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The Evaluation of Integrated Disease Management of Rice Plants (*Oryza sativa* L.) In East Buay Madang District, Ogan Komering Regency, South Sumatra

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ABSTRACT

Rice is a staple food source for people in Indonesia Rice plants (*Oryza sativa* L.) are one type of hydrophytic spermatopyta plant. The method used in this research is the survey method, which involves directly visiting the land and conducting surveys in several food crop fields in Buay Madang Timur District, Oku Timur Regency. Observation of farmers' fields by observing disease intensity and the application of the concept of integrated pest and disease control. Additionally, by documenting the symptoms of disease attack and recording the results obtained through direct land observations. The results showed the calculation of the incidence of blast disease attacks in Srimulyo Village on land 1 to land 10 including the moderate attack category which is 44%, land 11 to 20 the lowest attack category is 20% and the category of moderate attack percentage is 46% and on land 20 to 30 the category of moderate attack with a percentage of 42%. As well as based on the calculation of the intensity of blast disease attack in Srimulyo Village on the 1st land to the 10th land including the mild attack category which is 15.5%, while on land 11 to 20 the mild attack category with a percentage of 19% while on land 20 to 30 the mild attack attack category with a percentage of 15.6%.

Keywords: *Oryza sativa, Pyricularia orizae*, Blast disease, ICM

INTRODUCTION

Indonesia is one of the countries with the largest rice producers. The agricultural sector still plays an important role in helping the national economy (Sumardiyanto and Nugroho, 2021). A very important agricultural product cultivation commodity is rice (*Oryza sativa*). Rice plants (*O. sativa* L.) are a type of spermatopyta plant that is hydrophytic (Valinta et al., 2021). Rice is a source of staple food for people in Indonesia (Onibala et al., 2017). Food is a very important and basic need for humans to replenish energy in daily life (Rahayu and Febriaty, 2019). Rice (*O. sativa*) is a very important diaper plant and is consumed by all people every day. Therefore, the demand for rice has soared to supply the daily needs of the community (Listiani et al., 2019).

In the process of agricultural cultivation, it can include, the physical production obtained from the work of several production factors at once, namely soil, seeds, fertilizers, pesticides, and labor (Purnomo and Utami, 2018). Ogan Komering Ulu Timur Regency with East Buay Madang District is one of the rice-producing production centers (Saputra and Prihtanti, 2022). In the rice cultivation process, the first step that needs to be considered is the selection of seeds that have quality varieties. Because

seeds are one of the determinants in the success of rice cultivation *O. sativa*, seeds are the determinants of genes that carry the good and bad quality of rice offspring *O. sativa* that will be produced later (Khusna and Mariana, 2021). Diseases that attack rice plants in each phase, namely blast disease caused by pathogens *Pyicularia oryzae*. Blast disease is an important disease in rice cultivation that can reduce production and productivity in plants (Pamekas et al., 2023). Control can be done for blast diseases caused by *Pyicularia oryzae* This is one of them by means of preventive control or by regulating the planting distance between plants (Ayu Lestari et al., 2021). The purpose of this study is to find out how integrated crop management of blast disease incidence in rice plants (*O. sativa*)

MATERIAL AND METHOD

Place and Time

This research was carried out in June in East Buay Madang District, Ogan Komering Regency, South Sumatra. The identification of pathogens was carried out at the Phytopathology Laboratory of the Plant Protection Study Program, Faculty of Agriculture Sriwijaya University (Figure 1).

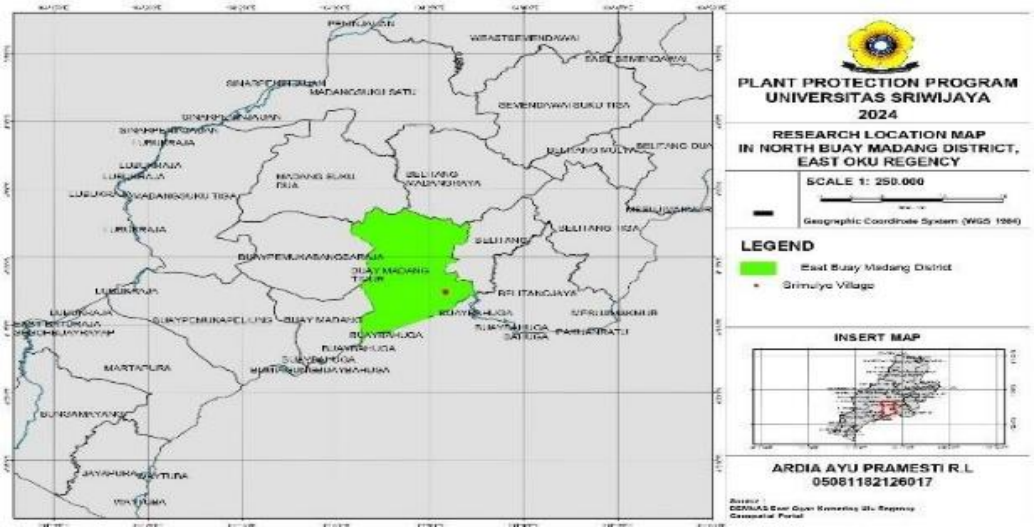

Figure 1. Map of the research location

Tools and Materials

The tools used in this study are: 1) Bunsen, 2) Cover glass, 3) Syringe, 4) Syringe, 5) Mobile phone camera, 6) Lighter, 7) Microscope, 8) Preparat, and 9) Tissue. The materials used in this study are: 1) Aquadest and 2) Rice attack the disease samples obtained in the field.

Research Methods

The method used in this study is the survey method by visiting the land directly and conducting a direct survey of several food crop fields in East Buay Madang District, Okutimur Regency. Observation of farmers' land by observing disease intensity and the application of the concept of integrated pest and disease control. As well as by documenting the symptoms of disease attacks and recording the results obtained in direct field observations.

How it works

Determining the Location

The determination of the location to be observed is by determining 30 rice farmers who have a land area of ± 1/4 Ha–1 Ha in Ogan Komering Regency, South Sumatra Province. Observation

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was carried out to observe the symptoms of blast disease attacks on cultivated rice plants (*O. sativa*).

Interview

The interview was conducted by visiting farmers directly by asking several questions to find out whether farmers are implementing integrated crop management (ICM). Furthermore, the data that has been collected is processed and analyzed, and qualitative data is decrypted with words (not in the form of numbers) (Ahmad and Muslimah, 2021). The distribution of farmer groups is based on the level of application of technology recommended for integrated crop management (ICM) of paddy fields according to (Sari et al., 2014).

TPT = (Actual Weight/Maximum Weight) × 100%

Information:

TPT: Percentage (%) Technology application rate of the component certain technologies.

Weight: Summing the weights of each sample for the component of certain technologies.

Max weight: The maximum weight that can be obtained for the whole sample of certain technological components.

Table 1. Distribution of farmer groups based on the level of application of recommended technology ICM paddy field

Interval	Classification	Number of Groups	Percentage (%)
26-43	Low	0	0
44-61	Medium	0	0
62-78	High	11	0
Sum		11	100
Mode	= 62 (High)		100

Sampling

Sampling was carried out using the diagonal sampling technique, which was found on one land or farmer there were 5 points and each point consisted of 10 plants observed. There are 50 plants in each 1 land that is observed and which will be sampled. After obtaining the samples, they were identified in the phytopathology laboratory, Plant Protection Study Program, Faculty of Agriculture, Sriwijaya University.

Pathogen Identification

Pathogen identification is carried out by taking samples of disease symptoms in rice fields directly, and incubating ± 24 hours. Microscopic identification is carried out in the laboratory to confirm the pathogens obtained.

Observation Parameters

The observation parameters observed in this study are as follows.

Incidence of disease attacks

The incidence of plants affected by blast disease in rice (*Oryza sativa*) can be calculated using the formula according to (Deza Bi, 2015)

$$P = \frac{n}{N} x\ 100\ \%$$

Notes :

P = Percentage of disease attacks (%)

n = Number of infested plants

N = Number of plants observed

Intensity of disease attacks

The intensity of plants affected by blast disease in rice (*Oryza sativa*) can be calculated using the formula according to (Deza Bi, 2015).

$$I = \frac{\Sigma(n.v)}{Z.N} \; x \; 100\%$$

Notes:
I = disease attack intensity (%)
N = number of plants showing symptoms from each category Attack
V = attack score value
Z = highest attack score value
N = number of plants observed

Data Analysis

Microsoft Excel program which will then be presented in the form of images, graphs, and tables.

RESULT AND DISCUSSION

Farmer Education Level

Education is one of the factors that farmers must have in cultivating rice plants. Based on the observation of farmer education in East Buay Madang District, dominated by 5 elementary school graduates, Education of Farmers (Figure 2).

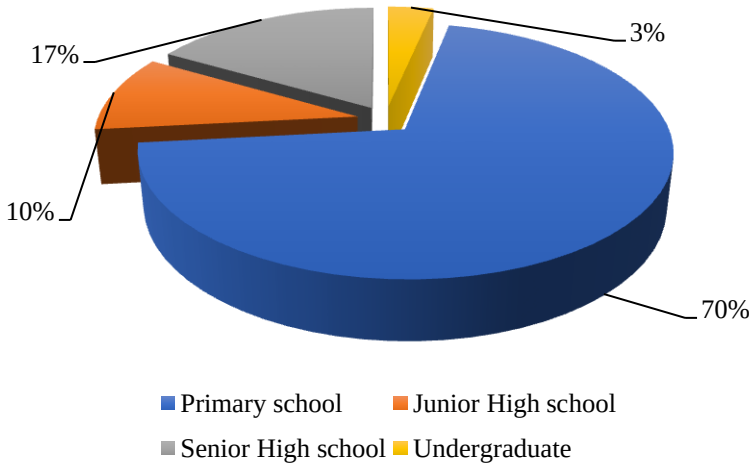

Figure 2. Farmer Education

Rice plant cultivation

Rice cultivation in Srimulyo Village starts from soil tillage, seed selection, land preparation, and maintenance to harvest. Farmers in Srimulyo Village dominantly use Mikongga variety rice seeds, because this variety has several advantages including higher rice productivity, a sturdy stem or resistance to collapse, high rice yield, more rice saplings, and is resistant to bacterial leaf blight.

Morphology of Rice Plants (*Oryza sativa*)

Morphological characteristic of rice plants during the growth phase on farmers' cultivation land in East Buay Madang District (Figure 3)

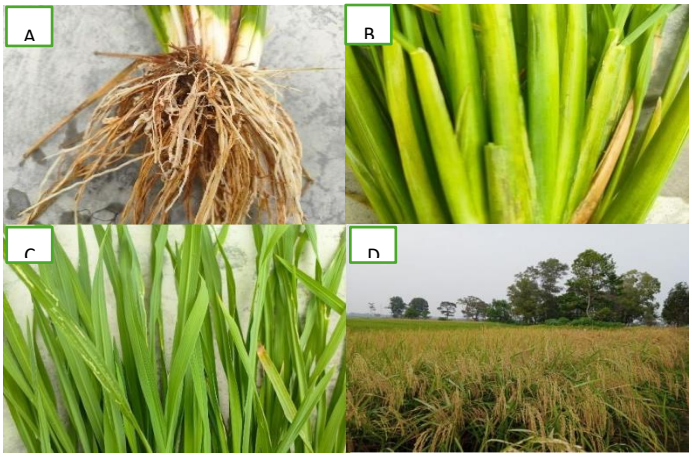

Figure 3. Morphology of rice plants: Root (A), Stem (B), Leaf (C), and Panicle (D).

Identification of Symptoms of Blast Disease (*Pyricularia orizae*)

Symptoms of small bitnics on the surface of the leaves that will enlarge over time. Transmission of this disease is usually through air, water, or friction from infected plants. *Pyricularia oryzae* Fungus microscopically has septic fungal hyphae and oval macrochondria and has partitions 1 -2 (Figure 4)

Figure 4. Symptoms of Blast Disease in rice (A), and conidia *Pyricularia orizae* (B)

Adoption Rate of Integrated Crop Management Technology in Rice (*Oryza sativa* L.) in East Buay Madang District

The results of interviews on integrated crop management in East Buay Madan District, East Ogan Komering Ulu Regency are presented in the following table 4.

Table 4. Level of Application of Integrated Crop Management Technology in East Buay Madang District

Village	Percentage (%) on the 1st to 30th land										Average	Scale
Srimulyo	97	100	97	97	88	100	100	100	100	88	96,7	High
	97	100	100	97	97	100	100	100	100	97	98,8	High
	97	88	88	88	88	100	97	97	72	75	89	High

Incidence of Blast Disease (*Pyricularia orizae*) Attack in Srimulyo Village

Based on the calculation of the incidence of blast disease attacks in Srimulyo Village on land 1 to 10, including the category of moderate attack, which is 44% (Figure 5.).

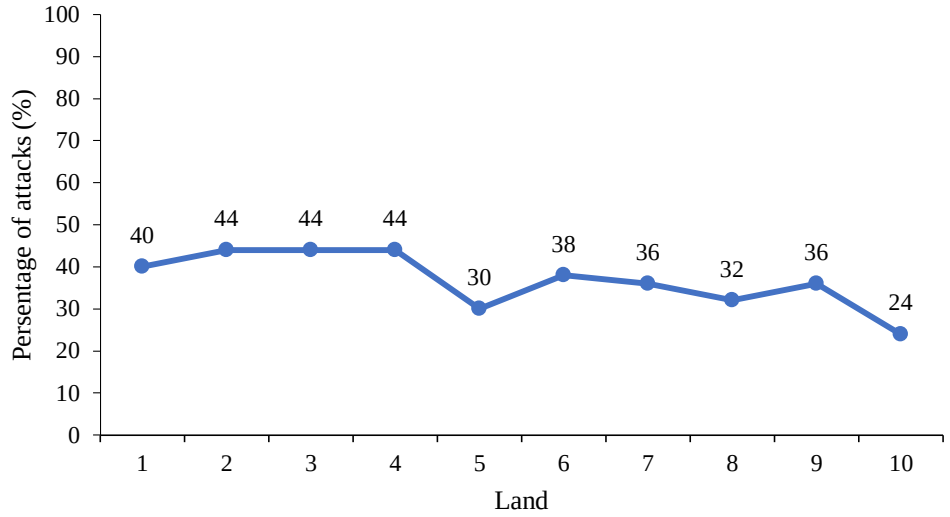

Figure 5. Incidence of Blast Disease in Rice in Srimulyo Village, Land 1 to 10

Meanwhile, inland 11 to 20, the lowest attack category is 20% and the medium attack percentage category is 46% (Figure 6).

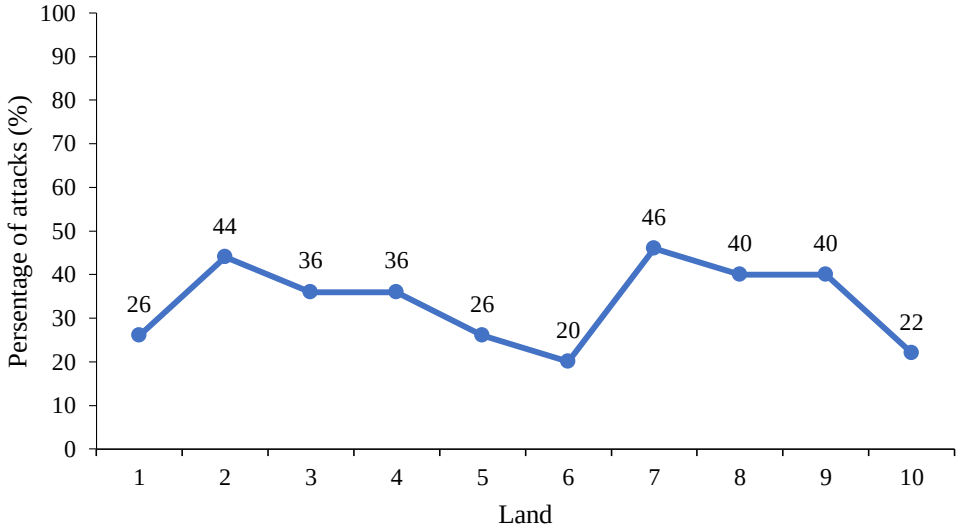

Figure 6. Incidence of Blast Disease in Rice in Srimulyo Village, Land 11 to 20

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On land 20 to 30 the attack category is moderate with a percentage of 42% in the figure (Figure 7).

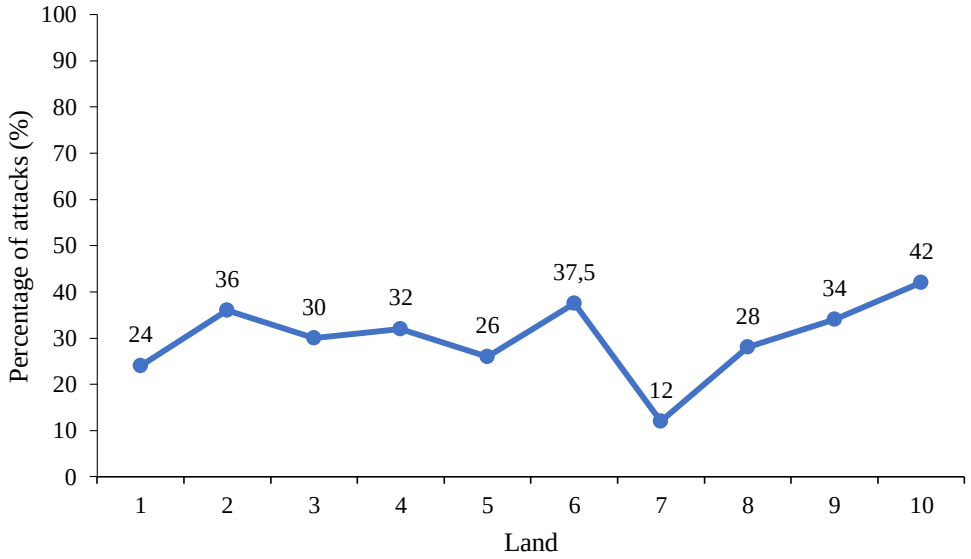

Figure 7. Incidence of Blast Disease in Rice in Srimulyo Village, Land 21 to 30

Intensity of Blast Disease (*Pyricularia orizae*) Attack in Srimulyo Village

Based on the calculation of the intensity of blast disease attacks in Srimulyo Village on land 1 to 10, including the category of light attacks, which is 15.5% (Figure 8).

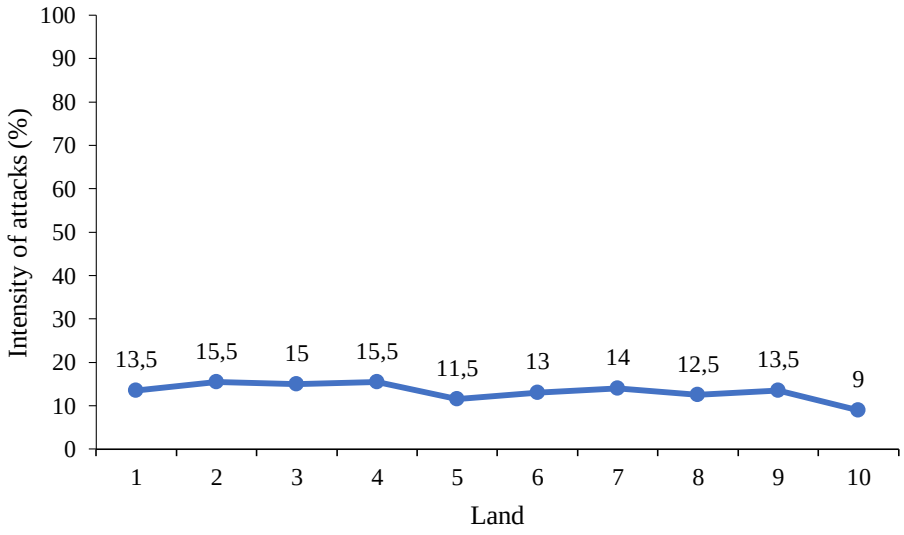

Figure 8. The intensity of Blast disease in Rice in Srimulyo Village, land 1 to 10

Meanwhile, on land 11 to 20 categories of light attacks with a percentage of 19% (Figure 9)

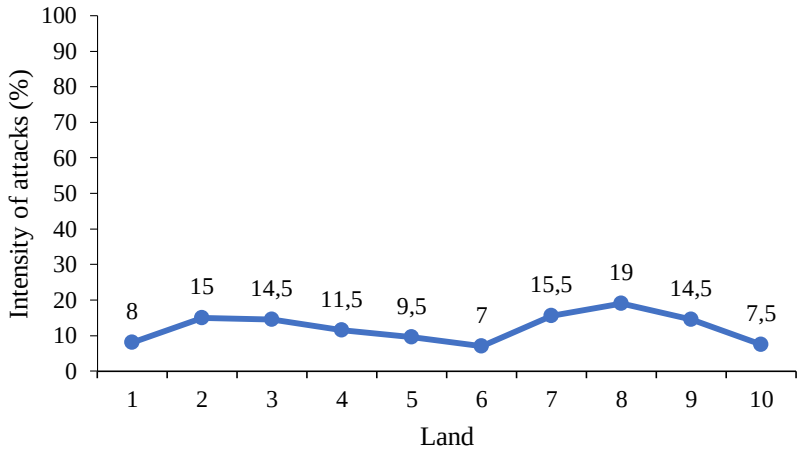

Figure 9. The intensity of Blast disease in Rice in Srimulyo Village, land 11 to 20

On land 20 to 30, the attack category is light attack with a percentage of 15.6% (Figure 10).

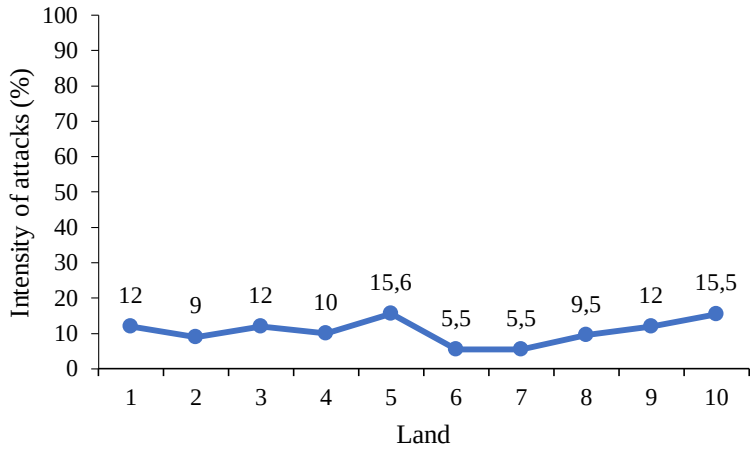

Figure 10 Intensity of Blast disease in Rice in Srimulyo Village, land 21 to 30

DISCUSSION

Rice plants (*Oryza sativa* L.) are a staple food source for most Indonesian people. Rice plants can be cultivated in rice fields or tides. In general, rice cultivation if planted in rice fields needs to require more attention because if there is a lack of water, it will affect plant development. This research was conducted in Srimulyo Village, East Buay Madang District, East Ogan Komering Ulu Regency. From June to September, which is carried out on the land of the surrounding farmers. The data in this study was obtained from the observation of 30 farmers' land by providing a questionnaire to strengthen the data results. The education of farmers in Srimulyo Village is more dominant than elementary school graduates and those with at least an S1 Bachelor. And the difference between junior high and high school education is not too much. Farmers use most mikongga varieties

because of higher rice productivity, sturdy stems or resistance to collapse, high rice rendenen, having more rice saplings, and being resistant to bacterial leaf blight. Farmers in Srimulyo Village have implemented integrated crop management (PTT), namely by regulating planting distances, using irrigation, and weed management.

However, most farmers do not really understand what the components of integrated crop management are. So often after harvesting, farmers leave the rest of the harvest on the land until the next rice is planted, this causes diseases that existed in the previous rice to still have temporary host niches and will then move to the next rice cultivation plant.

The disease obtained from this study is blast disease on rice leaves caused by fungi *Pyricularia oryzae* which will attack in all vegetative or generative phases. This disease will appear a lot when the land is moist and lacks water, blast disease will appear as symptoms of small spots on the surface of the leaves which will grow over time. Transmission of this disease is usually through air, water, or friction from infected plants. Fungus *Pyricularia oryzae* Microscopically, it has a blocky fungal hyphae and an oval-shaped macrochondria and has a partition of 1 -2. Based on the calculation of the incidence of disease attacks in Srimulyo Village, it is classified as a moderate attack category, which is 46%, while the lowest is 12%. The calculation obtained from the incidence of blast disease attacks in this study is low, which is around 19%. The intensity obtained is low because farmers have just started planting and the age of the plants is still young, so the intensity is low.

Supporting factors for the spread or development of diseases in rice plants (*O. sativa* L.) one of them is an alternative host around the land. The habit of farmers in East Buay Madang District is not to immediately clean the land after harvest, thus triggering the growth of pathogens *Pyricularia oryzae*. Some species of fungi can survive on plant residues such as straw and fungal spores will develop in the next growing season if crop rotation is not carried out.

The condition of the land in East Buay Madang District is classified as a category of land that is always flooded. The condition of the land that is always watery and wet allows support for the growth of the pathogen *Pyricularia oryzae*, which causes blast disease in rice. In addition, the characteristics of the soil in East Buay Madang Village have a sandy clay texture on most of the land. This is one of the factors that result in the incidence and intensity of blast disease in rice plants in Srimulyo village in the category of moderate attack.

CONCLUSION

This Research concludes that the level of application of integrated crop management components in Buay Madang Timur District is in the high category. The incidence of blast disease obtained from observations in the field, namely on land 1 to land 30, is included in the medium category. The intensity of the attack from the results of observations made obtained a mild attack category, the percentage of disease attacks that attack rice plants is 44%, while the highest attack intensity is 15.6%.

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