

Conference Paper

Socialization of Pamelo Cultivation Based on Biopesticides: a Community Service to Develop Organic Pamelo Tourism Village in Tambakmas Village, Sub-District Sukomoro, Magetan Sukomoro, Magetan Regency.

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Abstract

Community service, concerning the development of organic Pamelo Tourism Village based on biopesticides, has been carried out in Tambakmas Village, sub-district Sukomoro, Magetan Regency. Pamelo (*Citrus maxima*) has potential to be developed due to its ability to grow in tropical area and its raising production. Tambakmas Village in sub-district Sukomoro, Magetan, is one of the Pamelo production areas. Stem rot, caused by *Botryodiplodia theobromae* which is often happened to Pamelo trees in Tambakmas village, might reduce the quality and quantity of the harvest. However, the use of chemicals to prevent stem rot must be avoided to preserve the environment. Therefore, the development of Pamelo Organic Tourism Village requires biopesticide-based organic agriculture to restrain the disease. The socialization of biopesticide-based organic pamelo cultivation has been carried out to the Pamelo farmer group in Tambakmas Village from May to July 2019, it was integrated disease control including weeding, pruning, preparing and sterilizing the soil, and application of biopesticides. The severity of stem rot disease in Pamelo trees on the observation land with integrated disease control was examined and compared to the trees on the farmers' land without integrated disease control. Results of the observation land with integrated disease control showed that the disease severity slowly decreased by 16.20%. In contrast, disease severity that happened in the land without integrated disease control increased by 5.8%. Besides, the Pamelo trees that were treated with biopesticide developed a wound healing from the stem rot disease and exhibited growth of shoots on the treated region.

Keywords: Pamelo (*Citrus maxima*), organic cultivation, biopesticides, pamelo tourism village and community service

Introduction

Pamelo orange (*Citrus maxima* (Burm.) Merr.) is one type of orange that has the potential to be developed because it grows in the tropical area and its production is currently increasing (Erwin & Ribeiro, 1996; Susanto, 2004). Magetan Regency is one of the Pamelo production areas. During the

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process of increasing the production of Pamelo oranges, there are several obstacles, one of them is stem rot disease which caused by *Botryodiplodia theobromae* Pat. (Dwiastuti *et al.*, 2004). It is a prominent disease since it can kill plants from the time they are still in the nursery to the time they are already mature enough to produce Pamelo oranges.

Chemically control of stem rot disease in Pamelo citrus plants needs to be avoided to conserve the environment. This community service aims to control stem rot disease organically and increase Pamelo fruit productivity using biopesticide. Socialization of crop disease control using biopesticides has been carried out several times in Tambakmas Village, sub-district Sukomoro, Magetan Regency as an effort to improve the health and production of Pamelo citrus plants. Therefore, Tambakmas village can be developed as an organic tourism village of Pamelo Oranges. Community service, concerning the development of organic Pamelo Tourism Village based on biopesticides, has been carried out in Tambakmas Village, sub-district Sukomoro, Magetan Regency.

Research Method

Time and Place of Community Service

The Community Service has been carried out from January to August 2019. The accomplished activities were: counseling, training, and making demonstration plots for organically diseases control using biopesticides. Disease Control was carried out in the Pamelo Plantation Land in Tambakmas Village, Sukomoro District, Magetan Regency, with details of the location coordinates as follows; Plots 1. 7 ° 38'53 "S and 111 ° 22'59" E, and Plots 2. 7 ° 38'54 "S and 111 ° 23'1" E. This area is located at an altitude of 214 meters above sea level, air temperature of 27 ° C, and humidity of 77%.

Material and Tools

Materials used in the activity of integrated disease control in Pamelo citrus plantation land were manure, water, and biopesticide formulations. Moreover, the tools were hoes, sickles, buckets, sprayers.

Implementations

Counseling and Training

Counseling was done to give understanding to the Pamelo orange farmer groups about the importance of developing the Pamelo Organic Tourism Village to improve their prosperity. Biopesticide-based organic disease control training was conducted to explain the correct way of organic farming, specifically stem rot disease control to the farmers.

Disease Control Implementation

The sample plot consisted of two fields with an area of 1500 m² each. The number of trees in each land was 50 trees. Of the 50 trees in each plot, 15 plants were treated with integrated pest management (IPM) and 15 plants with (non-IPM) treatment. Plant sampling in each plot was carried out randomly by selecting plants that showed symptoms.

Integrated Pest Management activities such as weeding by cleaning the soil from unwanted plants were carried out at the beginning and also every week. Soil sterilization by loosening the soil and spraying it using a 10 ml/liter biopesticide formula and fertilizing using 10 kg of manure per individual Pamelo tree, were carried out 2 times. Pruning was done by removing dry branches, cutting branches or shoots that were attacked by pests and also removing the source of transmission, cutting the fruit stalks.

Pruning was done in conjunction with soil sterilization and fertilization. Biopesticide formulation was aimed to maintain plants with a concentration of 7.5 ml/liter of water which was carried out every week.

Non-integrated farming was carried out by farmers. The process was done without weeding, soil sterilization, pruning, and also without the use of biopesticides. California porridge pesticide mixed with fungicides and chemical fertilizer were used.

Obervation Parameters

To find out the empowerment of the community towards the organic Pamelo tourism village development program, a questionnaire was distributed that had to be filled by Pamelo orange farmers. Then the questionnaire was analyzed. For the implementation of biopesticide-based controls, the parameters of successful control is disease severity.

Observation of the disease severity was carried out once a month for four months on the Pamelo citrus plantation. Disease severity (%) was calculated by the formula:

$$I = \frac{\Sigma(n \times v)}{Z \times N}$$

Information:

- I : Disease severity (%)
- n : Number of plants attacked in certain categories
- v : Score certain attack categories
- N : Number of plants observed
- Z : The biggest category value (Murdolelono *et al.*, 2004).

Data Processing

The number of infected plants in each sample plant from each experimental plot was used to calculate the disease severity. It was then tabulated into frequency data and then processed using the Excel 2007 program.

Result and Discussion

The Level of Community Contribution to the Program

The symptoms caused by stem rot disease in Pamelo orange plant are concentrated brownish-yellow liquid that comes out of the wood tissue, namely the stem and branches. Symptoms of such a disease are called "gumosis" and the discharge comes out called "gum", when the liquid dries up it turns hard and yellow. The symptoms found in the field indicate that the infection was caused by *Botryodiplodia* sp. (Timmer *et al.*, 2000; Hashem and Alamri, 2009).

The basic contribution of community service activities undertaken is to increase the ability of the community to plan, implement and evaluate efforts to cultivate organic Pamelo oranges that are disease resistant as well as the driving force for the realization of community-based tourism (CBT) villages so that they can independently manage their area and improve the economic welfare of the community. The level of community empowerment that is a program partner is an important measure to be carried out to show indicators of the success of the community service programs implemented. Internal perceptions based on motivation to participate in the development of organic pamelo tourism villages showed an increase in community participation to obtain an increase in income by 47%, increase the productivity of the Pamelo citrus plants by 33%, and to promote village social culture and maintain social relations by 20%.

Disease Severity

A symptom of *Botryodiplodia* sp. infection was indicated by the yellow “gum” on the stem or bigger branches. The wounds will be peeled off and then healed (Retnosari, 2011; Hariri, 2017).



Figure 1. Gumosis Symptom on a Pamelos Tree

The result of disease severity observation shows that at the beginning of the observation the severity of stem rot disease in both highlands is integrated agricultural land by 48.3% and 60%, while in non-integrated agricultural land is 47.5% and 49.2%.

The progression of disease severity in each observation in integrated farming has decreased slowly while in non-integrated farming lands has increased. The severity of disease achieved in both integrated agricultural lands is from 48.3% to 31.7% and from 60% to 44.2%. Whereas on the two non-integrated agricultural lands, the severity of the disease achieved was from 47.5% to 48.3% and from 49.2% to 60%. So that it can be seen the magnitude of the decrease in disease severity on integrated land is 16.6% and 15.8%. While the magnitude of the increase in disease severity on non-integrated land is 0.8% and 10.8%.

These results indicate that weeding, pruning, tillage, and application of biopesticide formulas can reduce the development of pathogens because weeding and pruning will directly affect the temperature and humidity around the plants, soil treatment in the form of soil sterilization with biopesticide formulas and fertilization will suppress the growth of soil-borne pathogens. The application of biopesticide formula can also suppress and control the pathogens that infect the stem and branches of the Pamelos orange plant.

Thus the biopesticide formula used in this community service program can support organic farming activities in the framework of developing organic pamelos tourism villages in Tambakmas Village, Magetan Regency.

Conclusion

The results showed that the problem of miscarriage or brucellosis often occurs in cattle raised by breeders with a total of 5 tails from a sample of 300 productive females or with a percentage of 1.7%. Control activities carried out by veterinarians and field health workers are by conducting surveillance of brucellosis. Vaccination and test and slaughter have not been carried out due to limited resources.

Based on the results of the implementation of community service and the discussion above it can be concluded that:

1. Internal perceptions based on motivation to participate in the development of organic pamelos tourism villages showed an increase in community participation to obtain an increase in income by 47%, increase the productivity of the Pamelos citrus plants by 33%, and to promote village social culture and maintain social relations by 20%.
2. The progression of disease severity on each observation in integrated farming decreases slowly while in non-integrated farming lands increases. The magnitude of the decrease in

disease severity on integrated land was 16.6% and 15.8%. While the magnitude of the increase in disease severity on non-integrated land is 0.8% and 10.8%.

3. The biopesticide formula used in this community service program can support organic farming activities in the framework of developing organic pamelo tourism villages in Tambakmas Village, Magetan Regency.

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