Identification of Pests and Diseases in Coffee Plants in the Manggarai Area – Flores, Indonesia

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Abstract. The purpose of this study is to identify pests and diseases in coffee plants in the Manggarai Flores Area. This preliminary research is the basis for mapping the conditions of pests and diseases of coffee plants in Manggarai, as a reference in deciding the pest and disease control of coffee plants wisely. Research methods used by field observation. Data collection by random sampling in Manggarai Area, which administratively consists of 3 districts, namely East Manggarai, Manggarai, and West Manggarai. The number of sampling location points is 30 location points spread across 3 districts. Analysis of data used by identification, categorization, and classification. The results showed that the dominant pests on coffee plants in the Manggarai Flores Area were green aphid (Coccus viridis), dompolan aphid (Planococcus citri), and coffee fruit borer (Hipothenemus hampei). The dominant disease in coffee plants in Manggarai is leaf rust (Hemileia vastatrix), 90% of the data collection sites found leaf rust disease and as much as more than 50% of the data collection sites found leaf spot disease (Cercosfera coffeicola), as well as soot dew (Capnodium sp), the number of attacks at each location is still less than 30% of the number of coffee plants on site.

Keywords: coffee plants, Manggarai-Flores, pests and diseases of coffee

1 Introduction

Since the last two decades, coffee production in Indonesia has increased significantly to reach 4-5% per year, namely coffee production in Indonesia has averaged 792 kg of coffee beans per hectare, so that Indonesia is included in the four major coffee producers in the world [1]. Coffee is one of the mainstay commodities for export commodities for plantation crops in Indonesia. Apart from being an export commodity, coffee is also a source of economy for the community, a producer of raw materials and a source of employment. Indonesia is listed as the largest coffee producing country in Southeast Asia and the third largest in the world after Brazil and Vietnam. The main market share of Indonesian coffee reaches various countries in Asia, Africa, Australia, America, and Europe. Until now, coffee export opportunities are still wide open and the market prospects in the country are also quite good [2].

Based on BPS data (2013) the increase in the number of coffee production in various regions in Indonesia in the last 5 years tends to be unstable. Some things that cause unstable production are the influence of unfavorable weather and the presence of insect pests that are able to reduce the quantity and quality of coffee produced.

The main problem that can reduce the quality and quantity of coffee plants is the attack of Plant Disturbing Organisms (OPT). Pests on coffee plants include groups of pests and diseases. Based on the results of research by [3], it was obtained that coffee plant damage was caused by pests, namely stem borers, fruit borers, and mealybugs. With a damage rate based on 3

categories of damage, namely light 62%, medium 32%, weight 6% found in stems, leaves and fruits. The decline in coffee production is also caused by disease attacks. Every year the losses caused can reach millions of rupiah per hectare of coffee plants. The cause of the disease that is often found in coffee plants is fungi.

Preliminary research on the identification of coffee pests and diseases is important to be the basis for appropriate pest and disease control measures. The purpose of this study is to identify the types of pests and diseases that have attacked coffee plants in the Manggarai area. Some types of diseases that attack coffee in plantations are leaf rust disease (Hemileia vastatrix), coffee fruit blight, leaf spot disease (Cercosfera coffeicola), upas fungal disease (Upasia salmanicolor) [4]. Based on [5], [6] it was also found that soot dew disease (Capnodium sp) is caused by fungi such as Capnodium sp and Meliola sp. Sooty dew disturbance, the fungal layer only covers the surface of the leaves and is not parasitic, but it remains detrimental because it inhibits metabolism, especially the process of photosynthesis [7].

Based on previous studies after identifying and observing macroscopic pests and diseases that attack coffee plants, then the technique can be done control such as pruning unproductive branches of coffee trees, experimental gardens must always be kept clean to avoid the source of infection and if the attack is widespread, it is necessary control with appropriate insecticides with the causes of diseases and pests. Good and correct control will able to reduce the amount of damage and losses incurred caused, and it is expected to increase coffee production in Indonesia. Based on this, it is necessary to research to identify pests and diseases that attack coffee plants, so it can controlled properly

2 Method

The method of data collection is carried out by observation, identification of objects, and classification. Observations were made on the condition of the leaves, seeds, and stems of coffee plants at the data collection site. The results of the existing observations were identified based on the external appearance (morphology) of the plant by identifying the symptoms that appeared, discoloration, and the type of damage that occurred in the morphology of the coffee plant. Classification is based on the types of pests and diseases of coffee plants.

The location of data collection was carried out in three districts, namely Manggarai, East Manggarai, and West Manggarai. Data collection was carried out using a random sampling method at the location of community coffee plantations whose average area was 30-50 m2. The number of coffee plantation locations for the sample was 30 coffee plantations spread across three districts.

The results of observations are carried out on pests, observing the symptoms and morphology of the pest. The treatment of the disease is based on the symptoms caused by the disease on the affected parts of the plant. Identification of objects on the site is based on the general guidelines of the literature on the identification of pests and diseases in plants. The classification of pest types is carried out based on the results of data that have been collected from the observation and identification of pests and diseases found in each sample field

3 Results and Discussion

The results of observation, identification, and classification of pests and diseases in the Manggarai-Flores region are preliminary research to become the basis for optimal coffee production management in the Manggarai region. The identification and classification of disease

pests in coffee is also a basis for proper pest and disease control and using resources efficiently. Proper and wise control is one of the methods to reduce the excessive use of chemicals so that they can cause pollution and environmental damage. The use of environmentally friendly biopesticide materials can maintain the sustainability and sustainability of nature [8]–[10].

The results of the identification of pests and diseases of coffee plants in the Manggarai region, consisting of East Manggarai, Manggarai, and West Manggarai, show that the distribution of pests and diseases of coffee plants is already in the distribution of the entire region. Pests of coffee plant diseases in the Manggarai area, have attacked organic coffee plants maintained by local communities. The community in Manggarai develops coffee plants in a small area below 500 m^2, there is no expanse of coffee plant plantations managed by companies or the private sector on a large expanse above 5000 m^2. Therefore, coffee plant management is still traditional and has not used many chemicals in its management. The organic pattern carried out by the community is a positive value for the quality of coffee without pesticides and the development of pests and diseases in coffee plants.

Based on the results of observations made at 30 sample points, it shows that the distribution of pests is still at a tolerance limit not exceeding 30% of the area of coffee plants attacked by pests and diseases. However, there needs to be special attention because the distribution of pests and diseases in coffee plants is evenly distributed at all sample points, while maintaining the population from experiencing an explosion of pest populations.

The results of the distribution of pests and diseases of coffee plants in the Manggarai region, presented in Chart 1
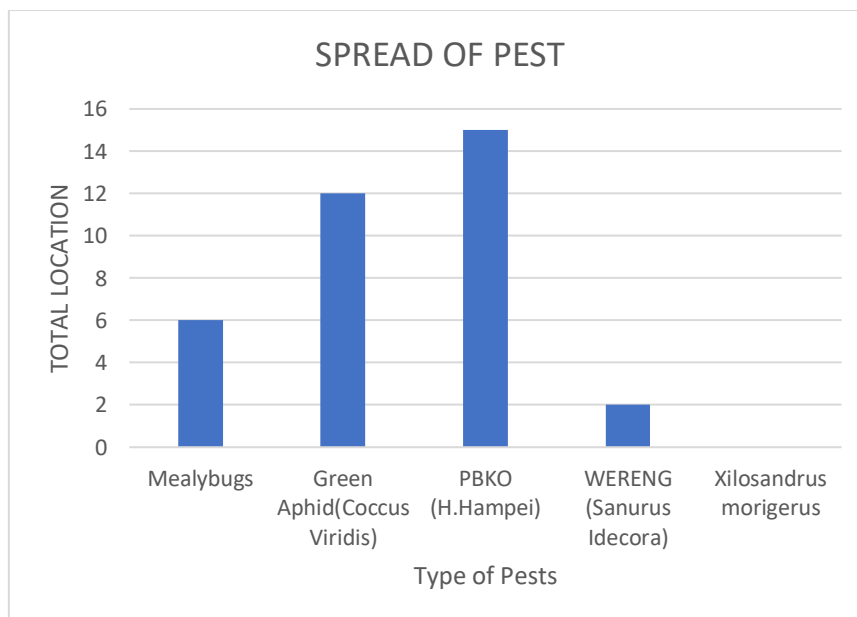

Chart 1. The distribution of pests of coffee plants in the Manggarai region

Coffee plant pest attacks in the Manggarai Region are still relatively low because the average is still below 30% of the coffee population in the coffee plant area. Although the attack is still below 30%, the PBKo attack needs to be watched out for early. PBko type pests have an influence on a significant decrease in the quality of coffee yields. The PBko attack in the Jember

region, East Java has reduced the quality of coffee yields, up to 65% of kopong or unfilled coffee yields, and the remaining 30% with poor quality coffee results [11]. Pbko pests are also spread in the Sumatra region, especially Simalunggun which is known as a coffee producer in Indonesia. Pbko pests attack coffee plants with various heights of location and various patterns of coffee plant management both through pruning, fertilization and technical culture [12]. Therefore, control of PBKo can be carried out in an integrated manner with prudent control.

Green aphid pests (*Coccus viridis*) are widely found on sample plants. Almost 50% of the total sample sites found green aphid pests. Green aphid is symbiotic with gramang ants, by attaching aphid colonies to ants. Ants secrete exudate that is favored by green aphids. The presence of gramang ants helps the spread of green aphid colonies on coffee plants [13].

Dompolan mealybugs (*Planococus* sp) were also found at some sample sites. Mealybugs are usually found under the leaves or at the base of the leaves. Mealybugs emit honeydews that are favored by ants. The resulting honey dew also causes a layer of soot on the leaves, known as sooty dew on the leaves, which inhibits the process of photosynthesis in coffee plants [13].
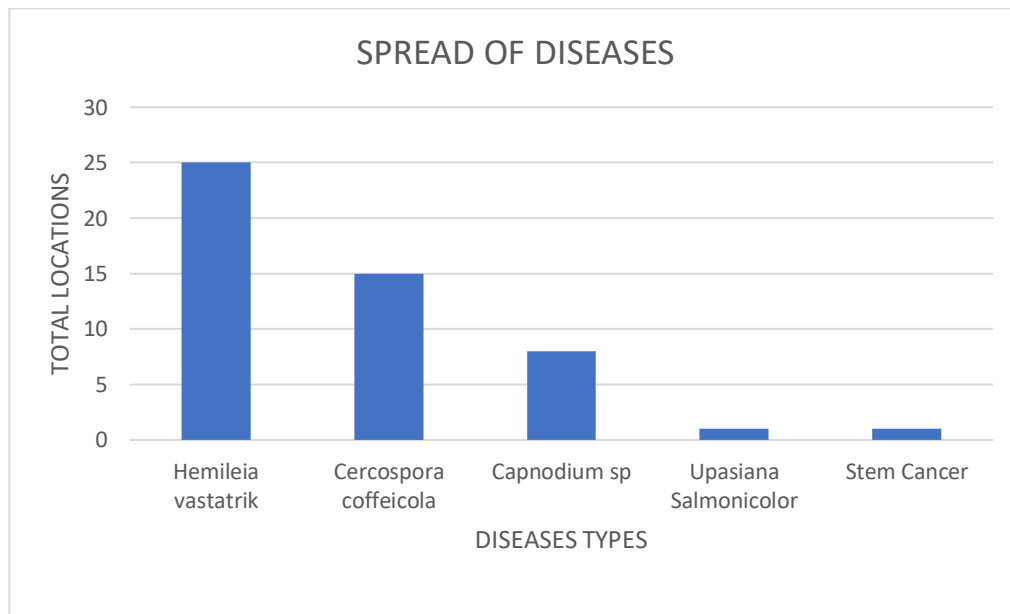

Chart 2. The distribution of diseases of coffee plants in the Manggarai region

Leaf rust disease (*Hemileia vastatrik*) was found more than 90% of the sampled sites in the Manggarai region. Leaf rust found with the characteristic presence of yellow spots there is an orange to bright orange powder resembling rust consisting of uredispora of *the fungus Hemileia vastatrik*. Leaf rust disease at a high infestation rate causes the plant to appear yellowish, and the leaves to fall off so that the coffee plant becomes bare and molts [4]. Leaf rust disease is known from the symptoms caused to the leaves of the coffee plant. The symptoms that appear are the result of microorganisms that can be observed in the ordinary eye that show symptoms of the disease. Symptoms of such diseases can be used to identify the type of disease that struck. Factors that help the spread of leaf rust disease, one of which is the presence of water and wind also help the spread of spores in leaf rust disease. Therefore, integrated control, from an early

age using mechanics and other natural materials can be integrated control, is a leaf rust control solution that favors ecological sustainability.

Leaf spot disease (*Cercospora coffeicola*) was found to be close to 50% of the sample sites in the Manggarai region. Leaf spot disease found indicates the presence of reddish-brown spots, with an intense color. According to [10], [13] Leaf spot disease in coffee plants has a gray center, with a sprinkling of black due to the presence of fungal conidium, and is in a humid area because the protective tree is too heavy.

Diseases resulting from the presence of green aphid, namely sooty dew, were also found at some sample sites. The disease of the found soot dew is characterized by the presence of a layer resembling soot on the surface of the leaves. The soot that appears on coffee leaves is caused because the green aphid produces excessive honeydew, causing a fungus that resembles soot on the leaf surface. The presence of sooty dew on coffee plants has hampered food production on coffee leaves, this is due to the irradiation process to the part of leaf production which is hampered by soot that covers the leaf surface.

4 Conclusion

From the results of the study it can be concluded: 1. Pests that are dominant in coffee plants in the Manggarai-Flores Area are green aphid (Coccus viridis), dompolan aphid (Planococcus citri), and coffee fruit borer (Hipothenemus hampei). 2.   The dominant disease in coffee plants in Manggarai is leaf rust (Hemileia vastatrix), 90% of the data collection sites found leaf rust disease and as much as more than 50% of the data collection sites found leaf spot disease (Cercosfera coffeicola), as well as soot dew (Capnodium sp). 3.   Pests and diseases found in small quantities are stem borer (Xylosandrus morigerus) and split cancer.

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