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EXPLORATION AND IDENTIFICATION OF INSECTS IN ORNAMENTAL PLANTS IN THE FIELD

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ABSTRACT

Flowering ornamental plants have an important role as an aesthetic element as well as a microhabitat for various types of insects. The presence of insects in ornamental plants can have a positive impact as pollinators, predators, parasitoids, and decomposers, but some others have the potential to be detrimental because they act as pests. This study aims to explore and identify the types of insects found in various flowering ornamental plants and classify their roles as beneficial or detrimental insects. The study uses an exploratory descriptive method with purposive sampling techniques on 11 types of flowering ornamental plants in the field. Insect sampling was carried out using the sweep net method of 10 swings on each observation plot, then the insects caught were identified based on morphological characteristics. The data was analyzed in a quantitative descriptive manner through the calculation of density, frequency, and Shannon-Wiener diversity index. The results showed that flowering ornamental plants are a place for various types of insects with different compositions and abundance in each type of plant. The insect diversity index value is generally in the medium category, with variations between morning and evening observations. The insects found consist of potentially beneficial groups, such as pollinators and predators, as well as detrimental groups, such as aphids, whiteflies, thrips, and plant fluid-sucking insects. This study shows that the identification of insects in ornamental plants is important as the basis for sustainable and environmentally friendly management of ornamental plants.

Keywords: flowering houseplants; insects; identification; diversity; sweep net.

INTRODUCTION

Ornamental plants are one of the horticultural commodities that have aesthetic, ecological, social, and economic value. In the study of floriculture, ornamental plants are not only understood as plants that are used to beautify the environment, but also as part of a landscape system that functions to support environmental quality, enrich biodiversity, and contribute to regional and national economic growth (Ministry of Agriculture, 2013). The beauty of ornamental plants can be reviewed from various plant organs, such as leaves, flowers, stems, fruits, roots, aromas, and overall plant morphological shapes. Therefore, ornamental plants have diverse visual and ecological characters, both as fence plants, vines, potted plants, and decorative elements of open spaces and yards (Widyastuti, 2018).

Ecologically, flowering ornamental plants have an important role because they are able to provide resources for other organisms, especially insects. Flowers in ornamental plants produce certain nectar, pollen, colors, shapes, and aromas that function as ecological signals for insects that visit flowers. In the theory of plant-insect interaction, the relationship between flowers and insects can occur through visual and chemical attraction mechanisms. Insects are generally attracted to flowers because of the presence of pollen, nectar, flower color, flower size, number of flowers, aroma, and floral morphological conditions that are suitable for feeding or pollinating activities (Pulungan & Afrianti, 2021). Pollen is also an important source of nutrients because it contains proteins, fats, carbohydrates, vitamins, and minerals with different compositions depending on the plant species (Andrian & Maretta, 2017).

The interaction between flowering plants and insects can be explained through the concept of mutualism. In mutualistic relationships, plants provide a source of feed in the form of nectar and pollen, while insects help the pollination process through the transfer of pollen from one flower to another. Pollinating insects have an important role in the reproductive success of flowering plants because they can increase the chances of pollination, especially in plants that depend on biotic agents (Asbani & Winarno, 2009). This relationship is known as entomophilia, which is a pollination process assisted by insects (Hill, 1994). Thus, the presence of insects in flowering ornamental plants cannot be seen only as a nuisance, but also as part of an ecological process that maintains the sustainability of plant ecosystems.

In addition to being pollinators, insects in ornamental plants also have various ecological functions. Some insects can act as predators, parasitoids, decomposers, and natural enemies for insect pests. Flowering plants are able to provide nectar and pollen as an additional source of feed for predators, adult parasitoids, and pollinators (Gurr et al., 2004; Landis et al., 2000; Supriyadi, 2015). From an agricultural ecological perspective, the presence of flowering plants in a habitat can support the conservation of natural enemies and improve the balance of arthropod communities. This shows that flowering ornamental plants have the potential to become microhabitats that support the existence of beneficial insects.

However, not all insects found in ornamental plants have a positive impact. Some insects can act as pests because they damage leaves, flowers, stems, or other parts of the plant. Insect pests can cause a decrease in the visual quality of ornamental plants, inhibit plant growth, and reduce their aesthetic and economic value. In ornamental plants, even small damage can reduce the selling value because this commodity is highly dependent on morphological appearance and visual beauty. Therefore, insect identification is important to distinguish between beneficial and detrimental insects for ornamental plants.

The diversity of insects in flowering ornamental plants is also influenced by habitat conditions. Environmental factors such as the availability of flowers, the number and diversity of feed sources, microclimatic conditions, and the sustainability of nectar and pollen sources over time can affect the number of insect species and individuals present in a plant (Hodgson et al., 2011; Lestari et al., 2014). Insect diversity is closely related to pollination success because the more diverse the species of insects that visit, the more likely it is that ecological interactions will occur that support plant reproduction (Widhiono & Sudiana, 2015). In the pollination process, plants require an optimal number of insect visit frequencies, both in terms of quality and quantity of visits (Asra, 2015).

Studies on the exploration and identification of insects in flowering ornamental plants are important because there is still limited information about the composition of insects present in various types of ornamental plants in the field. In fact, this information is needed as a basis for ornamental plant management, especially to find out the types of insects that act as pests, pollinators, predators, parasitoids, and other organisms that contribute to the balance of the

ecosystem. Insect identification can also be the first step in more precise pest control, because plant management cannot be done effectively without knowing the type and role of the organisms found.

Based on this description, this research is important to explore and identify various types of insects found in flowering ornamental plants in the field. This research is focused on observing insects present in several types of flowering ornamental plants, as well as grouping insects based on their role as beneficial or detrimental insects. In the thesis manuscript on which this article is based, research was carried out on flowering ornamental plants in the field with the aim of identifying various insect species, classifying beneficial and harmful insects, and exploring the presence of insects in various ornamental plants.

Thus, the results of this study are expected to provide scientific information about insect diversity in flowering ornamental plants. This information can be used as a basis for sustainable management of ornamental plants, especially in maintaining a balance between the existence of beneficial insects and the control of insects that have the potential to harm plants.

RESEARCH METHODS

Types and Approaches to Research

This study uses an exploratory descriptive approach with a field survey method. The descriptive approach is used to describe the type, number, and distribution of insects found in flowering ornamental plants, while the exploratory approach is used to trace the presence of insects in various types of ornamental plants in the field. The survey method is suitable for use in direct observation-based research because it is able to provide a factual picture of the condition of the research object in a certain location (Asra, 2015).

Sample determination is carried out by purposive sampling technique, which is the deliberate selection of samples based on certain criteria that are relevant to the purpose of the research. This technique is used because the observed plants must meet the criteria as flowering ornamental plants and have the potential for the presence of insects. Purposive sampling is commonly used in exploratory research when researchers need samples that are considered most suitable to answer the research objectives (Etikan et al., 2016).

Place and Time of Research

The research was carried out in Medan Helvetia District, Sei Sikambing C II Village, Medan City, North Sumatra. The research location is at an altitude of about 28 meters above sea level. The research activity began with a survey of flowering ornamental plants in the field, then continued with observation and sampling of insects on predetermined plants. The selection of locations was carried out based on the presence of various types of flowering ornamental plants that allow interaction between plants and insects.

Research Object

The object of this study is the insects found in flowering ornamental plants. Flowering ornamental plants were chosen as observation objects because flowers provide ecological resources such as nectar and pollen that can attract the presence of insects, either as pollinators, predators, parasitoids, decomposers, and plant pests. Insects in flowering plants are generally attracted by the color, aroma, nectar, pollen, flower size, and morphological conditions of the flowers (Pulungan & Afrianti, 2021). In addition, the availability of feed in flowers is related to the diversity of insects present in a habitat (Sedgley & Griffin, 1989).

The types of flowering ornamental plants observed include Mussaenda frondosa or beautiful nusa, Plumeria or cambodia, Cananga odorata or ylang, Ixora paludosa or asoka, Allamanda cathartica or yellow trumpet, Hibiscus rosa-sinensis or hibiscus flower, Bougainvillea glabra or purple bougenville, Lavandula angustifolia or lavender, Antigonon leptopus or bridal tear, Clitoria ternatea or telang, and Bougainvillea spectabilis or white bougenville.

Materials and Tools

The materials used in this study include flowering ornamental plants as observation objects, alcohol for the preservation of insect samples, glue, and insect determination books as identification references. The tools used include insect nets or sweep nets, jars, plastic cups, tile cloth, magnifying glasses, rubber bands, wood, stopwatches, and other supporting tools. The use of aids such as magnifying glass and determination books is necessary to observe the morphological character of

insects, because insect identification is generally carried out based on body features, antennae, wings, limbs, and other morphological structures (Borror et al., 1992).

Research Procedure

The research begins with a location survey to determine the observation area of flowering ornamental plants. The survey is carried out by observing the presence of flowering ornamental plants and ensuring the possibility of insect activity on flowers, leaves, stems, or other parts of the plant. After the sample plants are determined, direct observation of the insects present on each plant is carried out.

Insect sampling was carried out using the insect net method or sweep net. The sweep net technique was carried out by swinging a net around the flowering ornamental plant that became the object of observation. This method was effectively used to catch insects that actively moved or flew around vegetation, especially on flowers and plant crowns (Borror et al., 1992; Southwood & Henderson, 2000). In each observation plot, sampling was carried out 10 times of net swing. The caught insects were then collected, separated, and stored for further identification process.

Insect observation was carried out on predetermined flowering ornamental plants. The data collected included the type of insect, number of individuals, time of presence, and plants where the insects were found. Insects obtained from the capture results were then grouped based on their type and ecological role. This grouping is important because insects on plants can act as pollinators, predators, parasitoids, decomposers, or pests that have the potential to harm plants (Gullan & Cranston, 2014).

Insect Identification

Captured insects are identified based on morphological characters by referring to the insect determination book. Identification is carried out up to the genus or species level if the morphological features found allow. The observed characters include body shape, body size, body color, antennae shape, wing type, leg shape, and other special characteristics that distinguish between insects. Morphological identification is a common approach in insect taxonomy because the body structure of insects can be used as a basis for identifying orders, families, genus, or species (Borror et al., 1992; Triplehorn & Johnson, 2005).

After the identification process, insects are grouped based on their ecological status, namely beneficial insects and detrimental insects. Beneficial insects include pollinators, predators, parasitoids, and decomposers, while harmful insects include insects that have the potential to become pests on ornamental plants. This grouping is carried out to determine the composition of insects associated with flowering ornamental plants and their potential role in plant ecosystems.

Observation Variables

The variables observed in this study included insect type, number of insect individuals, absolute density, relative density, absolute frequency, relative frequency, and insect diversity index. Insect types were observed to determine the composition of species or genus found in flowering ornamental plants. The number of individuals was observed to determine the abundance of insects in each plant. Meanwhile, density and frequency were used to describe the dominance and level of insect presence at the observation site.

The diversity index is used to determine the structure of insect communities in flowering ornamental plants. Species diversity is not only determined by the number of species found, but also by the distribution of the number of individuals in each species in a community (Magurran, 2004). Therefore, the diversity index can be used to see whether insect communities in ornamental plants are dominated by a particular species or are more evenly distributed.

Data Analysis

The data obtained was analyzed in a quantitative descriptive manner. Descriptive analysis was used to explain the types of insects found, the number of individuals, and their ecological role in flowering ornamental plants. Quantitative analysis was carried out by calculating absolute density, relative density, absolute frequency, relative frequency, and insect diversity index.

Absolute density is used to indicate the number of individuals of an insect species found in the observation habitat. Relative density is used to determine the percentage of the number of individuals of an insect species compared to the total number of all individuals found. The formula for relative density is as follows:

$$KR = \frac{KM}{\Sigma KM} \times 100\%$$

Description:
KR = Relative density
KM = Number of individuals of a type of insect
∑KM = Total number of individuals of all insect species

Absolute frequency is used to indicate the number of presence of a type of insect in observation. Relative frequency is used to determine the percentage of presence of a type of insect compared to the total frequency of all types of insects. The formula for relative frequency is as follows:

$$FR = \frac{FM}{\Sigma FM} \times 100\%$$

Description:
FR = Relative frequency
FM = Frequency of presence of a type of insect
∑FM = The total number of frequencies of all insect species

The insect diversity index is calculated using the Shannon-Wiener index. This index is commonly used in community ecology studies to measure the level of diversity based on the number of species and the proportion of individuals in each species (Magurran, 2004; Shannon, 1948). The formula of the Shannon-Wiener index is as follows:

$$H' = -\sum (p_i \ln p_i)$$

Description:
H' = Shannon-Wiener diversity index
pi = Proportion of individuals of type i to total individuals
ln = Logaritma natural

The diversity index value was then interpreted to determine the level of insect diversity in each flowering ornamental plant. In general, a low index value indicates a community that tends to be dominated by a few insect species, while a higher index value indicates a more diverse and relatively stable community (Krebs, 1999; Magurran, 2004).

RESULTS AND DISCUSSION

Research Findings

Based on the results of field surveys, 11 types of flowering ornamental plants were found that became habitats or places to visit various types of insects and organisms visiting plants. These ornamental plants include Mussaenda frondosa or nusa indah, Plumeria or frangipa, Cananga odorata or kenang, Ixora paludosa or asoka, Allamanda cathartica or yellow trumpet, Hibiscus rosa-sinensis or hibiscus, Bougainvillea glabra or purple bougenville, Lavandula angustifolia or lavender, Antigonon leptopus or bridal tear, Clitoria ternatea or telang, and Bougainvillea spectabilis or white bougenville. The eleven plants have different flower characteristics, so they have the potential to attract different types of insects.

The results of observations show that the insects found in flowering ornamental plants have a diverse composition. Some of the types found include Dolichoderus thoracicus, Aulacophora similis, Musca domestica, Misumena vatia, Valanga nigricornis, Lucilia sp., Myzus persicae, Sarcophaga sp., Bemisia tabaci, Aphis gossypii, Bactrocera dorsalis, Monomorium minimum, Vespula vulgaris, Apis cerana, Orthetrum sabina, Eurema sp., Planococcus citri, Thrips tabaci, Xylocopa sp., Chilocorus sp., and several other species. The findings show that flowering houseplants are visited not only by pollinating insects, but also by groups of pests, predators, parasitoids, and other organisms associated with the plant.

Quantitatively, the number of individuals found in the morning observation reached 470 individuals, while in the afternoon observation reached 517 individuals. This shows that insect activity in flowering ornamental plants does not only occur in the morning, but also quite high in the afternoon. However, the value of the diversity index in the morning is generally higher than in the afternoon. The average diversity index in the morning is 1.58, while in the afternoon it is 1.29. Thus, although the number of individuals in the afternoon is more, the insect community in the morning tends to be more even and more diverse.

Table 1. Summary of Insect Diversity Index in Flowering Ornamental Plants

Flowering houseplants	H' morning	H' evening	General interpretation
Mussaenda frondosa	2,240	1,456	Sedang
Plumeria	1,874	1,788	Sedang
Cananga odorata	2,051	1,412	Sedang
Ixora paludosa	1,440	1,703	Sedang
Allamanda cathartica	1,020	0,659	Sedang–rendah
Hibiscus rosa-sinensis	1,317	0,303	Sedang–rendah
Bougainvillea glabra	1,348	0,301	Sedang–rendah
Lavandula angustifolia	1,750	1,978	Sedang
Antigonon leptopus	1,716	1,757	Sedang
Clitoria ternatea	1,381	1,418	Sedang
Bougainvillea spectabilis	1,280	1,409	Sedang

Based on the Shannon-Wiener index value, most flowering ornamental plants are in the category of moderate diversity. In the morning observations, the highest index was found in Mussaenda frondosa with an H' value of 2.240, followed by Cananga odorata with 2.051 and Plumeria with 1.874. Meanwhile, the lowest index in the morning was found in Allamanda cathartica with an H' value of 1.020. In the afternoon observation, the highest index was found in Lavandula angustifolia with an H' value of 1.978, followed by Plumeria with 1.788 and Antigonon leptopus at 1.757. The lowest index in the afternoon was found in Bougainvillea glabra at 0.301, Hibiscus rosa-sinensis at 0.303, and Allamanda cathartica at 0.659. These data show that the level of diversity is not only influenced by the number of individuals found, but also by the level of equal distribution of the number of individuals between the sexes.

Another finding that is quite prominent is the dominance of several groups of insects that suck plant fluids, such as Aphis gossypii, Myzus persicae, Bemisia tabaci, Planococcus citri, and Thrips tabaci. This group has the potential to harm ornamental plants because they can suck plant fluids, interfere with growth, reduce the visual quality of plants, and have the potential to become disease vectors. On the other hand, insects that have the potential to be beneficial are also found, such as Apis cerana, Xylocopa sp., and Eurema sp. as insects that visit flowers or pollinators, as well as Chilocorus sp., Orthetrum sabina, Misumena vatia, and Sycanus sp. which have the potential to act as predators or natural enemies.

Research Discussion

The presence of different types of insects in flowering ornamental plants suggests that ornamental plants not only function as aesthetic elements, but also as ecological components that can provide resources for various organisms. Flowers provide nectar, pollen, color, aroma, and certain morphological structures that can attract visiting insects. This is in line with Purwantiningsih et al.'s (2025) research on red guava flowers in East Java which found 3,432 individual insects from 17 families and five orders, with pollinator groups dominating throughout the study site. The study also showed that insect activity is influenced by flowering periods, temperature, and light intensity.

Diversity index values, which are mostly in the medium category, indicate that insect communities in flowering ornamental plants are relatively stable, but still show the dominance of certain species. In some plants, such as Mussaenda frondosa, Cananga odorata, Plumeria, Lavandula angustifolia, and Antigonon leptopus, the H' value is relatively higher than that of other plants. This can be attributed to variations in flower morphology, feed availability, flower color, and the possibility of a more suitable microhabitat for insects. These findings are in line with Koneri et al. (2024), who show that habitats with more complex vegetation structures have higher pollinating insect richness and diversity than simpler habitats.

The difference in diversity index values between morning and evening shows the dynamics of insect activity based on observation time. In the morning, the average value of H' is higher than in the afternoon, although the number of individuals in the afternoon is larger. This condition suggests that the afternoon tends to be dominated by certain species, while the morning has a more even distribution of individuals between species. This pattern is relevant to the findings of Sinaga et al. (2024) on coffee pollinating insects in North Sumatra, which showed that the abundance and activity

of insect visits differed according to habitat conditions and time of activity. Thus, observation time is an important factor in the study of insect communities because each group of insects can have a different rhythm of activity.

The dominance of insects such as Aphis gossypii, Myzus persicae, Bemisia tabaci, Planococcus citri, and Thrips tabaci indicates the potential for pest pressure on flowering ornamental plants. These groups are generally phytophage insects that can utilize plant tissues as a food source. The presence of Bemisia tabaci, for example, is noteworthy because this insect is known to be an important pest on various commodities, including vegetable crops, cotton, tobacco, and ornamental plants. Hussain and Freed (2025) assert that B. tabaci damages plants by sucking leaf fluid and producing honeydew that can trigger soot fungus growth and inhibit photosynthesis.

The presence of ants, especially Dolichoderus thoracicus and Monomorium sp., is also an important finding because ants are often associated with honeycomb-producing insects such as aphids, mealybugs, and whiteflies. In this research paper, D. thoracicus is described as a black ant that is often found associated with mealybugs because mealybugs secrete honeydew as a source of ant food. This pattern suggests that the presence of ants on ornamental plants can be an indirect indicator of the presence of insects that suck plant fluids.

Despite the presence of insect pests, flowering ornamental plants also support the presence of beneficial insects. The discovery of Apis cerana, Xylocopa sp., Eurema sp., as well as several predator groups suggests that flowering ornamental plants can serve as microhabitats for pollinators and natural enemies. Amanina et al. (2025) showed that the addition of refugia flowers to strawberry cultivation increases the diversity and abundance of pollinating insects, with Apis cerana being one of the dominant pollinators. The study also showed that the abundance of pollinators contributes to improving the quality and quantity of strawberry fruits.

These findings reinforce the concept that flowering plants can serve as refugia or supportive habitats for beneficial insects. Aminatun et al. (2023) found that the use of flowering trap plants such as marigolds can increase the diversity index and evenness of pollinating insects in chili plants. In addition, Jachowicz and Sigsgaard (2024) through meta-analysis showed that flower strips with a more diverse mix of flower types are able to increase the presence of natural enemies more strongly than simple flower compositions. Thus, the diversity of flowering ornamental plant types has the potential to support the balance of insect communities, especially when managed as part of a pollinator-friendly landscape and natural enemies.

In the context of urban landscapes, the results of this study are also relevant because the observation location is in the city of Medan. Ornamental plants in urban environments can act as pockets of habitat for insects, especially when natural green space is increasingly limited. Balogun et al. (2025) show that flower variables are important predictors of pollinator diversity in the mosaic of urban landscapes, agriculture, and natural areas. Meanwhile, Park et al. (2026) emphasized that vegetation quality, plant density, and plant species richness can be more important factors than the area of the park itself in supporting insect diversity in urban parks.

However, the results of this study also show that flowering ornamental plants do not always only attract beneficial insects. Some plants actually show the dominance of certain pests, such as Aphis gossypii in Bougainvillea glabra and Clitoria ternatea, Thrips tabaci in Allamanda cathartica, and Vespula vulgaris in Hibiscus rosa-sinensis in afternoon observations. Therefore, the management of flowering ornamental plants needs to be directed at the principle of ecological balance, namely maintaining plants as a source of beneficial insect feed, but still monitoring insect pest populations. Li et al. (2022) show that flowering landscapes can support predators and help reduce the density of Bemisia tabaci, so increasing the proportion of flowering plants and plant diversity can be an ecological strategy in pest management.

Overall, this study shows that flowering ornamental plants have a dual role in urban microecosystems. On the one hand, ornamental plants can be a source of feed and a stopover for pollinating insects as well as natural enemies. On the other hand, the same plants can also be a place for insect pests to grow or gather. Therefore, it is important to identify insect species in flowering ornamental plants as the basis for more sustainable ornamental plant management. Information about the type, abundance, time of presence, and ecological role of insects can help determine plant maintenance strategies, conservation of beneficial insects, and more precise and environmentally friendly pest control.

CONCLUSIONS

Based on the results of the study, it can be concluded that flowering ornamental plants at the research site are habitats and places of visit for various types of insects with diverse ecological roles, both as beneficial and detrimental insects. The types of ornamental plants observed include Mussaenda frondosa, Plumeria, Cananga odorata, Ixora paludosa, Allamanda cathartica, Hibiscus rosa-sinensis, Bougainvillea glabra, Lavandula angustifolia, Antigonon leptopus, Clitoria ternatea, and Bougainvillea spectabilis. The insects found showed variations in composition and abundance in each plant, with the diversity index generally in the medium category. Some insects are potentially beneficial because they act as pollinators and natural enemies, while others have the potential to be detrimental because they act as pests that suck plant fluids and destroy plant parts. Thus, the presence of insects in flowering ornamental plants reflects an important ecological interaction, so the identification and monitoring of insects needs to be carried out as the basis for more precise, sustainable, and environmentally friendly management of ornamental plants.

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