**Pollinator Insect Found in Coconut Tree in Banyuasin Regency, South Sumatera**

**Erise Anggraini** 1 2 *, Tia Ellisa Riyanti 1, Chandra Irsan 1, Harman Hamidson 1, Marlin Sefrilla 3, Astuti Kurnianingsih 3, Wei Hong Lau 4, Mahesh Tiran Gunasena 5

1 Plant Protection Study Program, Department of Plant Pests and Diseases, Faculty of Agriculture, Sriwijaya University, South Sumatra, Indonesia
2 Agroecotechnology Study Program, Faculty of Agriculture, Sriwijaya University, South Sumatra, Indonesia
3 Agronomy Study Program, Faculty of Agriculture, Sriwijaya University, South Sumatra, Indonesia
4 Department of Plant Protection, Faculty of Agriculture, University Putra Malaysia, Serdang, Selangor 43400, Malaysia
5 Agriculture Research Grain Legume and Oil Crop Research and Development Centre, Angunakolapelessa, 82220, Sri Lanka

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**CORRESPONDENCE**

Erise Anggraini
E-mail address: erise.anggraini@unsri.ac.id

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**ABSTRACT**

Insect pollinators are insects that play an important role in maintaining the existence of a plant species through pollination and maintaining the genetic diversity of plants in the population. Pollinator insects generally come from the Hymenoptera order. This study aimed to determine the types of pollinator insect species that dominate coconut plantations in the Banyuasin area of South Sumatra. Data were collected by field observation using the plant survey method. The survey was conducted by directly observing coconut farmers' coconut plants in the Banyuasin area. Observations were made on coconut plants by observing pollinator insect species that associate with flowers on coconut plants.

Insect pollinator species found in coconut plantations in the Banyuasin area include Vespa affilish, Apis mellifera, and Apis dorsata. The most dominant type of pollinator insect found in coconut plantations in the Banyuasin area is Apis dorsata with 201 individuals. So, the results show that the abundance of individuals is high but has a low diversity index.

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**INTRODUCTION**

The pollinator insects are from the order Hymenoptera (bees and wasps), order Coleoptera (beetles), order Diptera (flies), and order Lepidoptera (butterflies) [1]. The role of pollinating insects is very useful in maintaining the existence of a plant species through pollination and maintaining the genetic diversity of plants in the population [2]. Pollinating insects often visit flowering plants in search of food. In this case, blooming flowers contain sugar (nectar), a food source for pollinating insects. The presence of pollinating insects on flowers in the habitat is closely related to dispersal patterns, as visiting insects can move from one habitat to another depending on the food availability in a habitat [3]. The surrounding habitat conditions strongly influence the diversity and abundance of insect visitors in coconut plantations.

Insects interact favorably or unfavorably with other organisms in their habitat [2]. A mutual interaction between insects and plants, especially pollinators, is very beneficial. According to [4], Mutualistic relationships between pollinating insects and plants vary by species and occur over a wide range. The relationship with pollinating insects positively impacts plants, primarily through cross-pollination. For insects, the relationship with plants is beneficial, especially the food source of pollen and nectar.

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Pollen contains 15-30% protein, nectar contains 50% sugar, and other compounds such as lipids, amino acids, minerals, and aromatic compounds.

One of the plants that utilize pollinating insects is coconut (C. nucifera L.). Coconut (C. nucifera) is one of the plants in the Palmae family, which can generally be found in tropical climates [5]. According to [6], Coconut (C. nucifera L.) is a strategic commodity that has an economic, cultural, and social role in the lives of Indonesian people. The benefits of coconut trees lie in the meat and fruit, and all parts of the coconut tree have great uses. For example, coconut leaves can be used to make brooms, and the fruit meat can be eaten. Coconut water can be used as a poison antidote, the skin can be used for handicrafts, the trunk can be used as a building material, and the leaves and roots are often used as fuel.

METHODS

This research was conducted in Banyuasin Regency, South Sumatra Province. Then continued at the Entomology Laboratory, Department of Plant Pests and Diseases, Faculty of Agriculture, Sriwijaya University, Indralaya. This activity was carried out in August until completion. The method used in this research is by making direct observations of farmers’ fields, and insect sampling is carried out by purposive sampling on coconut plantations in the research area that has been determined, namely in the Banyuasin Regency area.

Data Analysis

Data analysis was performed using the diversity, dominance, and evenness indexes. A formula is used to determine the diversity index (Shanon-Wiener index):

$$H’ = – \sum Pi \ln Pi$$ where \(Pi = ni / N\)

Explanation:

- \(H\): Diversity index
- \(ni\): number of individuals in species i
- \(N\): Total number of individuals

The Criteria for the Shannon-Wiener diversity index value \(H\) are explained below:

- \(H < 1\): Low diversity
- \(1 < H < 3\): Moderate diversity
- \(> 3\): High diversity

A dominance index is used to determine the dominance of an organism. The Dominance Index value can be found using the Odum Dominance Formula (Odum, 1996).

$$C = \sum (Pi)^2$$

Explanation:

- \(C\): Dominance index
- \(Pi = ni/N\)
- \(N\): Total individual

The Criteria for the dominance index are explained below:

\(0 - 0.50\): Low dominance
\(0.5 - 0.75\): Moderate dominance
\(0.75 – 1\): High dominance

The evenness index can be calculated by following the formula:

$$E = H’/ \ln S$$

Explanation:

- \(H’\): Diversity values
- \(S\): Total individuals observed

The value from the calculation based on the formula will be matched with the value at the index explained below.

- \(0 < E < 0.4\): Small evenness, depressed community
- \(0.4 < E < 0.6\): Moderate evenness, unstable community
- \(0.6 < E < 1.0\): High evenness, stable community

RESULTS AND DISCUSSION

The results of this study are presented based on the number and character of pollinator insects found around coconut plants (C. et al.) in the Banyuasin Regency. The results of the research conducted at the research location are presented as follows:

Table 1. Number of pollinator insects found on coconut plants (Cocos nucifera) in Banyuasin district

<table>
<thead>
<tr>
<th>No.</th>
<th>Ordo</th>
<th>Species</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hymenoptera</td>
<td>Vespa affinis</td>
<td>35</td>
</tr>
<tr>
<td>2</td>
<td>Hymenoptera</td>
<td>Apis mellifera</td>
<td>139</td>
</tr>
<tr>
<td>4</td>
<td>Hymenoptera</td>
<td>Apis dorsata</td>
<td>201</td>
</tr>
</tbody>
</table>

Table 2. Morphology of pollinator insects found on coconut trees (Cocos nucifera) in Banyuasin district

<table>
<thead>
<tr>
<th>No.</th>
<th>Species</th>
<th>Morphology</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vespa affinis</td>
<td>V. affinis has a prominent feature with its sleek, hairless body that is more shiny and yellow and black in color [7].</td>
</tr>
</tbody>
</table>

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2. **Apis mellifera**  
A. *mellifera* bees have a special body shape that is different from other bees and different characteristics. The characteristics of *Apis mellifera* are three pairs of yellow stingers on the back of the abdomen [6].

3. **Apis dorsata**  
The body of the *A. dorsata* bee is black. Clypeus has a black head covered with brown hairs. Dark black antennae cover the shoulder blades and stalk. The lower jaw is black on the underside and yellow-brown at the base near the cheek area when viewed from the side. The black chest is covered with yellow-brown to black hairs on the mesonotum. The femur of the hind leg is black and covered with brown hairs. The tegula is solid black. The shins are black, and the hind shins are slightly hairy [8].

The results obtained in Table 2 showed that the morphological form of pollinator insects found in coconut plantations in Banyuasin Regency generally has a different body shape. The difference between *V. affinis* species is that the body is yellow and black and has a prominent body part that is slender and hairless, shinier [7]. While *Apis mellifera* has a larger body shape than other *Apis* species. Where *A. mellifera* has a special body shape that is different from other bees and has different characteristics. The characteristics of *A. mellifera* are three pairs of yellow stings on the back of the abdomen and a 2-legged antenna with a long and slender part [6]. The *Apis dorsata* species have the same body color as the *A. mellifera* species but have a difference at the end of the abdomen, which is more round and has a smaller body size than the *A. mellifera* species [8]. The order Hymenoptera includes a group of insects with the most species outside the orders Diptera and Lepidoptera and is more biologically diverse than other insects. The order Hymenoptera has four thin wings. The hindwing is smaller than the forewing and has a row of tiny hooks on its leading edge. Hence, the hind wing attaches to a single fold on the posterior edge of the forewing [10].

Table 3 shows that the pollinator insects obtained from the observations belong to the order Hymenoptera, and it is known that the pollinator population found in Banyuasin Regency is quite abundant. This is indicated by the value of the species diversity index of the Hymenoptera order observed in the Banyuasin Regency area measured using Simpson's index. The results found a diversity index value of 0.923 with the number of species found three species, namely. *V. affinis*, as many as 35 individuals; *A. mellifera*, as many as 139 individuals; and *Apis dorsata*, as many as 201 individuals, with 1,954 individuals. The species diversity index obtained is included in the low category. The diversity index determines or finds diversity; the higher the index, the more diverse the species [11]. Then, the species evenness index is used to show the even distribution of individuals of the organisms that comprise an ecosystem.

Table 3. Species Diversity Index and Evenness of Insect pollinator in coconut fields in Banyuasin District

<table>
<thead>
<tr>
<th>Community characteristics</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of individuals</td>
<td>2,021</td>
</tr>
<tr>
<td>Diversity (H')</td>
<td>0.923</td>
</tr>
<tr>
<td>Dominance (D)</td>
<td>0.536</td>
</tr>
<tr>
<td>Evenness (E)</td>
<td>0.155</td>
</tr>
<tr>
<td>Richness (R)</td>
<td>0.295</td>
</tr>
</tbody>
</table>

The results in Table 1 showed that the pollinator insects found from the observations have quite a large number. According to [9], pollinator insects' abundance is due to pollinating insects' attraction to flower growth. Flowering plants have a positive relationship with the abundance of pollinating insect groups. The higher the species richness of flowering plants, the higher the richness and abundance of pollinating bees. In insect-pollinated plants, the flowers are surrounded by a corolla that varies in color, shape, and arrangement depending on the species to attract pollinating insects. In addition, insect interest in flowers is also influenced by the availability of nectar and pollen and the conditions of the flower for pollination by insects. The availability of pollen and nectar is a significant attraction because insects mainly visit flowers to find their food source. Thus, the more types of plants and flowers found in a place, the more the number of insect species and individuals found will increase.
results show that this observation is included in the depressed category with a value of 0.155.

CONCLUSIONS

The abundance of pollinator insects in coconut plantations (C. nucifera L.) in the Banyuasin Regency area has a total of 375 species consisting of V. affinis species as many as 35 individuals, A. mellifera as many as 139 individuals, and A. dorsata with a species diversity index of 0.923 which is included in the low category.

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REFERENCES


