

UTILIZATION OF PIPER CANINUM BLUME LEAF EXTRACT COMBINED WITH COMPOST TO SUPPRESS BLAST DISEASE AND INCREASE THE GROWTH OF LOCAL RICE BALI (ORYZA SATIVA)

BY:

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ABSTRACT

Blast disease is a disease that attacks rice plants. The control of this disease is still using a synthetic fungicide that is very harmful to the environment. The purpose of this research is to know the effect of combination of *Piper caninum* leaf extract with compost to blast disease and rice plant growth. This research was conducted in vivo in the glass house of Senganan village, Penebel Tabanan. Bali. This study used a randomized block design .In this study the extracts were combined with organic fertilizer which was made by biotechnology *stater starmik ok*. Fo = control (soil 100%). F1= (soil 90% + compost 10% + extract 0,5%) .F2 = (soil 80% + compost 20% + extract 1%) F3 = (soil 70% + 30% + extract 1.5%). F4 = (soil 60% + compost 40% + 2% extract), do repeat 4 times. The results show that the formulas F3 effectively reduce the intensity of blast disease by inhibition of 79.09%, significantly affect the amount of rice leaves, and the number of rice tillers increases but in treatment F4 decreased. The height of the rice plant from F1 to F4 decreases, it is great because it reduces the fall when the rice is fruitfull. This is due to the disruption of growth hormone by the extract.

Keyw

ords: *Rice crop, Piper caninum, compost, blas disease*

BACKGROUND

One of the important diseases in rice is blast disease, caused by the fungus *P. oryzae*. This fungus can infect rice plants at different growth stages (Yolanda, 2013). Blast disease is capable of lowering the enormous yield, causing production loss up to 50% in endemic areas. Blast disease poses two typical symptoms, i.e. leaf blast and panicle blast. Blast leaves are a dark brown spots, rhombic with white patches center. Panicle blast is in the form of dark brown spots on the base of the neck that can cause neck panicles not to be able to sustain and get broken. Control of this disease is very difficult, but it is generally done by planting resistant varieties interchangeably to anticipate changes of blastrace very fast (Utami, 2006).

Control of blast disease by farmers is still using synthetic fungicides, if done less precisely; it can have a negative impact on the ecosystem of paddy crop. The use of botanical pesticides for controlling plant diseases is one alternative that is safe for the environment control, but its use has not been widely practiced in Indonesia (Rahmawati and Corlina, 2009). Blast disease can be controlled by using microbial antagonists such as *Enterobacter agglomerans*, *Seratia liguefaciens*, *Xanthomonas lumenescens*, and *Tricoderma harzianum* (Suprapta, 2012; Suprapta *et al.*, 2014; Gouramanis, 1997). Many types of plants in Indonesia contain active ingredients that can be used as a plantpesticide. In applying the plant pesticide, usually one thing that needs to be done is the making of an effective formula, which is done on the greenhouse scale research and continued in the field (Suprapta, 2014). Blast disease can be controlled by using compost extract and leaf *Piper caninum* extract by inhibitory 83,31% at a concentration 2,5% (Suwandi et al, 2012; Suriani et al, 2015).

But research using this extract has a weakness because too many extracts are used. Based on the above, there needs to be integrated blast disease control so that the extract used is not too much. Blast disease control by combining plant extract with compost organic fertilizer has not been done especially in Bali. This control will produce appropriate technology that is environmentally friendly. This method is one way that supports the government program that is developing organic farming. The purpose of this research is to explore the optimal potency of chili leaf extract combined with compost organic fertilizer as biopesticide against blast disease in rice plant, and to get the right formula from extract which combined by compost in pressing blast disease on rice and spur rice plant growth.

MATERIALS AND METHODS

This research was conducted at the Bio-pesticide Laboratory of Agriculture Faculty Udayana University, and the Village of Senganan, Penebel, Tabanan Bali. Research began from January 2018 until November 2018. Forests chili leaves (*P. caninum* Blume) were collected from plants grown in the Village of Senganan, Penebel District, Tabanan Regency Bali.. The materials were then macerated in methanol at a ratio of 1:10 (weight / volume) for 48 hours in the dark, at room temperature. The filtrate was obtained by filtering, using 4 layers of gauze followed by filtration using Whatman filter paper No. 1. The maceration process was done 3 times with methanol. The filtrate obtained were combined and then evaporated using a rotary evaporator (Iwaki, Tokyo) at 40° C to separate the solvent (methanol) and the extract. The crude extract obtained was ready for the next test.

In this study the extracts were combined with organic fertilizer which was made by biotechnology *stater starmik ok*. Fo = control (soil 100%). F1= (soil 90% + compost 10% + extract 0,5%) .F2 = (soil 80% + compost 20% + extract 1%) F3 = (soil 70% + 30% + extract 1.5%). F4 = (soil 60% + compost 40% + 2% extract), do repeat 4 times. Glass house experiments were carried out in the village of Senganan, Penebel District, Tabanan Regency, Bali Province using a randomized block design (RBD) consisting of 5 treatments: Each experimental unit consisted of 10 clumps rice plants . Implementation of the experiment include: seeding, planting media preparation, , fertilizing, plant maintenance, inoculation of pathogenic fungi (*P. oryzae*), vegetable fungicide application.

The observed parameters covered intensity of blast disease, growth parameters (plant height, number of tillers, amount of leaf) Measurement of the intensity of the blast disease was

done by the following formula (Sinaga, 2006)
$$IP = \frac{\sum_{i=0}^i (n_i \cdot v_i)}{NV} \times 100\%$$
 Where IP = Intensity of disease (%), n_i = Number of leaves with a score i , v_i = Value of each category of disease scores, N = number of leaves were observed, V = highest score.

RESULTS AND DISCUSSION

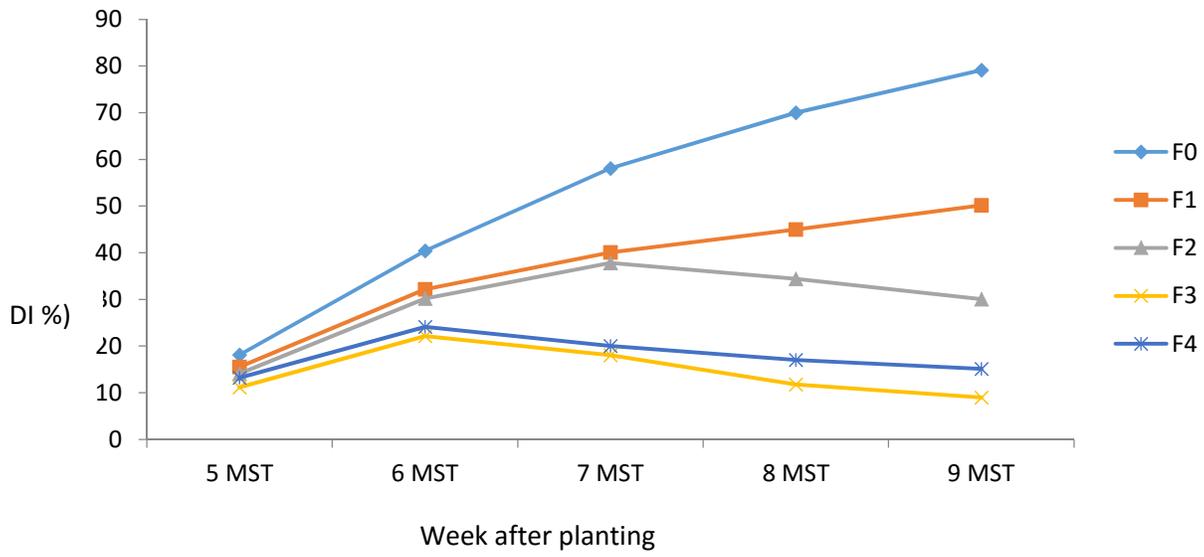
Intensity of Disease

The results showed that the treatment of chili leaf extract combined with compost gave a significant effect ($P < 0.05$). Suppressing blast disease in red Bali rice plants after 8 MST (Table 4.1). 1.5% extract combined with 30% compost and 70% soil have the highest inhibitory (Figure 4.1). The higher concentration of organic extract and fertilizer then the intensity of blast disease decreased until the concentration of extract 1.5% and concentration of organic fertilizer 30%. While the concentration of 2% extract combined with 40% organic fertilizer increases disease intensity, which shows more blotches (Figure 4.2). This possibility is due to the presence of toxic factors by the extract so that the resistance of rice plants weakens. Extract contains polar and non polar compounds, non-polar substances are destructive to wax coating on leaves if the concentration is excessive (Suprpta, 2014). In addition it can also be caused by the content of substances contained allelopathy extract that can disrupt the growth of plants. Research Djazuli (2011) showed that the allelopathy substances on nilam leaves damage the soil. The concentration of organic fertilizer is too high in the soil also causes nutrient imbalance in the soil, there the micro nutrients are reduced so that can not be absorbed by plants. It is also shown by Padmanabha et al (2014) research that the addition of organic fertilizer is too high cause the decrease of yield and growth of rice plants.

Table. 4.1.

| Intensity of blast disease and inhibiting activity after 9MST | | | |
|---|-----------|--------------------------------|---------------------------|
| No | Treatment | Intensity of blast disease (%) | Inhibiting activities (%) |
| 1 | P0 | 79,10a* | - |
| 2 | P1 | 50,14b | 28,96 |
| 3 | P2 | 30,07c | 49,30 |
| 4 | P3 | 9,01e | 79,09 |
| 5 | P4 | 15,14d | 63,96 |

* Figures followed by the same letter do not show significant difference based on Duncan multiple range test at the level of 5%. (F0= control; F1=extract 5 %+ compost10%; F2= extract 1% + compost 20%; F3= extract 1,5% + compost 30%; F4= extract 2% + compost 40%).



Gambar 4.1. Intensity development of blast disease during spraying with extracts



F0



F1



F2



F3



F4

Gambar 4.2. Spotting blast disease for each treatment

Growth of Rice Plant

The result of the research showed that the combination of chili leaf extract had significant effect on the number of tillers (table 4.2) and number of leaves (table 4.4), ($P < 0,05$). The higher the treatment concentration, the number of tillers and the number of leaves increased until treatment F3: 1.5% extract concentration and 30% compost concentration and decreased at 2% extract concentration and 40% compost. This is caused by the higher the concentration of treatment, the intensity of blast disease decreases until the treatment of F3. While the treatment of F4 blast disease intensity decreased, this is probably due to decreased resistance of rice crops so that the intensity of blast disease increased. Suriani research (2015), that chili leaf extract can suppress the highest blast disease intensity at 2.5% concentration and decrease its inhibitory concentration at 3.5% in ciherang rice plant. Research (Irsan *et al*, 2012) states that the compost extract significantly affect the growth of rice plants, increasing K. uptake.

The results of the study for the parameters of plant height showed that there was a decrease from F2 to F4. The higher the treatment concentration, the higher the crop begins the treatment of 1% extract and 20% compost, the height of the rice plant decreased (table 4.3). This is probably due to disruption of growth hormone by the extract, and the absorption of nutrients is not balanced so that the rice crop becomes shorter. This is very advantageous in the field because with the reduced height of the plant, then reduces the fall when the rice is fruitfull. research Padmanabha *et. al* (2014) that the addition of organic fertilizer is too high cause the decrease of rice plant growth.

Tabel 4.2
The effect of extract on the average number of tillers of rice plant
(age 60 day after planting)

| Treatment (%) | Number of tillers |
|---------------|-------------------|
| F0 | 8,10a* |
| F1 | 9,50b |
| F2 | 11,15b |
| F3 | 13,69c |
| F4 | 10,46b |

* Figures followed by the same letter do not show significant difference based on Duncan multiple range test at the level of 5%.

Table 4.3
The effect of extract on the average number of height of rice plant
(age 60 day after planting)

| Treatment(%) | plant Height (cm) |
|--------------|-------------------|
| F0 | 187,77a* |
| F1 | 187,12a |
| F2 | 173,75c |
| F3 | 161,50d |
| F4 | 157,88b |

* Figures followed by the same letter do not show significant difference based on Duncan multiple range test at the level of 5%.

Table 4.4
The effect of extract on the average number of leaves of rice plant
(age 60 day after planting)

| Treatment(%) | Number of leaves |
|--------------|------------------|
| F0 | 28,39 |
| F1 | 30,55 |
| F2 | 35,12 |
| F3 | 40,02 |
| F4 | 31,30 |

* Figures followed by the same letter do not show significant difference based on Duncan multiple range test at the level of 5%.

CONCLUSION

The chili leaf extract combined with the compost significantly affected the growth of local rice Bali varieties. The most appropriate formula to increase the growth of the number of tillers and the number of leaves is the concentration of extract 1.5% combined 30% compost.

ACKNOWLEDGEMENT

It is suggested that this research will be continued in the field to know the environmental factors.

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