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Insect Exploration in Plants Palm Oil (*Elaeis guineensis.* jacq) in Sirapit District, Langkat Regency

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ABSTRACT

Oil palm is one of the leading commodities in Indonesia and is a source of foreign exchange for the country. This oil palm plant is the main crop for private plantations, the government and also the people. The number of pest attacks on oil palm plants causes a decrease in production so it must be controlled using pesticides and natural enemies. People's oil palm plant control management with minimal knowledge always considers all insects to be pests. This is the main goal of researchers to explore the types of insects that exist in mature and immature plants. The research method is qualitative descriptive, namely by survey and direct identification, from research conducted in June 2021, it was found that insect diversity was in the moderate category, and the highest number of insects was found in immature plants such as *Dolichoderus thoracicus*.

Keywords: Insect exploration, Soil Insects, Oil palm plantation

INTRODUCTION

Oil palm is a plantation cultivation plant that is very popular in Indonesia, where oil palm is a leading and main plantation commodity in Indonesia, because this plant has a high economic value and is the largest contributor to foreign exchange compared to other plantation commodities, as a source of income and a place to live. supply of job opportunities for residents (Fauzi *et al*., 2004).

The percentage of soil insects based on their ecological role found in immature plants that act as decomposers was 50.8% which came from the order Collembola (family Entomobrydae and Onychiuridae), while at the location of plants producing decomposers, 24.2% came from the order belonging to the same order. same. The rest are acting as pollinators and others (Hermawan, 2016).

Sirapit Subdistrict which has an area of 8.62 km2 has 2148 inhabitants, the majority of whom work as farmers and the main commodities cultivated by the community in Serapi District are oil palm and rice. Where the area of producing oil palm plantations in 2017 was 160 ha, while the area of land that produced 1,307 ha and the area of non-producing plants was 8 ha and the production obtained in 2017 was 24,179.50 tons (Badan Pusat Statistik Kecamatan Sirapit Dalam Angka 2018)

The presence of insects was found in the plantation area of TM and TBM. The status of insects was different; there were beneficial insects, namely decomposers, pollinators, predators and parasitoids. As well as insect pests, it is necessary to explore and identify to find out the presence of insects in the oil palm plantation area

MATERIALS AND METHOD

This research was carried out in July 2021 in an immature plantation small holder oil palm plantation with a history of previous land use being rubber and immature plantations with a history of previous land use being rumbia in Sirapit sub-district, Langkat district.

The materials used in this research are insects, jars, 70% alcohol, aquadest, formalin, Soil Sampler size (25 x 25 x 30) cm while the tools used are hoe, scissors, net, tweezers, pins, thermohygrometer, meter, bottle, magnifying glass, microscope, camera

This research uses quantitative descriptive method. The method of observation or direct sampling from the research or exploration location

Observation and research location determination

Direct site inspection for research to be carried out, in oil palm plantation areas. From the observations obtained to determine the location of sampling.

1. Observation Station 1: Oil palm plantation type Immature plantations (IP).
2. Observation Station 2: Oil palm plantation land Mature Plants (MP)

Sampling Method

Sampling method using a line 20 m long, with a distance of 5 m between each point. Made as many as 3 lines. Then soil sampling was made at the specified points with a size of 20 x 20 and a depth of 25 cm. Then the excavated soil is put into a plastic bag, and the insects found are put in a bottle filled with alcohol

Insect Identification

Insect identification was carried out under a microscope and then matched with an insect identification book at the Laboratory of the University of North Sumatra.

Diversity Index

Species diversity is a characteristic of community level based on their biological organization. Species diversity can be used to express community structure. Species diversity can also be used to measure community stability, namely the ability of a community to keep itself stable despite disturbances to its components (Soegianto, 1994 in Indriyanto, 2006).

To determine the species diversity is calculated using the Shannon-Wienner diversity index (Odum, 1998), with the following formula:

$$H' = -\sum Pi \ln (Pi),\ Pi = (ni/N)$$

Note:

H' = Diversity index Shannon-Wienner
ni = Number of individual i
N = Number of individuals of all types
H' < 1 : low diversity
1<H'≤3: medium diversity
H' >3 : high diversity

RESULTS AND DISCUSSION

Insects found on oil palm

Based on research that has been carried out in the area of smallholder oil palm plantations, Sirapit sub-district, Langkat district, North Sumatra at two observation stations for plant groups, namely immature oil palm plantations (TBM) and mature oil palm plantations (TM), each during the day and night. In June 2021, using a pitfall trap, 339 soil insects from TM and TBM were obtained from the phylum Arthropoda, class insecta. According to Jumar (2000) as many as 80% of the 750,000 known species are members of the phylum Arthropoda and about 75% of them are insects (insects).

The insects found at the research location consisted of various types of orders such as the order Hymenoptera, Hemiptera, Orthoptera, Oraneae, Celeoptera, beetles, blattodea and based on the orders that were most commonly found at the research site, namely, Order Hymenoptera in the Formicidae family, Orthoptera in the Gryllidae family, and Coleoptera in the Scarabaeidae family.

Table 1: Classification of Soil Insects Found in Oil Palm Farming Areas in Kec. Sirapit

No	Ordo	Nama Famili	Spesies
1	Hymenoptera	Formicidae	*Dolichoderus sp Monomorium sp* *Solenopsis geminata* *Solenopsis invicta* *Dinoponera gigantean*
2	Hemiptera	Alydidae Lygaeidae	*Leptocorisa oratorius* *Nysius raphanus*
3	Orthoptera	Acrididae	*Dissosterira Carolina* *Valanga nigricornis* *Schistocerca sp*
		Gryllidae Blatidae	*Gryllus assimilis* *Teleogryllus emma* *Gryllodes sigillatus* *Blattela spp*
4	Coleoptera	Scarabaeidae Curculionidae	*Megasoma vogti* *Cicindelidae latreille* *Oryctes rhinoceros* Pheropsopnus jessoensis *Anopsilus pusillus*
5	Diptera	Drosophildae	*Drosohpila sp*

Soil Insect Diversity Index

The diversity of insects present is seen from the number of organisms that make up the community in a particular area. A community is said to have high diversity if a community is formed by many species and vice versa (Odum, 1998). This is supported by the statement of Soegianto (1994) which states that a community is said to have high species diversity if the community is composed of many species with the same or almost the same abundance.

Table 2: Shannon Wiener Index (H') Soil Insects in Oil Palm Plantation in Kec. Sirapit

No	Species	Lokasi		Pi		H' = -∑ Pi ln (Pi)	
		TM	TBM	TM	TBM	TM	TBM
1	*Dolichoderus thoracicus*	35	56	0.20	0.34	-0.33	-0.39
2	*Monomorium sp*	25	22	0.15	0.13	-0.29	-0.28
3	*Solenopsis geminate*	5	11	0.02	0.07	-0.008	-0.20
4	*Solenopsis invicta*	52	8	0.29	0.05	-0.37	-0.16
5	*Dinoponera gigantean*	4	0	0.02	0	-0.08	-0.00
6	*Leptocorisa oratorius*	17	19	0.09	0.12	-0.22	-0.27
7	*Nysius raphanus*	0	1	0	0.006	-0.00	-0.03
8	*Dissosterira Carolina*	9	26	0.05	0.16	-0.15	-0.31
9	*Valanga nigricornis*	3	7	0.01	0.04	-0.04	-0.13
10	*Schistocerca sp*	2	2	0.02	0.01	-0.08	-0.05
11	*Gryllus assimilis*	0	3	0	0.02	-0.00	-0.08
12	*Teleogryllus emma*	15	0	0.08	0	-0.20	-0.00
13	*Gryllodes sigillatus*	0	1	0	0.006	-0.00	-0.03
14	*Cincindelidae latreille*	2	0	0.01	0	-0.04	-0.00
15	*Oryctes rhinoceros*	0	1	0	0.006	-0.00	-0.03
16	*Pheropsopnus jessoensis*	2	0	0.01	0	-0.04	-0.00
17	*Anopsilus pusillus*	0	2	0	0.01	-0.00	-0.05
18	*Megasoma vogti*	5	2	0.02	0.01	-0.08	-0.05
19	*Drosopila sp*	0	1	0	0.006	-0.00	-0.03
20	*Blattela sp*	1	0	0.005	0	-0.02	-0.00
Total		**177**	**162**	**0.975**	**0.924**	**1.86**	**2.09**

Based on the diversity index value (H') in Table 2, it is known that the diversity index (H') in TM and TBM is moderate because it is above 1.5. This is due to the types of plants that are cultivated in monoculture in a very large area and the use of pesticides as a control measure is very low based on direct interviews with land-owning farmers so that the level of diversity is moderate. This is supported by the BP2TP

research (2009) which states that a pest species colonizes a new geographic area without being followed by the development of natural enemies, natural enemies are killed by the application of pesticides or the habitat occupied by pests and natural enemies is modified so that it is very suitable for pests.

Value of Absolute Density and Relative Density

According to Michael (1995) absolute density indicates the number of insects found in the habitat stated in absolute terms. The results of the calculation of absolute density and relative density values are in Table 3.

Table 3: Values of Absolute Density and Relative Density of Insects in Oil Palm Plantations

No	Species	TM		TBM	
		KM	KR%	KM	KR%
1	*Dolichoderus thoracicus*	35	19.77	56	34.56
2	*Monomorium sp*	25	14.12	22	13.58
3	*Solenopsis geminate*	5	2.82	11	6.79
4	*Solenopsis invicta*	52	29.37	8	4.93
5	*Dinoponera gigantean*	4	2.25	0	0.00
6	*Leptocorisa oratorius*	17	9.60	19	11.72
7	*Nysius raphanus*	0	0.00	1	0.61
8	*Dissosterira Carolina*	9	5.08	26	16.04
9	*Valanga nigricornis*	3	1.69	7	4.32
10	*Schistocerca sp*	2	1.12	2	1.23
11	*Gryllus assimilis*	0	0.00	3	1.85
12	*Teleogryllus emma*	15	8.47	0	0.00
13	*Gryllodes sigillatus*	0	0.00	1	0.61
14	*Cincindelidae latreille*	2	1.12	0	0.00
15	*Oryctes rhinoceros*	0	0	1	0.61
16	*Pheropsopnus jessoensis*	2	1.12	0	0.00
17	*Anopsilus pusillus*	0	0.00	2	1.23
18	*Megasoma vogti*	5	2.82	2	1.23
19	*Drosopila sp*	0	0.00	1	0.61
20	*Blattela sp*	1	0.56	0	0.00
Total		**177**		**162**	

Based on the data in Table 3, it can be seen that the highest absolute and relative density values in TBM oil palm fields are in the order Hymenoptera which is dominated by the Dolichoderus thoracicus species with a KM value of 56 and a KR of 34.56%. While observing the TM area, it is known that the absolute density value and the highest relative density on the land are also dominated by Solenopsis invicta species originating from the Hymenoptera order with a KM value of 52 and a KR value of 29.37 percent.

Hanafiah et al (2010) explained that the density of soil biota in an area depends on the activities of each group, which is strongly influenced by three main factors, namely: 1) Weather, especially rainfall and humidity. 2) Soil conditions/ properties, especially acidity (pH), humidity, temperature and availability of nutrients. 3) Types of land cover vegetation such as grasses.

CONCLUSION

There are differences in the diversity of insect species in TM and TBM oil palm plantations. Hymenoptera is most commonly found in traps when compared to other orders. The relationship between soil organic matter and soil insects, namely soil organic matter greatly determines the population density of soil organisms, one of which is soil insects where the higher the soil organic content, the more diverse an ecosystem.

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