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The Main Disease and its Attacks in the Generative Phase of Maize (*Zea Mays* L) in the Freshwater Swamps of South Sumatra

Penyakit Utama dan Serangannya pada Fase Generatif Jagung (*Zea Mays* L) *di Sentra Rawa Lebak Sumatera Selatan*

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ABSTRAK

Di Sumatera Selatan luasan lahan rawa lebak 157.846 Ha, dengan luasan lahan rawa lebak tersebut dapat dimanfaatkan untuk budidaya tanaman pangan salah satunya tanaman jagung. Tujuan penelitian ini untuk memberikan informasi identifikasi dan serangan penyakit jagung di lahan rawa lebak Sumatera Selatan. Metode penelitian secara disengaja purposive sampling. Berdasarkan hasil identifikasi ditemukan gejala dari serangan karat daun jagung terlihat dari fisiologi daun jagung seperti ada benjolan atau pustule berwarna orange seperti karat yang ada dibesi gejala dari hawar daun jagung dilihat dari fisiologi daun jagung seperti ada garis kecil yang lojong berwarna kecoklatan seperti daun terbakar penyakit karat daun tingkat serangannya mencapai 90% dan hawar daun jagung mencapai 98%. Berdasarkan hasil penelitian ini bawasannya penyakit utama tanaman jagung yang menyerang pada fase generatif ditemukan karat daun (*Puccinia polysora*) dan hawar daun jagung (*Bipolaris maydis*).

Kata kunci: lahan rawa lebak, karat daun, hawar daun

ABSTRACT

In South Sumatra, the freshwater swamps is 157,846 hectares, with this wide freshwater swamps, it can be used for crops food cultivation, one of which is maize. The purpose of this study was to provide information on the identification and attack of maize disease in freshwater swamps of South Sumatra. The research method was purposive sampling. The results of the study identification that the symptoms of maize leaf rust attack, seen from the physiology of maize leaves, were the lumps or pustules of orange color such as rust and the symptoms of maize leaf blight seen from the physiology of maize leaves, were small oval brownish lines like burning leaves. The leaf rust disease had an attack rate of 90% and the maize leaf blight reached 98%. Based on the results of this study, the main disease of maize attacking in the generative phase was the leaf rust (*Puccinia polysora*) and maize leaf blight (*Bipolaris maydis*).

Keywords: freshwater swamps, leaf rust, leaf blight

INTRODUCTION

Freshwater swamps in Indonesia cover an area of 9.2 million hectares (Sarwani, 2013). In South Sumatra, the area of freshwater swamps is 157,846 hectares (Khodijah, 2015). This wide freshwater swamps can be used for the cultivation of crops, one of which is maize (Herlinda & Sandi, 2017). According to (Khairiyah et al., 2013) maize is an important staple crop after rice, consequently the production needs to be increased.

Cultivation in wide freshwater swamps can only be done during the dry season (Galib, 2010). Low levels of fertility are often found in wide freshwater swamps , the presence of toxic substances in the soil such as Al, Fe and SO_4 and low Cu and Zn micro nutrients (Helmi, 2015) and very low P elements (Subagyo, 2012). The effect of fertilization can affect the level of susceptibility of plants to disease (Syafruddin et al., 2012). The technology in cultivating maize is quite simple with perfectly cultivating the land by plowing it, then applying agricultural lime and balanced fertilization (Yasin, 2013).

In increasing the production, it is hampered by the presence of plant pests such as diseases that often attack maize plants in the generative phase, such as the attack rate of leaf rust disease of 15.35% to 19.19%, (Saputra, 2019) (Pakki, 2016), the downy mildew attack rate was 95% (Asputri & Aini, 2013) (Talanca, 2013), the maize leaf blight was 70% (Latifahani et al., 2014), and the leaf spot attack was 59% (Pakki, 2015) (Soenartiningsih et al., 2013). (Silitonga, 2018).

The maize planting is very good if it uses the principle of integrated crop management (ICM) which has enough potential to increase the production of maize crops (Silitonga, 2018). Providing information about diseases and symptoms of attack in wide freshwater swamps maize centers requires proper identification. The purpose of this study aimed to provide information on the identification and attack of maize disease in wide freshwater swamps of South Sumatra.

MATERIALS AND METHODS

This study was conducted in Ogan Ilir District, South Sumatra, Indonesia and the Laboratory of Phytopathology, Department of Plant Pests and Diseases, Plant Protection Study Program, Faculty of Agriculture, Universitas Sriwijaya. This activity was carried out from April to August 2019.

The research method was purposive sampling. The collected data were the primary data obtained from direct observation in the field. When observing the leaves of diseased maize plants, determining the predetermined score from (Table 1).

They were taken to the laboratory for identification using a microscope, and with a needle already dry sterilized using a Bunsen burner to take the spores that were on the leaves and placed them under a microscope slide already treated with distilled water and covered with a glass cover, photoed and noted down the results obtained.

Land Determination

The land used in this study belonged to farmers of Ogan Ilir District, South Sumatra and three farmers were selected with a land area of 0.25 hectares.

The plant age was that of entering the generative phase. The samples were taken deliberately by not taking the five innermost beds and the five outermost beds, in the sixth beds, five plant samples were taken with the distance of eight plants planted.

Data Analysis

This study used descriptive method and was presented in graphic forms. The data were collected quantitatively, observing the percentage and intensity of attacks on maize (%).

Determination of the Score of Each Sample Plant

Table 1. Score damage value on plant samples

Value of damage	Remarks
0	Healthy Leaves
1	≤ 10% of the leaf sheet being diseased symptomatic
2	> 10% - ≤25% of the leaf sheet being diseased symptomatic
3	> 25% -≤50% of the leaf sheet being diseased symptomatic
4	> 50% -≤75% part of diseased leaf sheet
5	> 75% of the leaves being diseased symptomatic

(Puspawati & Sudarma, 2016)

Percentage of Disease Attack

$$P=\frac{a}{b}\times 100\%$$

P = Percentage of attack (%)
a = The number of plants affected
b = Number of plants observed

Intensity of Disease Attack

$$Is=\frac{\sum(ni \times vi)}{(Z \times N)}\times 100\%$$

Remarks:
Is = attack intensity
ni = the number of plants indicating the category of attack
vi = The scale value of each category of attack
Z = The scale value of the highest attack category
N = Number of plants observed

RESULTS

The results of the statement obtained indicate that the macroscopic symptoms of corn leaf epidermis were swollen, red-orange spots, rust, and iron. The pustules will burst and spread. The spores of uredospores were oval in shape, the spores seen from a very small microcope that were easily blown by the wind were orange. Symptoms of corn leaf rust attack begin with the presence of small spots and eventually nodules will form on the corn leaves. This could be seen from the physiology of the corn leaves in the form of lumps or rusty orange spots on the iron (Figure 1).

The attack of leaf rust in the respective areas of Tanjung Senai, Timbangan and Tanjung Pring with a high percentage of attacks on the weighing area with a percentage of 90%, for the Tanjung Pring area it was percentage of 40% and the lowest was the tanjung senai area percentage of 0%. The highest level of maize rust disease severity in the weighing area percentage of 55% and the Tanjung Pring area was on average percentage of 25% and the lowest in the Tanjung Senai area percentage of 0% the incidence of disease for each observation increased daily (Figure 2).

The results of observations of the symptoms of corn leaf blight could be seen from the macroscopic appearance of small black spots that were not very clear about the physiology of corn leaves, in the form of small, brownish oval lines the longer the leaves appear to be burning. The line enlarges over time and extends to follow the shape of the corn leaf seen from the oval spore microcope and has six intersel (Figure 3). The results of field observations carried out during the field of leaf blight attack in the respective areas of Tanjung Senai, Timbangan and Tanjung Pring with the highest percentage of the area in the Senai Cape area with an average of 98%, in the Tanjung Pring area with an average of 60% while in the weighing area with an average of 0%. The average incidence of corn leaf blight in each area in the Tanjung Senai area was 60%, in the Tanjung Pring area with an average of 35% in the weighing area with an average of 0% The incidence of disease for each observation increased daily (Figure 4).

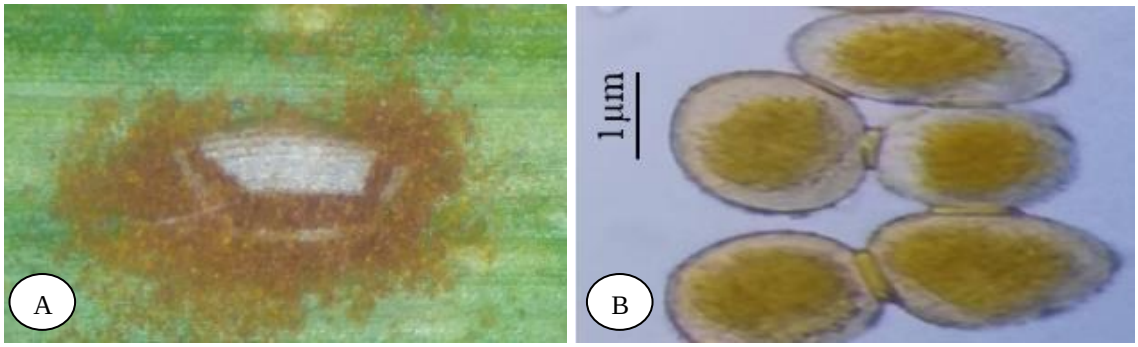

Figure 1. Symptoms of maize leaf rust disease forming dark brown pustules (A) leaf rust urediospores (B)

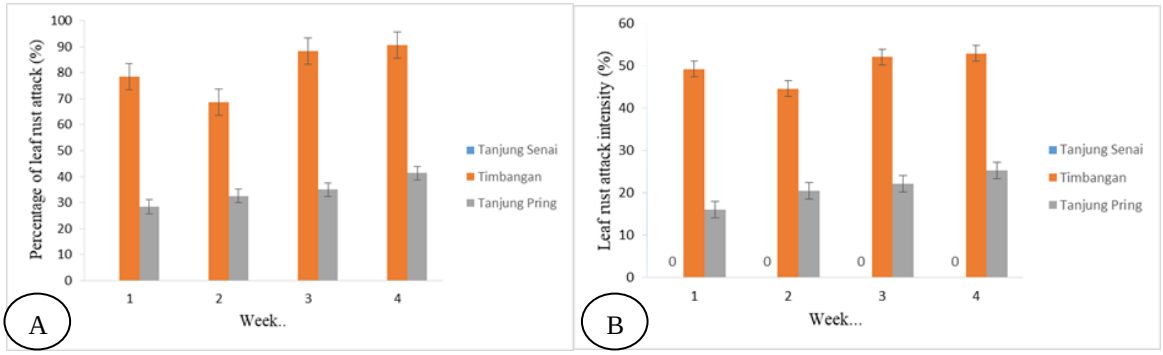

Figure 2.Percentage of maize leaf rust attack (A) intensity of maize leaf rust attack (B)

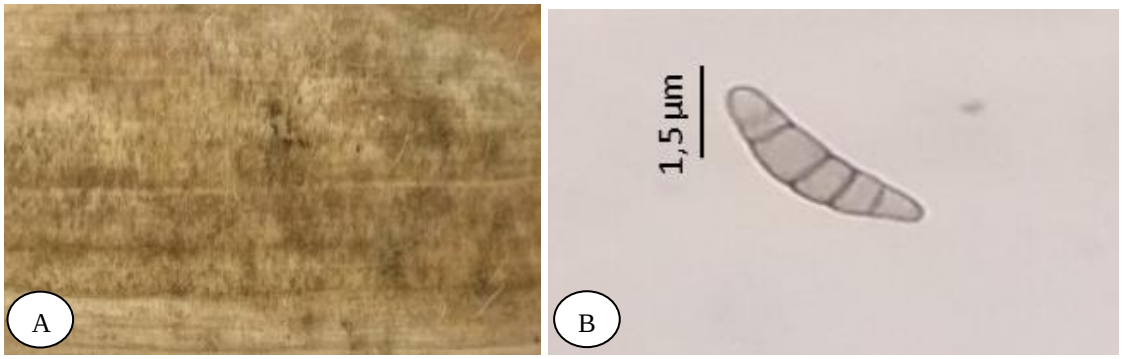

Figure 3. Symptoms of maize leaf blight such as burnt leaves (A) conidia *Bipolaris maydis*

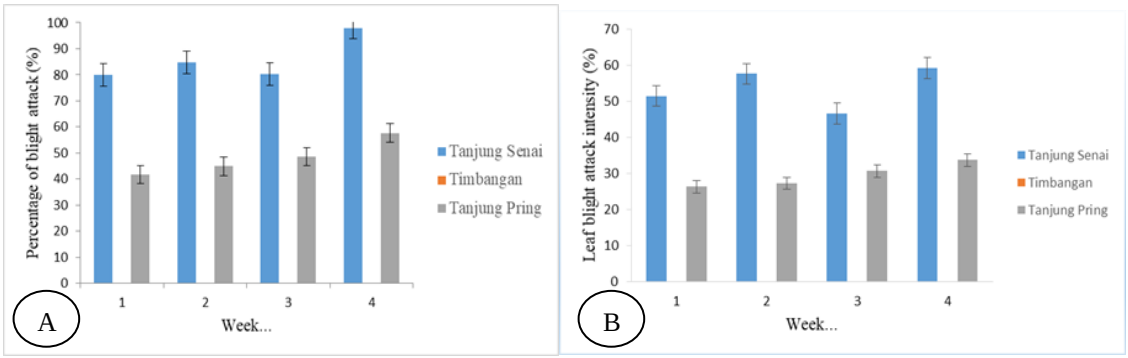

Figure 4. Percentage of blight attack (A) intensity of leaf blight attack (B)

DISCUSSION

Based on the results of field research from the three villages, the farmers used Bonanza F1 and Sweet boy varieties. All the land had the same soil plowing with the help of a tractor, ground fertilizer used chicken manure before planting for chemical fertilizers using nitrogen and NPK 16:16:16. Weed sanitation was only carried out once at the beginning of planting. The use of pesticides was conducted after two weeks of planting.

The results obtained from the laboratory showed that there were several diseases attacking maize plants in the generatif phase. The disease that was found in the three villages during the field research was an important disease affecting maize. The diseases found were maize leaf rust disease (*Puccinia polysora*) and maize leaf blight (*Bipolaris maydis*) (Hendrayana, 2020). Symptoms of maize leaf rust attack can be seen from the physiology of maize leaves, such as lumps or orange pustules such as rust on the iron (Figure 1).

The attack of leaf rust in the respective areas of Tanjung Senai, Timbangan and Tanjung Pring with an average percentage of 0%, 90% and 40%. The average severity of corn rust disease in each area was 0%, 55% and 25% (Figure 2). The incidence of disease for each observation increases (Haris & Tenrirawe. 2015). such as research, the intensity of the attack of corn leaf rust was influenced by temperature and humidity which make the environment suitable for disease development.

The disease that was found in the three villages during the field research was an important disease affecting maize. The disease found was maize leaf blight (*Bipolaris maydis*). The symptoms of maize leaf blight can be seen from the physiology of maize leaves, such as a small, oval line that was brownish like a burnt leaf (Latifahani et al., 2014). The line enlarged over time and lengthened to follow the shape of the maize leaves (Figure 3).

The results of field observations carried out during the field of leaf blight attack in the respective areas of Tanjung Senai, Timbangan and Tanjung Pring with an average percentage of 98%, 0% and 60%. The average incidence of maize blight in each area was 60%, 0% and 35% (Figure 4). According to research (Latifahani et al., 2014), leaf blight attacks very quickly in the generative phase of maize, which is marked by the incidence of disease for each observation increases..

Based on the results obtained from the field and laboratory, the percentage and severity of leaf rust disease (Puccinia polysora) and corn leaf blight (Bipolaris maydis) has increased quite rapidly in the generative phase. (Latifahani et al., 2014), The increase in pathogen attack can be influenced by the behavior of farmers who pay less attention to the environment around the plants. Weed sanitation that is not carried out by farmers can reduce future yields where weeds can affect temperature and humidity or accelerate the attack of host plants that are susceptible to pathogen attack.

Humidity and spacing that are too close together are one of the factors that support the severity of the disease from leaf rust and maize leaf blight (Purwanto et al., 2016). It was exacerbated by continuous planting of maize which keeps the pathogen's life cycle from being broken by the presence of an inoculum source around the plants or weeds which are alternative hosts before the main plants are planted (Hamidson & Suwandi, 2019). Therefore, the integrated plant processing was very good for use (Sumarno & Hiola, 2017).

CONCLUSION

Based on the results of this study, the main disease of maize attacking the generative phase in lowland swamps was the leaf rust (*Puccinia polysora*) and maize leaf blight (*Bipolaris maydis*).

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