A STUDY OF TYPE AND INTENSITY OF DISEASE INFECTING BANANA PLANTS (*Musa* sp.) AT TEGALAGUNG VILLAGE, SEMANDING SUBDISTRICT

Supiana Dian Nurtjahyani[*] and Devi Shyntya Agustin[**]
[*]Biology Education Department, Faculty of Teacher and Educational Science, Universitas PGRI Ronggolawe Tuban
[**] Biology Department, Faculty of Mathematics and Science, Universitas PGRI Ronggolawe Tuban
Corresponding Author email: diantbn@yahoo.co.id

ABSTRACT

Diseases affecting banana plants are very detrimental to farmers as these can lower production and economic income. The purpose of this study was to determine the type and intensity of the disease affecting banana plants. This research was an observational analytic study that observe and analyze condition or symptoms of diseases affecting banana plants in Tegalagung village, Semanding subdistrict, Tuban as many as 38 samples. Parameters observed were type of disease and measure intensity of the disease, data obtained were analyzed descriptively. Based on the symptoms that occurred on the leaves, the study found four disease types affecting banana plant that were fusarium wilt, bacterial wilt (Blood), Sigatoka leaf spot and stunting disease. The diseases intensity were 50% of Fusarium wilt; 26,66% of bacterial wilt (Blood); 26.32% of Sigatoka leaf spot and 15.38% of stunting disease. Conclusion of the study, the highest intensity of the disease that attacks banana plants is Fusarium wilt as high as 50%.

Keywords: *disease type, disease intensity, banana plant, Tegalagung Tuban*

INTRODUCTION

Banana plant has wide potential for economic income a side as an alternative staple food. Generally, farmer grow bananas in a simple process as using seeds and organic fertilizers of their own then planting around rice fields for filling empty land. Growing bananas have good impact to increase income of the farmers (Hafif , 2006).

Recently, banana production has increased year to year to meet the needs of both local and export market. Production of bananas in 1985 around 1.91 million tonnes matrix, increased to 4.20 million tonnes matrix in 2004 (Anonymous, 2005). Increasing bananas production will lead to increase the need of quality banana's seedlings whereas the growth of banana plants are often plagued by pathogens. The pathogen could attacks the banana plant in seedling stage as well as in the field. Pathogens that attack banana plants can cause diseases. Disease affecting banana plants include Fusarium wilt, Blood bacterial wilt, Sigatoka and stunting diseases (Sahlan *et al*, 1996).

Fusarium wilt disease of banana plant is often called Panama disease caused by *Fusarium oxysporum* f. Sp cubense (FOC). Furasium wilt disease have attacked Cavendish banana plantations (655 ha) owned by PT Nusantara Tropical Fruit in Lampung (Nugroho, 2002). Attack rate of Fusarium disease continues to increase from year to year and decrease the production (Apriyanto, et al 2007). Sigatoka disease of banana plants is caused by *Mycosphaerella musicol* while stunting disease of these plants caused by 'Banana Bunchy Top Virus' (BBTV) and bacterial wilt caused by Blood Disease Bacterium (BDB). BDB was first attacked South Sulawesi, nowdays BDB already affects about 90% provinces in Indonesia (Subandiyah, *et al* 2006). *Fusarium oxysporum* f. Sp cubense (FOC) and BBTV (Banana Bunchy Top Virus) as the most important diseases affecting banana plants. Identifiying the types of disease can be obtained not only through observation of symptoms, but also through other methods such as the Postulate of Koch.

Tegalagung village which population mostly as farmer, has wide fields planted with corn and rice. In addition, the farmers also use edge field to grow banana plants for income addition. However, new problem arise by existence of pathogens that attack the banana plants and causing diseases. So far, information about banana diseases in the village still very limited so it is necessary to do research about diseases affecting banana plants. The purpose of this study was to determine type and intensity of the diseases that attack banana plants.

MATERIALS AND METHOD

The study was an observational analytic study with random observation. Thirty eight samples were taken from 3 sub villages of Tegalagung village as a purposive sampling covering 2 hectares banana plantations as the observational plot, on May 23rd, 2014. The instrument used was stationery, calculator and digital camera. Materials used were banana plants (leaves and tree stems) showing disease symptoms, banana's diseases and the intensity literature. It should be elabarated that the samples taken from 3 sub-villages for puposive sampling and to collect data for determining the intensity of disease using the formula:

I = TLS/TLO x 100%.

Direction: I: Intensity of disease,
TLS: Total Leaves with Symstoms,
TLO: Total Leaves Observed).

RESULTS

An observation of banana plants from 3 sub villages showed varies disease symptoms. Seventeen banana plants found attacked by Fusarium wilt with the bottom edge of the leaves became dark yellow then become brown, dried and dead. Bacterial wilt (Blood) attacks 8 banana plants with yellowish leaves and withered. Sigatoka leaf spot disease found on 10 banana plants showed symptoms as yellow spots on edge of leaves, it then widens into a reddish to blackish of dark yellow spots resulting to whole yellow leaves. While another 3 banana plants showed symptoms of stunting disease with dwarf form and has curly upward of edges leaves and become yellow. The disease symptoms affecting banana plants can be seen in Figure 1,2,3, and 4 below.

Figure 1. Banana plant affected by Fusarium wilt disease.

Figure 2. Banana plant affected by stunting disease.

Figure 3. Banana plant affected by bacterial wilt (Blood) disease.

Figure 4. Banana plant affected by Sigatoka leaf spot disease.

Measurement of disease intensity among plants is very important in order to determine how severe the disease affecting in one growing area. Disease intensity is a parameter for severity level of crop damage by a disease in a population or individual plant due to pathogen attack. Measurement of disease intensity can be seen in table 1.

Table 1. Disease Type and Disease Intensity Banana Sub District Dukoh, Sawahan and Dlupang

Sub district	Type of Disease	Total observed banana plants	Total banana plants with disease	Intensity of Disease (%)
Dukoh	Fusarium wilt	15	6	40
Sawahan		10	5	50
Dlupang		13	6	46,15
Total		**38**		
Dukoh	Baterial wilt (Blood)	15	4	26,66
Sawahan		10	2	20
Dlupang		13	2	15,38
Total		**38**		
Dukoh	Leaf spot (Sigatoka	15	4	26,32
Sawahan		10	3	30
Dlupang		13	3	23,07
Total		**38**		
Dukoh	Stunting	15	1	6,66
Sawahan		10	0	0
Dlupang		13	2	15,38
Total		**38**		

DISCUSSION

Fusarium wilt was the most disease type found in this study affecting banana plants as high as 17 out of 38 samples and the highest intensity is in Sawahan sub village that is 50% from 10 observed banana plants (table 1). The result similar with research in Bengkulu that report Fusarium wilt disease among 71.67% banana plants (Manti, 2004), whereas in Tawangmangu Karanganyar dominated by Fusarium wilt disease with intensity respectively 14.17%, 2.67%, 2.10%, and 1.60% (Hadiwiyono, 2010). The high intensity of wilt disease is influenced by the place where the disease is more predominant at highland with 20-22°C temperature and at lower land with 24-30°C temperature (Kung'u *et al*, 2001).

Another wilt disease found affecting banana plants is Bacterial wilt (Blood) caused by pathogenic bacteria *Blood Disease Bacterium* (BDB) that is attack 21.05% from 38 samples; the disease intensity is highest in Dukoh sub village that is found 26.66% from observed banana plants in this sub village. Disease transmission may occur through seeds, soil, water irrigation and agricultural tools. The bacteria can survive at least 1 year in the soil. Sigatoka leaf spot disease found from 26.32% of 38 samples and disease intensity mostly found in Sawahan sub village as high as 30%. Sigatoka leaf spot caused by *Mycosphaerella musicola Mulder* with most spots develop into dark brown to black, the spots width approximately one-third of its length (Crous, 2009). The observation of stunting disease showed only 7.89% affecting plants of the 38 samples and disease intensity mostly in the Duplang sub village as high as 15.38%. This disease is caused by Bunchy Top Virus. Symptoms shows upward curly leaves segment with narrow leaves, the leaves become yellowish to brown. Intensity of disease is influenced by the place.

Based on results and discussion of the research, it can be concluded there are four type of disease affecting banana plants in 3 sub villages of Tegalagung village, Semanding sub district, Tuban. Fusarium wilt disease found from 44.73% samples with the highest disease intensity is 50%; bacterial wilt (Blood) disease found from 21.05% samples with the highest disease intensity is 26.66%; Sigatoka leaf spot disease found from 26.32% samples with highest disease intensity is 30% and stunting disease found from 7.89% samples with highest disease intensity is 15.38%.

REFERENCES

Anonymous, 2005. Rumusan Pertemuan Sinkronisasi Pelaksanaan Pengembangan Hortikultura 2005.*http://www.hortikultura.id* . Accesed on May 25th, 2014.

Apriyanto, D., Manti, I., and Hartal. 2007. Tanaman pisang serta hama dan penyakitnya di Kabupaten Rejang Lebong. *Jurnal Ilmu Pertanian Indonesia. Edisi Khusus DiesNatalis Ke-26 UNIB*, No. 1: 111-121.

Crous, P. W. 2009. Taxonomy and phylogeny of the genus *Mycospherella* and its anamorpoh. *Fungal Diversity* 38:1-24.

Hadiwiyono, 2010. Insidens Penyakit Layu Bakteri dan Layu Fusarium Pisang di Sambung Macan Sragen dan Tawangmangu Karanganyar. *Jurnal Agrosains* 12(1): 19-23.

Hafif, B. 2006. Meraih Untung dengan Usaha Pisang Raja Nangka. BPTP Lampung. *http://www.libang.deptan.go.id.* Accesed on May 25th, 2014.

Kung'u, J.N., Rutherford, M.A. and Jeffries P. 2001. Distribution of *Fusarium* wilt of banana in Kenya and its impact on small holder farmer. *Infonusa* 10 (1): 28-32.

Manti, I. 2004. Penyebaran dan Tingkat Serangan Penyakit Layu pada Tanaman Pisang di Kabupaten Bengkulu Selatan. *Proseding Seminar Nasional Hortikultura* : 143-147.

Nugroho, H. 2002. Pengendalian penyakit layutanaman pisang Cavendish di perkebunan pisang PT Nusantara Tropica Fruit Lampung. Makalah Seminar Nasional Penyakit Layu Pisang, Padang, 22-23 Oktober 2002.

Sahlan, Nurhadi, dan Hermanto, C. 1996. Penyakit-penyakit utama tanaman pisang.Buku Komoditas pisang. Balitbu, Solok.

Subandiyah, S. Hadiwiyono, E. Nur,. Wibowo, A., Fegan, M and Taylor, P. 2006. Survival of blood disease bacterium of banana in soil p.76-77 in: P*roceedingof the 11st International conference on Plant Pathogenic bacteria.* 10th to 14th July 2006. Royal College of Physicians of Edinburgh, Edinburgh, Scotland United Kingdom.