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Inventory of Pest and Disease in Mango Plants (*Mangifera indica*)

Inventarisasi Hama dan Penyakit pada Tanaman Mangga (*Mangifera indica)*

Ahmad Ilham Tanzil*, Irwanto Sucipto, and Wildan Muhlison

Department of Agrotechnology, Faculty of Agriculture, Jember University, Jember 68121 Indonesia

*Corresponding author: aitanzil@unej.ac.id

ABSTRACT

Mango is a local fruit that is widely grown in Indonesia. Mango has several benefits for human life, including as a source of vitamins and industrial raw materials. This study aims to obtain pathogenic fungi that have the ability to cause disease in mango plants. This research was conducted in mango orchards in the provinces of South Sumatera, West Kalimantan, East Java, and Bali. Pathogenic fungi were observed from stems, leaves, and fruit. All symptoms of physiological and morphological deviations were observed to identify the cause. Then the identification procedure uses a supporting literature library. Pathogenic fungi were found, namely Xanthomonas citri pv. mangiferaeindicae, Ganoderma lucidum, Elsinoe mangiferae, Colletotrichum gloeosporioides, Ganoderma applantum, Paratetranychus yothersi, and Bemisia tabaci. From the results of the study, it was found that diseases from the group of bacteria and fungi as well as pests from the class of insects and mites. The benefits of this research can be as a guide in the spread of mango pests diseases, prevention and control.

Keywords: *Indonesia typical fruit, mango, plant pathogenic, plant pest organisms*

ABSTRAK

Mangga merupakan buah lokal yang banyak ditanam di Indonesia. Mangga memiliki beberapa manfaat bagi kehidupan manusia, diantaranya sebagai sumber vitamin dan bahan baku industri. Penelitian ini bertujuan untuk mendapatkan jamur patogen yang memiliki kemampuan menyebabkan penyakit pada tanaman mangga. Penelitian ini dilakukan di kebun mangga di provinsi Sumatera Selatan, Kalimantan Barat, Jawa Timur, dan Bali. Jamur patogen diamati dari batang, daun, dan buah. Semua gejala penyimpangan fisiologis dan morfologis diamati untuk mengidentifikasi penyebabnya. Kemudian prosedur identifikasi menggunakan pustaka pustaka pendukung. Patogen yang ditemukan yaitu *Xanthomonas citri* pv. *mangiferaeindicae, Ganoderma lucidum, Elsinoe mangiferae, Colletotrichum gloeosporioides, Ganoderma applantum, Paratetranychus yothersi,* dan *Bemisia tabaci.* Dari hasil penelitian didapatkan penyakit dari golongan bakteri dan jamur serta hama dari golongan serangga dan tungau. Manfaat penelitian ini dapat sebagai pedoman dalam penyebaran hama penyakit mangga, pencegahan dan pengendalian.

Kata Kunci: Buah lokal indonesia; mangga; panyakit tumbuhan dan hama tanaman

INTRODUCTION

Indonesia has hundreds of types of fruits that are currently rare. Most of the fruits used to be fruit whose trees grew in the forest around villages and jungles wildly, most of which were also planted in people's gardens. For the types of *Mangifera indica*, for example, mango gadung, golek, arumanis, manalagi cengkir, while the types of *Mangifera foetida* such as mango kweni and kemang.

The diversity of mango cultivars in each distribution area is different, for example, mango cultivars in East Java, for example Madiun, Kediri, Tulungagung, and Ngawi are different from those in West Java. At this

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time, genetic erosion is running very fast which also occurs in mango plants. This is due to several cases, for example, the decline in plant populations is due to the development of cities and settlements in their distribution areas. Imported cultivars are sold at low prices compared to local cultivars, and people only cultivate mangoes that have high economic value, such as gadung mango, manalagi, etc. cultivation has begun to be abandoned (Sumiarsih *et al*., 2006).

The most popular mangoes are mangoes from Pasuruan and Probolinggo regencies (Rahman, 2020). To overcome this genetic erosion, several efforts were made, including the preservation of mango germplasm ex situ such as in Pasuruan and Subang, as well as a reforestation movement by planting mangoes in yards such as in Nganjuk. One of the factors for the destruction of the mango fruit is the frequent occurrence of forest fires that also burn existing fruit trees, attacks by pests and diseases, including illegal forest encroachment by the community.

Information about the types of mango plant diseases is very important to support the implementation of mango cultivation, especially to determine appropriate control techniques. In order for optimal mango cultivation, it is necessary to know the diseases of mango plants in farmer's land. Information about mango plant diseases is still very limited, especially in geographic indication areas of mango plants in Indonesia (Sari, 2019). Therefore, this study was conducted to take an inventory of mango (*Mangifera indica*) plant diseases in several mango planting centers.

Inventory is an activity to collect data, record, and report data collection results. In-plant disease, inventory can be defined as an activity to record or record existing or potential diseases as pathogens, as well as recording the types of disease attacks and the symptoms they cause (Arsensi and Rofiq, 2015). Identification is taking samples of diseased plants. Samples of diseased plants were then isolated and grown on artificial aseptic media. Inventory and identification of pathogens is one way to find out pathogenic fungi that have the potential to cause disease on mango plants both now and in the future. So that the disease management method that will be used will be more appropriate. The purpose of the study was to determine the symptoms and signs of pests and diseases caused by certain pathogens on mango plants and types of microbes that have the potential to be pathogens on mango plants.

MATERIALS AND METHOD

This study was conducted in Departement of Agrotechnology, Faculty of Agriculture, University of Jember, Jember. The unhealthy mango tree was collected from mango plantations at South Sumatera, West Kalimantan, East Java, and Bali Province. The tools used are cameras and open-camera applications. While the research material is plants that have symptoms and signs of damage. In addition, plant-disturbing organisms attack.

Figure 1. Location of Mango Plantation

The method used in this research is inventory and comparison. The first stage is to find a manga garden at the research site to be used as observations. Plants are observed in each part to find damage or problems that are owned by plants. Plants that have problems are recorded on the type of plant, the part of the plant that is damaged, and the cause of the damage. Document with the camera every activity in the form of photos and videos.

Analysis of the data using photos and plant material that was attacked to be identified manually using journals, books and supporting literature.

RESULTS AND DISCUSSION

Observations of mango pests and diseases have different results in each region. Details of the observations can be seen in Table 1. The diseases found were from the group of pathogenic fungi *Colletotrichum gloeosporioides*, *Ganoderma applantum*, *Ganoderma lucidum*, *Elsinoe mangiferae*. Diseases found from the group of pathogenic bacteria *Xanthomonas citri* pv. *mangiferaeindicae*. The pests found were from the insect group *Bemisia tabaci* and the mite *Paratetranychus yothersi*. The pathogenic fungus *Colletotrichum gloeosporioides* attacking manganese fruit that causes fruit rot was found in Bangkalan Regency. Meanwhile, the pathogenic fungus *Colletotrichum gloeosporioides* attacking mango leaves was found in Jember Regency. The pathogenic fungus *Colletotrichum gloeosporioides* attacking manga fruit was found in Buleleng Regency.

The pathogenic fungus *Ganoderma applantum* that attacks stems causing stem rot was found in Bangkalan Regency. The pathogenic fungus *Ganoderma lucidum* attacking mango fruit was found in Ketapang Regency. The pathogenic fungus *Elsinoe mangiferae* attacking mango fruit was found in Tulungagung Regency. Pathogenic bacteria *Xanthomonas citri* pv. *mangiferaeindicae* attacking mango leaves was found in Tulungagung, Jember and Bangkalan regencies. The insect pest *Bemisia tabaci* that attacks the leaves was found in Lamongan and Palembang City. Meanwhile, *Paratetranychus yothersi* mites attacking mango leaves were found in Tuban Regency.

The object of observation of mangoes in Mayong Wetan, Mayong, Karangbinangun, Lamongan Regency, East Java and Palembang city, South Sumatera is a mango plant that is attacked by whitefly or whitefly pests usually nesting in clusters and usually attacked in the leaves and fruit. This pest sucks cell fluid. Affected leaves dry up and fall. Lice secrete honey liquid which becomes food for the fungus that causes sooty dew and generally attacks in the rainy season.

Plant-disturbing organisms that attack mangoes are whitefly pests (white lice). The mealybug causes various problems in plants including inhibiting growth which eventually kills the mango plant. The mealybug is toxic and acts as a vector for viruses that can damage plant growth (Sari, 2016). Whitefly (meadow lice) are oval, flat, covered with a thick waxy layer, often perch on leaves and suck leaf cell fluids. As a result of the flea attack, the leaves have dirty yellow spots. Symptoms if the plant is attacked by mealybugs is the leaves become whitish full of mealybugs. This disease is caused by the fungus *Meliola mangifera*, which is caused by insects that produce a sweet liquid or commonly known as honeydew.

This mango plant in Figure 3 is infected with a disease called black spots. Symptoms of what appeared to be bacterial cancer (also known as bacterial black spot). *Xanthomonas* citri pv. *mangiferaeindicae* causing bacterial canker (or black spot) is a major mango (*Mangifera indica* L.) pathogen in tropical and subtropical areas. The bacterium infects a wide range of mango cultivars, and induces raised, angular, black leaf lesions, sometimes with a yellow chlorotic halo (Pruvost *et al*., 2014). Characteristically, there are black watery spots on the leaves, dry spots and turn into light brown or gray, leaf loss occurs prematurely, and there are also small black spots that turn into craters that secrete sap. Symptoms caused by this bacterium are spots on the leaves and fruit, but can also affect the stems and branches if it is severe, initially small black and watery sores appear on the leaves.

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These blotches are surrounded by a yellow border and are lined by leaf veins. Symptoms of what appeared to be bacterial cancer (also known as bacterial black spot).

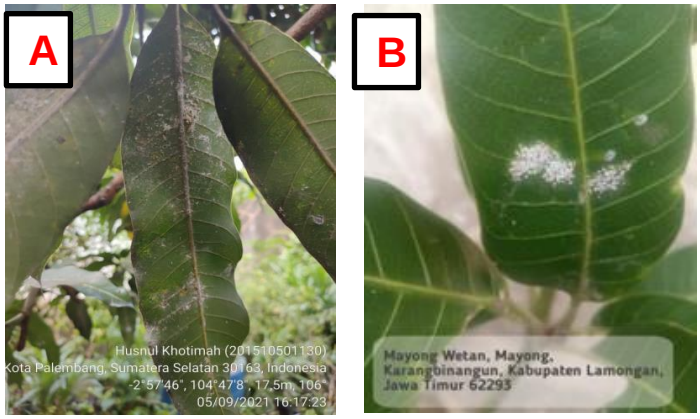

Figure 2. Whitefly symptoms (A) Palembang City; (B) Lamongan Regency

Table 1. List of Pest and Diasease

No	Coordinate	Part	Pest/Disease	Causes	District	Province
1	-7.04534,112.78069	Fruit	*Colletotrichum gloeosporioides*	Fungi	Bangkalan	East Java
2	-7.04534,112.78069	Stem	*Ganoderma applantum*	Fungi	Bangkalan	East Java
3	-7.04532,112.78061	Leaf	*Xanthomonas citri pv. mangiferaeindicae*	Bacteria	Bangkalan	East Java
4	-8.162527,113.717336	Leaf	*Colletotrichum gloeosporioides*	Fungi	Jember	East Java
5	-8.271842,113.3644	Leaf	*Xanthomonas citri pv. mangiferaeindicae*	Bacteria	Jember	East Java
6	-7.020989,112.42704	Leaf	*Bemisia tabaci*	Insect	Lamongan	East Java
7	-6.89843, 113.07121	Leaf	*Paratetranychus yothersi*	Mite	Tuban	East Java
8	-8.0553, 111.9819	Leaf	*Xanthomonas citri pv. mangiferaeindicae*	Bacteria	Tulungagung	East Java
9	-8.0553, 111.9819	Fruit	*Elsinoe mangiferae*	Fungi	Tulungagung	East Java
10	-8.1637, 114.7272	Leaf	*Colletotrichum gloeosporioides*	Fungi	Buleleng	Bali
11	-2.285194, 110.588044	Stem	*Ganoderma lucidum*	Fungi	Ketapang	West Kalimantan
12	-2.9628, 104.7856	Leaf	*Bemisia tabaci*	Insect	Kota Palembang	South Sumatera

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Figure 3. Bacterial black spot of mango (A) Bangkalan, (B) Jember

Mango plant or *Mangifera indica* L. is one of the plants that produce fruit that is much liked by the community with its sweet taste and lots of water. So it is not uncommon for those who cultivate it, of course there are obstacles in cultivating it due to the influence of the climate and the attack of various pests and diseases. The disease that is usually found in mango plants is the fungus *Colletotrichum gloeosporioides*. This fungus causes flowers to wither, rotten fruit, leaves black spots and curls. Mango anthracnose is one of the main diseases before and before mango harvest worldwide caused by *Colletotrichum gloeosporioides*. According to (Uddin *et al.*, 2018) anthracnose attacks flowers, young fruit, leaves and hype, even this disease can also appear in storage of ripe fruit. Symptoms of the disease appear as small, black, irregular depressions that grow in size and growth, leaf spot, flower blight, coloration and fruit rot. Fungicides or spraying bordeaux slurry fungicides can be used to control gleosporium disease (Sulis, 2009).

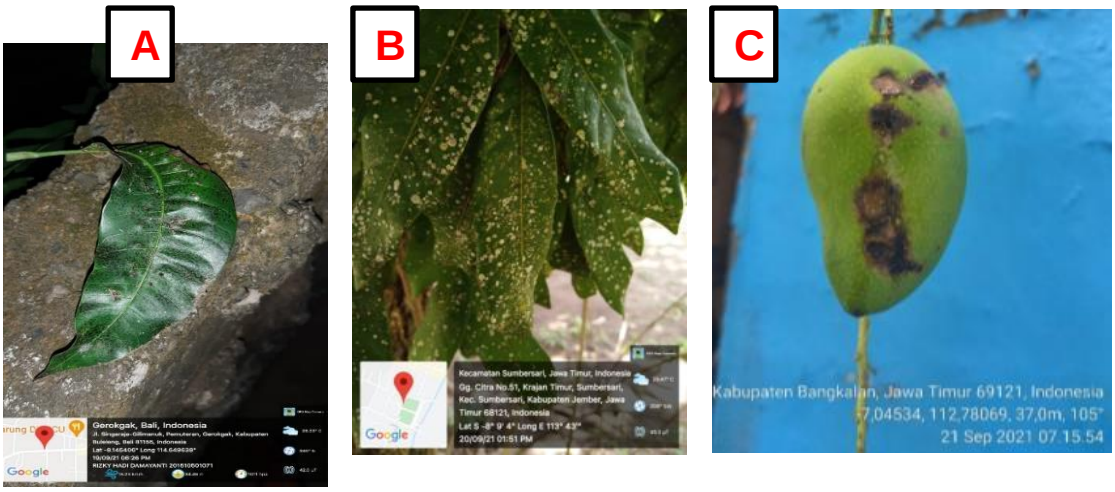

Figure 4. Anthracnose symptom (A) Buleleng, (B) Jember, (C) Bangkalan

The first *Paratetranychus yothersi* mite attacked was the mango leaf muta and then attacked the lower surface of the mango leaf, both of which attacked the mango flower arrangement (Solikin, 2020). Members f this family are characterized by having a small, globose body. The female is shaped rounded and the male, is smaller, elongated and shorter, both with 84 number and length of dorsal setae variable between species. *Oligonychus yothersi* or "spider red" begins its development with a very tiny larva that has 6 legs; subsequently develops the fourth pair of legs, a state is known as nymphal or immature, until before to reach adulthood. immature states are preceded by immobile

states, known as chrysalises. On the avocado of the Hass variety, the mite reaches its state adult after 14d under Quindío conditions at a temperature of 26°C and around 70% relative humidity. Under natural conditions, this mite is regularly controlled by the effect of rain and natural enemies (eg, the coccinellid *Stethorus tridens* (Gordon), lacewings, and predatory mites).

However, when mite populations increase the general recommendations are localized chemical applications or generalized or with sulfur compounds. The "red spider mite" mainly causes a bronzing on upper leaves when mite populations are high. are confined in the veins and cause a decrease in production as a secondary effect of their damage. The populations are abundant during periods of high temperature and the dust favors the increase in populations. When the mite establishes itself in avocado lots, it produces very fine cobwebs on the leaves that cover the colonies. The spider web protects them from possible natural enemies and adverse natural conditions such as rain. mites are commonly controlled by natural enemies that occur naturally in the crop, but due to the indiscriminate use of insecticides, the ecological balance can be altered, decreasing populations of natural enemies and as a result causing outbreaks population of these organisms (Vargas and Alberto, 2017).

Figure 5. Paratetranychus yothersi

The fungus *Elsinoe mangiferae* attacks the fruit surface. This fungus will only survive on living plant tissue. On the surface of the fruit there is an irregular dark brown structure. After the fruit is harvested, it leaves a hard, dry brown spot that reduces the appearance of the fruit. This disease usually attacks in the rainy season, when the fruit is the size of a marble. Severely affected fruit may fall prematurely. The newly formed fruit develops small black spots. When exposed to several black lesions, the fruit falls off. Affected fruit remaining on the tree develops unmarketable scar tissue or causes it to pass down. In contrast to anthracnose, scab lesions do not expand after harvest, or progress to rot. However, fruits with severe scars will show post-harvest anthracnose rot earlier than fruit without scars. Scab infection in mango nurseries can be very severe and the presence of multiple lesions can cause new shoots to be denuded (Conde and Pitkethley, 2007). As a plant pathogen, this *Ganoderma lucidum* fungus can cause stem and root rot in forest or tropical plants. Symptoms caused by this fungus are that the affected part will be covered by red rhizomorphs and white mycelium, the color of the stem changes, the leaves wither and eventually the plant dies. This fungus is brownish red and dark red. According to (Herliyana *et al.*, 2013) the method of isolation or control is to use antagonistic bacteria as biological agents to inhibit the development of this fungus.

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Figure 6. Mango Scab

Ganoderma fungi can also act as decomposers or decomposers of dead organisms. Its role as a decomposer is able to maintain the supply of organic nutrients which are very important for plant growth. Without decomposers, elements that are important for plants, such as carbon, nitrogen, and other elements will accumulate in carrion and organic waste so that organic nutrients will not be available for plants to grow. The fungus Ganoderma applanatum lives as a saprophyte (plants that do not have chlorophyll, live on the results of the overhaul or weathering of other bodies), mostly found in rotten wood.

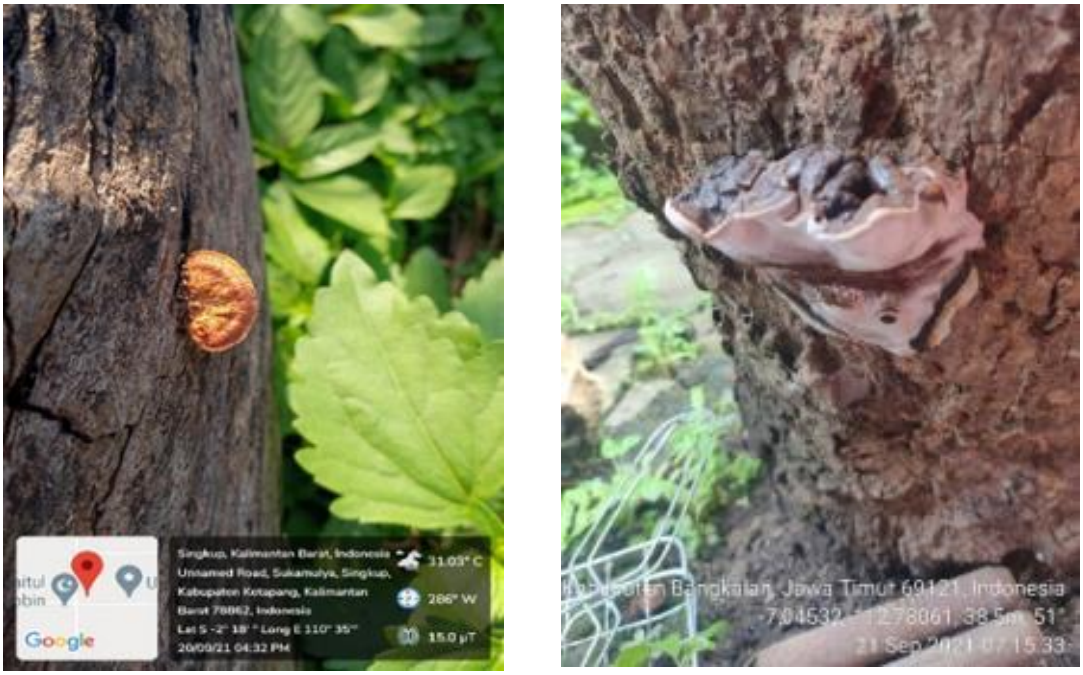

Figure 7. Wood Rot (A) Ketapang (B) Bangkalan

CONCLUSION

The diseases found were from the group of pathogenic fungi *Colletotrichum gloeosporioides, Ganoderma applantum, Ganoderma lucidum, Elsinoe mangiferae*. Diseases found from the group of pathogenic bacteria *Xanthomonas citri* pv. *mangiferaeindicae*. The pests found were from the insect group *Bemisia tabaci* and the mite *Paratetranychus yothersi*.

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