5	1.8	0.9	0.9	1.1
4	1.5	1.8	0.9	0.9	1.1
5	1.5	1.6	0.9	0.8	1.1
6	1.5	1.6	0.8	0.8	1
7	1.5	1.5	0.8	0.8	1
8	1.5	1.5	0.5	0.7	1
9	1.5	1.3	0.5	0.7	1
10	1.5	1.3	1.4	0.7	1

**Table 2.** Distributes the diameter of the place on the chili fruit extracted with *Mimosa pudica* root by ANOVA analysis.

Source of Variation	SS	df	MS	F	Sig
Between Groups	5.224	4	1.306	28.5846	0.000
Within Groups	2.056	45	0.04568		

**Table 3.** Average decrease in diameter in anthracnose spot.

No	Treatment	Before treatment (cm)	After treatment (cm)	Diameter (cm)	Percent (%)
1	Control (0%)	1.5	1.5	0	0
2	Extract 25%	2	1.3	0.7	70
3	Extract 50%	1.8	1.4	0.4	40
4	Extract 75%	0.9	0.7	0.2	20
5	Extract 100%	1.1	1	0.1	10

### Discussion

*Mimosa pudica* root extract 0%, 25%, 50%, 75% and 100% able to support the growth and development of the fungus *Colletotrichum* sp in several studies. *Mimosa pudica* 25% root extract has the most effective ability in the growth of *Colletotrichum* sp. On approval without *Mimosa Pudica* root extract 0% showed no significant changes. To overcome *Mimosa pudica*, 25% root extract produces the best results, which is able to reduce the diameter of spots by 70% from an average of 2 cm to 1.3 cm. The 50% treatment also shows the amount of anthracnose spots of 40%, from an average of 1.8 cm to 1.4 cm. The 75% treatment also showed an anthracnose spot size of 20%, from an average of 0.9 cm to 0.7 cm. The 100% treatment also shows the amount of anthracnose spots of 10%, from an average of 1.1 cm to 1 cm.

Next, a prerequisite analysis is performed through a trial using One Way ANOVA analysis and followed by a Least Significant Difference - test (LSD). Based on the calculation method of data analysis using this method, it can test the One Way Anova test results from the mean data of spotting inter-agreement diameter showing  $p < .05$  ( $p = 0.05$ ) which means the difference is in accordance with the aid of *Mimosa pudica* root extract for each aid. Furthermore, the One Way Anova test results from the mean diameter data after treatment, namely the Least Significant Difference Test (LSD)

method showed the value of  $F = 224,626$  and  $p < 0.05$  ( $p = 0,000$ ) extract.

### CONCLUSION

The conclusion obtained from research on the implementation of *mimosa pudica* root extract for anthracnose disease on red chili to increase productivity is *Mimosa pudica* root with various concentrations of 0%, 25%, 50%, 75% and 100% has a significant effect in reducing the diameter size spotting of the occurrence of anthracnose disease during growth until the 10th day. Concentration of 25% of female shame plant extract is a concentration that can give an optimal effect and is able to reduce the size of the spotting diameter by 70%.

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