



Diversity of Insect Species in Singha Merjosari Park, Malang City

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Abstract: Insects are a group of living things that have the highest number of species. This study examines the diversity of insect species that aims to determine the diversity of insect species found in Singha Merjosari Park, Malang City. This research was conducted on Monday, November 7, 2022. This research used the observation method to collect data by direct observation. This method is used as an observation of the object of research, especially on the focus of the problem under study. The data obtained consisted of the number of species and body morphological characteristics of the insect species. The results of the study found six species of insects with different body morphologies. The special feature of insects is their body is divided into three main parts, namely the head (Caput), chest (Thorax) and stomach (Abdomen). Insects have a function to help pollinate or fertilize flowers, as decomposers or decomposers, as environmental bioindicators, as producers of materials that have high economic value such as producing honey, medicinal ingredients, as cleaners and soil conditioners so that they can be found in their distribution in the area around Singha Merjosari Park, Malang City.

Keywords: Body Morphology; Insects; Species

Introduction

Insects are one of the organisms that belong to the Kingdom Animalia, Phylum Arthropoda and are grouped into the Insecta class. Insects are one of the animals that are often found in the surrounding environment. This shows that insects are the most common group of animals on earth. Insects can be found on the ground, trees, water or in the air (Permana & Putra, 2018).

According to Marshall (2005), insects are arthropod animals that have six legs and their bodies consist of three parts, namely the head, thorax and (chest) and abdomen (stomach). The head has a pair of antennae, the chest has three pairs of legs and one or two pairs of wings or no wings. Legs and wings can be lost according to life and evolution carried out by insects. Insect limbs have segments. The shape of the insect's legs undergoes modification according to its life. On the abdomen (stomach), insects have 10-11 segments. In the first

segment there is a Tympanum (hearing device). Each segment has a spiracle (stigma).

The unique thing that insects have, namely the ability of insects to reproduce. In fact, there are differences in the ability of each female parent to produce the number of fertile eggs. Having a long time of one generation varies from a few days to years. This has a good impact on the surrounding environment. Because, it is inconceivable if there is no mechanism to control the number of insects, then insects can cover the entire surface of the earth (Permana & Putra, 2018).

The unique thing that can be observed from insect behavior is the ability of insects to defend themselves from their natural enemies. Insects can pretend to be dead to trick their enemies. Insects are also able to change the color of their bodies and wings to make them invisible to their natural predators. Insects are also able to communicate with each other by using chemical compounds called pheromones. Based on their function, there are two kinds of pheromones, namely releasers and primers. Releasers play a role in encouraging the

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emergence of behavioral responses, while primers play a role in regulating the physiological conditions of insects (Edhi Martono, 1997). Pheromones which are classified as releasers function to recognize the opposite sex, recognize the population of the group and as a sign of danger (Permana & Putra, 2018). The queen bee secretes pheromones which are classified as primers. This type of pheromone functions to inhibit the growth of the female bee's reproductive organs (Edhi Martono, 1997).

Insects have a function to help pollinate or fertilize flowers, as decomposers or decomposers, as environmental bioindicators, as producers of materials that have high economic value such as producing honey, medicinal ingredients, as cleaners and soil conditioners so that they can be found in their distribution in the area around the Singha Merjosari Park, Malang City (Khamidah, 2019). It is stated that insects can help in this ecosystem, but many humans still feel disadvantaged as said by Alfin said that insects have the characteristics of 3 pairs of legs or 6 legs, the outer body is covered with chitin, and some species have wings. Insects are not always harmful. They will attack when they feel threatened, whether intentional or unintentional. What often happens is that humans accidentally disturb the lives of insects so they get attacked (Alfin, 2023).

Insects have a great diversity. A total of 1,413,000 species have been identified and known. More than 7,000 new species are discovered every year. In an ecosystem, almost can be found insects. The more various types of insects found, the more ecosystems studied. In an ecosystem, there are insects that act as pollinators, predators, scavengers and parasitoids (Siregar, Bakti, & Zahara, 2014). The existence of insects, especially in urban areas, is often ignored by the community. The existence of insects in urban areas is a positive thing because insects have an ecological, aesthetic and educational role. Insects' sensitivity to environmental changes is a determining factor for their existence in nature. This is related to its ability to respond to environmental disturbances in a certain pattern. The abundance and diversity of insects in a habitat have characteristics and environmental conditions that are different from other insect habitats (Hadi & Aminah, 2012; Taradipha et al., 2018).

Some members of the insect have positive or negative roles in agriculture and life. The negative role of insects in agriculture and life is as a plant eater, as a vector that causes disease in plants, and as a cause of disease in humans. The positive roles of insects are as pollinators or pollinators, as decomposers or decomposers, as predators or parasitoids (natural enemies), as environmental bioindicators, as producers of useful and useful materials in the health sector

(Arnaiz, 2022). Insects are beneficial to humans. Insects are able to survive in a variety of habitats, have a high reproductive capacity, the ability to eat different types of food, and the ability to save themselves from enemies. In addition, insects also act as pollinators or help pollinate plants, as environmental bioindicators, as producers of materials that are useful and beneficial for the health sector, for example used as herbal medicines (Meilin, 2016).

The presence of insects can also harm humans. There are tens of thousands of insects that can damage agricultural land. This type of insect affects the decrease in yields obtained (Hadi & Aminah, 2012). Not only agricultural land, insects can also eat cultivated plants and are carriers of diseases in plants and humans (Meilin, 2016). However, according to insects in the world have many roles, one of which is as a pollinator. Pollinators are insects that help pollinate 40% of plants (Atmowidi, 2019). In the role of insects there are also insects that can survive by eating other insects, either partially or completely. The difference between parasitoid insects and predators is the way of life and how to eat other insects. Predatory insects are usually bigger and stronger. Meanwhile, parasitoid insects are small and weaker than the insects they target. Parasitic insects will actively search for their host to get food. Parasitoid insects and predators act as natural controllers on plantations because they eat plantation pests (Nova, 2020).

This study aims to examine the diversity of insect species in the Singha Merjosari park, Malang City. Insects that are scattered in the area have several morphological types that distinguish one species from another. This research is expected to increase knowledge and information related to the diversity of insects that exist. The tools and materials used for this research were cellphones and stationery, as well as data collection which was carried out by exploring the Singha Merjosari park area, Malang City.

Method

The research method used in this study is a descriptive method using a purposive sampling technique (Istiqamah, 2018). Data collection was carried out by exploring the area under study. In completing the data, documentation, description, and identification specimens were carried out using various literature. Each type of insect (Insecta) found was photographed and then taken and recorded information regarding the location, date of exploration, type of insect (Insecta), habitat, and various other characteristics encountered for further identification later. Identification will be carried out by observing the external morphology of the

sample obtained and then matching it with some literature as a reference.

This research was conducted on November 7 2022 in the Singha Merjosari Park area, Lowokwaru District, Malang City. Researchers explored every part of the Singha Merjosari Park area starting at 12.00 WIB and ending at 14.00 WIB. The tools used in this study included writing instruments used to record observations of the morphological characteristics of insects (Insecta) in the research process. In addition, there is another tool for documenting samples, namely using a cellphone camera.

Results and Discussion

Based on the observations we have made at the Singha Merjosari park, Malang City. After collecting data from the research, six species of insect diversity were found in the Singha Merjosari park, Malang City. The various species that have been found certainly have differences that are used as differentiators from one species to another. Of the eight species found, each species has a different morphology. Of the six species can be explained through the description below.

Little Black Ant (Monomorium minimum)



Figure 1. Minimum monorium

Taxonomy
 Kingdom: Animalia
 Phylum: Arthropoda
 Class: Insects
 Sub-Family: Myrmicinae
 Genus: Monorium
 Species: M. minimal

Description

Monomorium minimum is a type of small black ant that is native to North America. The minimum monomorium includes ants which are cosmopolitan, so they can be found anywhere. Apart from that, these ants also have broad food preferences such as dead animals and plants, mushrooms, and plant liquids or honey buds (Putra et al., 2021). This ant is a monomorphic species that has one caste of workers and is polygynous which allows it to have more than one queen in one nest. Monomorium minimum this type of

ant can devour anything from excrement to dead animals. The color is glossy black with workers about 1 mm long and 4 mm queens (Setiawati et al., 2021). The small black ant species (Monomorium minimum) is among the most commonly found compared to other species (Mahfuza, Mailiza, & Afrida, 2020).

Thorn Caterpillar (Nymphalidae Caterpilla)



Figure 2. Nymphalidae caterpillars

Taxonomy
 Kingdom: Animalia
 Phylum: Arthropoda
 Class: Insects
 Order: Lepidoptera
 Family: Nymphalidae
 Genus: Nymphalidae
 Species: Nymphalidae caterpillars

Description

Thorn caterpillar (Nymphalidae Caterpillar) is an animal that belongs to the insect class. Thorn caterpillars can live in forests or quiet meadows. Thorn caterpillar food is leaves. Therefore, thorn caterpillars are often found clinging to leaves in search of food. The thorn caterpillar that we found has black characteristics, with a long white line around its body and has blue spots on each segment. In addition, in his body there are thorns that are equipped with orange sacs on the sides of his body. When the thorn caterpillar is in a state of danger, its thorns will emit a yellow sticky liquid (Mullen, 2002).

Locust Grasshopper (Locusta Migratoria)



Figure 3. Locusta Migratoria

Taxonomy

Kingdom: Animalia
 Phylum: Arthropoda
 Class: Insects
 Sub-family: Orthoptera
 Genus: Acrididae
 Species: Locusta

Description

Monomorium minimum is a type of small black ant that is native to North America. This ant is a monomorphic species that has one caste of workers and is polygynous which allows it to have more than one queen in one nest. *Monomorium minimum* this type of ant can devour anything from excrement to dead animals. It is glossy black in color with workers about 1mm long and 4mm queens. The wandering locust experiences 3 distinct population phases, namely the solitary, transitional and gregarious phases. The typical symptom of a locust attack is irregular serrated tears on the leaves. At a high level of attack, locusts are able to eat stems, leaves and plant buds (Simluhtan, 2022). In the solitary phase, locusts behave individually and do not damage. In the transition phase, small groups begin to form. In the gregarious phase, large groups are formed. These large crowds are detrimental to the environment they pass through, for example destroying rice fields and causing crop failure, to damage fruits (Damarjati, 2017). According to research (Sudewi, Ala, Baharuddin, & BDR, 2020), this insect appears and perches on the leaves of rice plants in the evening until late at night. . In the life cycle of the traveling locust, the average is 76 days so that in a year it can produce 4-5 generations in the tropics, especially in Southeast Asia. Meanwhile, these insects in sub-tropical regions only produce one generation per year. The phenomenon of the large-scale migratory locust population explosion is thought to be closely related to two main factors, namely the migratory locust biology and environmental factors (Putra, 2017).

Bees (*Monoceromyia javana*)

Figure 4. *Monoceromyia javana*

Taxonomy

Kingdom: Animalia
 Phylum: Arthropoda
 Class: Insects
 Order: Diptera
 Family: Syrphidae
 Genus: *Monoceromyia*
 Species: *Monoceromyia javana*

Description

Species in this genus are mostly found in Afrotropical, Australasian, Neotropical and Oriental regions. They mimic wasps and the genus is distinguished by the metapleurals which are far apart behind the hind coxae. The frontal base of the antennae extends at least as long as the antennal basal segment and the second abdominal tergum is longer than it is wide and narrows.

In *Monochromia javana* the head is wider than the chest to the naked eye. A frontal prominence is present, 4.0-4.3 times longer than it is wide; antenna scape slightly shorter than frontal prominence; and apical yellow arista. Prominent face, antero-ventral. The front is yellow with a narrow median black vitta, the vitta of the face is about 0.19-0.24 times the width of the face. Black stands out on the front. Thorax mainly black, scutum with yellow macules on post pronotum and notopleura; yellow vitta from the postalar callus to the suture on both sides; black pleuron with three yellow macules on the posterior episternum, dorsal metepisternum and on the animeron (Sankararaman, 2020). Yellow scutellum. The wing membrane is hyaline except for the anterior half, along the superior vein, M vein and bm-cu vein; yellow halter. Black belly (except tergite II, brown), tergite I with a pair of yellow spots, tergite II is 4 times the width; 3 yellow bands across digits II, III and IV, one in each tergite, posteriorly. Legs including coxae and trochanters are brown to black. Apical 1/8 of femur I and II brown to black, apical 1/5-1/3 of femur III black, remainder yellow, medial 1/6 of all tibia black, tarsi pale brown. *Monoceromyia javana* is a species of fly belonging to the family Tachinidae, known as fly parasitoids that infect other insects. *Monoceromyia javana* is found in the Southeast Asian region, including Indonesia, Malaysia, Thailand and Vietnam (Vids, 2022).

Butterflies (Junonia erigone Cramer)

Figure 5. *Junonia erigone* Cramer

Taxonomy

Kingdom: Animalia
 Phylum: Arthropoda
 Class: Insecta
 Order: Lepidoptera
 Family: Nymphalidae
 Genus: Junia
 Species: *Junonia erigone* Cramer

Description

Junonia erigone is a type of butterfly that we can find a lot in the area around trees and is a type of butterfly that has various colors and batik (Beccaloni, 2018). This butterfly has triangular wings with serrated concave mirror parts. On the back of the wing shape is rounded and has a convex serrated terminus. The upper wing has a brown base color in the middle and dark brown on the apical side, with pale yellow spots on the sub-apical side, black-orange ocelli spots on the cubital frame, and pale yellow spots on the marginal areas (Rohman, 2019). On the hind wings it has a light brown base color and in the submarginal area there are black-orange ocelli spots which are positioned in a row and there are dark brown lines in the marginal and termen areas. The lower wing has the same motif as the top but the color is slightly faded, while the back wing is light brown. The lower body has a light brown color and the upper part is dark brown. On the venation of the forewing there are five radial (R) frames, the discal cell is open, has three media frames, has two cubital skeletons, one anal frame, on the hind wings there is one radial frame, three media frames, two cubital skeletons, and two anal (Rohman, 2019).

Flies (Musca domestica)

Figure 6. *Musca Domestica*

Taxonomy

Kingdom: Animalia
 Phylum: Arthropoda
 Class: Hexapoda
 Order: Diptera
 Family: Muscidae
 Genus: Musca
 Species: *Musca domestica*

Description

Musca domestica fly is a mechanical transmission animal as an animal that spreads various infectious diseases. Moist and dirty areas are often a nest for flies. These flies also often regurgitate what they have eaten where they have landed, where the material vomited by flies is dirty material. If flies land on food and the food is consumed by humans, humans who eat the food can cause diarrhea (Piri et al., 2022). Flies have a segmented body with each body part clearly separated. The limbs are paired with symmetrical right and left halves, with the characteristics of the body consisting of 3 separate parts, the head, thorax and abdomen, and having a pair of antennae (antennae) with 3 pairs of legs and 1 pair of wings. The flight distance of flies is highly dependent on the availability of food. House flies can fly long distances and can reach a distance of 15 km within 24 hours. Most flies stay within 1.5 km around their breeding grounds, but some can go as far as 50 km. The fly prefers a place that is not windy, but cool, and at night it often settles in the bushes outside the house. These insects are very attracted to everyday human foods such as sugar, milk, processed foods, human and animal feces, blood and animal carcasses. The form of food is liquid or wet food, while dry food is moistened by the saliva first, then sucked (Sukmawati et al., 2019). Flies can be an indicator of environmental cleanliness. There are around 60,000-100,000 species of flies and some of them are dangerous fly species that can transmit disease. Several species of

flies that can interfere with health, namely *Musca domestica* (house flies), *Stomoxys calcitrans* (cage flies), *Phaenicia sp.* (green flies), *Sarcopaga sp.* (meat flies), and *Fania* (small flies) (Rahmayanti et al., 2022).

Conclusion

From the observations we have made at the Singha Merjosari Park, Malang City, it can be concluded that there are many types of insects in the Sangha Arjosari Park, including Small Black Ants (*Monomorium minimum*), Thorn caterpillars (Nymphalidae Caterpillar), Grasshoppers (*Locusta Migratoria*), Bees (*Monochromia javana*). Butterflies (*Junonia erigone* Cramer), and Flies (*Musca domestica*).

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Conflicts of Interest

The authors declare no conflict.

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