

Inventory of Insects in Lime Planting (*Citrus aurantifoli* Swingle)

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ABSTRACT

This research was conducted in September - November 2020 with the aim of knowing the types of pests and diseases that predominantly attack lime in Perak Subdistrict, Jombang Regency. This research is descriptive quantitative, namely taking samples directly from the observation location, using trapping tools such as trap holes, trap nets and direct observation of lime plantations. Sampling of all plants will be the point of sampling (30 plants. Observations were carried out 10 times, with an interval of observation every 3 days. Pest data obtained were identified and analyzed by the formula of abundance index (K) and Dominant index (C). Pest identification research obtained 504 individuals consisting of 6 species. The highest insect abundance (K) value was found in the Coccidae family with the Homoptera Order, which was 53.968. While the dominance index value was 0.29, indicating that no family dominates in cropping.

Keywords: *Lime and Insects.*

INTRODUCTION

Oranges are an annual fruit that originates from Asia and China, where oranges were first grown. Hundreds of years ago, citrus plants have entered Indonesia, and until now they have been cultivated both vegetatively and generatively. Lime (*Citrus aurantifolio* swingle) is a plant originating from Indonesia. Historically, the main center of origin of lime is Southeast Asia. However, several sources state that the lime plant originates from North Burma, South China, and India after the north, to be precise the Himalayas and Malaysia. Lime plants entered Indonesia because they were brought by the Dutch (Aldi, 2016).

The need for lime in the market is quite high because the various benefits offered by lime make this name very popular. However, the number of lime farmers is decreasing every year. As felt by Perak Subdistrict, Jombang Regency at this time. Before the 1990s, lime was a mainstay plant in the western part of Jombang. Various constraints that limit the cultivation of lime plants include the activity of insects which can affect the quality and quantity of lime fruit production. In lime plantations, various types of insects are often found. But in a low insect population ecosystem, it is said that the ecosystem environment is not balanced (Indriyanto, 2006).

Pests are organisms that interfere with the development process of a plant. Organisms that become pests are animals that attack cultivated plants, causing losses. Pests that damage plants can be seen directly by their marks, such as grinding and biting. Apart from pests, planting diseases can also interfere with plant growth. Plant disease is a condition in which plant cells and tissues do not function normally caused by continuous disturbance by pathogenic agents or environmental factors (abiotic) and will result in the development of symptoms (Agrios 2005). Diseases can be caused by fungi, bacteria, viruses and nematodes.

Information about pests and diseases in lime cultivation is currently not widely known and limited. Therefore, this study aims to determine the types of pests and diseases in the center of lime cultivation in the silver district of Jombang Regency. In addition, it is also hoped that this research can provide additional information about several pests and diseases that attack lime plants, so that the management of these plants can be carried out properly. Based on the above background, the researchers conducted a study entitled Insect Inventory in Lime (*Citrus Aurantifali* Swingle) Plantations in Plosogenuk Village, Perak District, Jombang Regency.

METHOD

The research was carried out in Kepohdoko village, Tembelang sub-district, Jombang district in May - June 2020. The tools used in the morphological observation were a meter, camera, writing instruments, calipers, label and cutter. The research used is a descriptive study aimed at describing the morphological characters of the salak and analyzing the data in the form of a dendogram. This study consisted of several samples, namely durian salak (SD), salak jackfruit (SN), and salak apple (SA). The samples were selected randomly (Random) by selecting each 6 plant samples of each type so that there were 18 samples in total. Observation variables include plant height, leaf midrib length, leaf length, leaf upper surface color, lower leaf surface color, leaf tip shape, thorn density, thorn texture and thorn shape.

RESULT AND DISCUSSION

Based on the results of observations in the Coccidae family (figure 6), it is characterized by an oval, convex, shiny body with wax-coated scales that look shiny and black. Meanwhile, according to (Siwi, 1991) the Coccidae family has characteristics: oval shape, flat, some are like stars, some are very convex. The body is covered with wax-coated scales so that it appears shiny, the scales are green, red, black and develop together with the body.

Symptoms of attacks by scale lice (family Coccidae) eat stems, leaves, green twigs and fruit. The damage is seen in the form of yellowing leaves and severe cases of defoliation (shedding of leaves). The honey produced by the hawksbill can become infected by a sooty fungus, which will discolor the leaves and fruit. According to (Siwi, 1991) scale lice are polyphaga, among others, attacking shoots / young parts of citrus plants. The classification of the coccidae family is based on the book Key to Insect Determination (Siwi, 1991), namely Kingdom: Animalia, Phylum: Arthropoda, Class: Insecta, Order: Homoptera, Family: Coccidae.

Based on the results of observations in the Aleyrodidae family (Figure 7.), it is characterized by a white body, 2 antennae and clear wings covered with a layer of starchy wax. Aleyrodidae called whitefly has the characteristics, insects are small, 2-3 mm, white. The body is covered in a wax-like material, perhaps in the form of scales or a white powder-like material. Antenna area of 7 pieces, the facet eye extends vertically and narrows in the middle. The rear wing is almost as large as the front wing, at rest the wing closes horizontally over the body (Siwi, 1991).

Whitefly (Hemiptera: Aleyrodidae) can cause direct and indirect damage to plants. Whitefly infestation on plants causes symptoms in the form of chlorotic spots that occur due to wounds caused by whitefly stylet penetrating the plant. These spots can result in an insufficient amount of chlorophyll in the leaves. Disruption to plant growth will be more significant if the whitefly saliva that enters the plant tissue contains toxins or viruses (Pollard 1955, Kalshoven 1981) The classification of the Aleyrodidae family is based on the book Key to Insect Determination (Siwi, 1991), namely, Kingdom: Animalia, Phylum: Arthropoda, Class: Insecta, Order: Homoptera, Family: Aleyrodidae.

Based on the results of observations in the Flatidae family (Figure 8), the following characteristics are obtained: the body size of this insect is 3-5 mm, the body color is pale white. The pair of wings are longer than the size of the body and when perched they cover the body up to the vertical. The position of these insects in the ecosystem acts as herbivores, namely eating plants around them (Borror, et al., 1992).

Symptoms of attack according to Dyah (2019) on Flatidae pests are sucking plant fluids. This insect has a mouth shaped like a stylet, which functions as a tip for suction. The parts of the plant that are attacked are young leaves, flower stalks, plant shoots and young fruit. Attacks when the population is high can cause the affected plant parts to dry out. If the flower stalk is attacked, it will not form fruit. The classification of the Flatidae family is based on the book Key to Insect Determination (Siwi, 1991), namely, Kingdom: Animalia, Phylum: Arthropoda, Class: Insect, Order: Homoptera, Family: Flatidae.

Based on the results of observations in the Dolichopodidae family of Figure 9, the following characteristics are obtained: the body size of this insect is 4 mm, its body color is yellowish green and shiny, this insect has long legs. Meunurut Siwi (1991), in the appearance of the Dolichopodidae family, the color is metallic greenish-bluish, bluish. 3-segment, 3rd-segment antenna sometimes rounded and often with a stylus. This family is very active in several places, especially near ponds or watercourses, wooded places and grasslands. Adults are predatory. The classification of the Flatidae family is based on the book Key to Insect Determination (Siwi, 1991), namely, Kingdom: Animalia, Phylum: Arthropoda, Class: Insecta, Order: Diptera, Family: Dolichopodidae. The classification of the Flatidae family is based

on the book *Key to Insect Determination* (Siwi, 1991), namely, Kingdom: Animalia, Phylum: Arthropoda, Class: Malacostraca Order: Isopoda Family: Porcellionidae.

Based on the observations, the following characteristics are obtained: this insect has a distinctive color, namely golden yellow. Body size 8-10 mm. This insect has a pair of long tentacles, its body is long. According to Borror, et al., (1992), the characteristic feature of this insect is that it has a distinctive smell. In the ecosystem these insects act as herbivores. The classification of the Flatidae family is based on the book *Key to Insect Determination* (Siwi, 1991), namely, Kingdom: Animalia, Phylum: Arthropoda, Class: Insecta, Order: Hemiptera, Family: Alydidae.

Based on the results of insect research on lime plantations, 504 individual families were obtained, consisting of 6 families. In direct observation, it was obtained 495 individuals consisting of 5 families. The largest family found in direct observation is Coccidae. In the pitfall trap, 9 individuals from the Porcellionidae family of soil insects were obtained from the Pitfall trap. In the Sweep net trap nets were obtained 13 individuals consisting of 2 families. The Aleyrodidae family and the Flatidae family were obtained in this stage.

The data from the results of this study illustrate that the types of insects found in lime plantation in Plosogenuk Village, Perak Subdistrict, Jombang Regency, show that the maintenance and control of insects are the main factors that cause differences in insect orders such as Homoptera, Diptera, Isopoda and Diptera. Planting on lime in Plosogenuk Village, Perak District, Regency is due to the lack of maintenance factors carried out by farmers, namely cutting weeds, pruning branches and controlling pests using pesticides. Homoptera insects are insects that are found as plant pests and usually the presence of these insects causes plants to become stunted and leaves with yellow spots and Subyanto et al. (1991 p. 83) stated that, "Homoptera as plant destroyers, among others, causes pale, wrinkled leaves. wrinkled, curly, stunted and can result in the death of plants.

The results of recording the number of individuals that have been obtained are analyzed using the abundance value (K) and the dominance index (C) showing the size of the role of a type of organism in relation to the community as a whole (Southwood, 1980). Based on the results of data processing, the abundance value (K) shows that the highest insect abundance value is found in the Coccidae family with the Homoptera Order, which is 53,968 because this family is an animal that can live by eating plants and annual plants from roots, stems and twigs. This is supported by the statement (Borror, 1992) which states that nymphs fall to the ground and eat roots, while adults eat plant stem fibers, especially annual plants. From the research results in (Table 2), the highest dominance index value is 0.29, in the Coccidae family. The value of the dominance index for each is said to be low, because it is close to 0, which means that there is no type that dominates the family that is obtained. This is in accordance with Odum's (1993) statement which states that a high dominance index value indicates a high dominance concentration (there are individuals who dominate), whereas a low dominance index value indicates a low concentration (no one is dominant). The high dominance indicates that the place has low species richness and the distribution is not evenly distributed. The low dominance value indicates that not all insects have the same adaptability and ability to survive in a place.

Environmental factors play a very important role in the level of insect presence. Environmental factor data measured in the study were temperature and humidity. The presence of insects in lime plantations can still be said to be a range of norms, which means that the environmental conditions have a variety of species that lead to good and have a moderate ecosystem. Where the average temperature obtained in the cultivated land is 26.4 C in the morning and 28.22 C in the afternoon. temperature affects the survival of insects. Jumar (2000) states that the range of effective air temperatures for insects in life development is between 15°C-40°C with an optimum breed temperature range of 25°C. While the average yield of humidity obtained in the morning is 81.2% and 70.1% in the afternoon. The level of humidity affects insect activity. Nainggolan (2001) explains that air humidity plays a very large role in the moisture content of the insect body, and the life cycle of insects, thereby regulating the activity of organisms and the spread of insects. This is in accordance with the opinion of Sodiq (1993) which states that in general insects are very susceptible to drought, especially in oviposition, and at the stage of larvae that come out of the fruit for pupation, and the emergence of imago is also influenced by optimal soil moisture for pupa life, which is between 80- 90%.

CONCLUSIONS

Based on the results of research conducted on Lime cultivation in Plosogenuk Village, Perak Subdistrict, Jombang Regency. The conclusion was that the types of insects obtained in the study were

504 individual families, consisting of 6 families of Coccidae Aleyrodidae, Flatidae, Dolichopodidae, Porcellionidae, Alydidae. The highest insect abundance (K) value was found in the Coccidae family with the Order Homoptera, which was 53,968. The dominance index value is 0.29 indicating the result that there is no family that dominates in Jeuk Nipis cultivation.

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