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Arthropoda Abbreviation of Natural Enemy (Predator) on the Soybean Plantation in the Sub of Optimal Sub District Jayapura Papua

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Abstract **– Production of soybean in Papua Province in 2017 amounted to 3522.53 tons with 2761 ha harvested area with low productivity which is average 0.77 -1.3 tons / ha. Jayapura district is one of the soybean production centers in Papua. The low productivity of soybean in Jayapura regency, in addition to the use of varieties whose yield potential, is still low, also due to the attack of plant pest organism (OPT). This activity was carried out in Kampung Karya Bumi Distrik Namblong Kabupaten Jayapura with the aim of this research is to see the level of abundance and diversity in phylum arthropod in soybean canopy habitat. The observations in the analysis used the Shannon and Wiener diversity index. The results of this study showed that the arthropods in the soybean canopy habitat with a total of 6 orders with a population of 227 of the class of fitofak, the species most commonly found Coleoptera order with 6 species and family amounted to 4 with a population of 167 tails. Biodiversity of predator arthropods in soybean cultivation habitat varies considerably, therefore conservation of biological agents in these habitats is very important to be implemented especially potential biological agents.**

Keywords **– Abundance, Diversity, Arthropods, Soybeans, Jayapura, Papua.**

I. INTRODUCTION

Soybean has a strategic position as a vegetable proteinI. and functional food that has been reached by all levels of society. To meet the needs of the processed industry, Indonesia needs about 2.2 million tons of soybeans per year. The production of cement inside today is only able to produce 30-40% of national demand. This will cause the need for an increase each year (Agricultural Research Agency, 2007).

One of the decisions in increasing production is the disruption of pests and diseases. Pests and soybean plant diseases can reduce yields by up to 80%, even no control measures (Marwoto, 2007) Production of soybean in Papua Province in 2017 amounted to 3,522.53 tons with a harvested area of 2,761 ha with low productivity average of 0.90 / ha. Jayapura district currently has a harvest area of 571 with production of 1044, 23 tons, with an average engineering rate of 0.75 to 1.3 tons / hectare (BPS Papua, 2017). From these data, the level of crop productivity is still low when compared to the potential yield that can be achieved 2.5 t / ha to 3.2 t / hectare (Puslitbangtan, 2007). The low productivity of soybean in the area, apart from the potential use is still low, also due to the attack of plant pest virus (OPT), especially pests and diseases. Production constraints are increasing nowadays.

In addition to several production centers in Indonesia there are explosions of various influences such as Etiella zinckinella, Helicoverpa armigera, Spdoptera litura (Okada *et al.,* 1998). This is unified by the use of synthetic organic insecticides that are less wise there especially the rice plants, which are usually planted before and after soybean crops can not be activated directly. But otherwise not all insects have status as a pest. In agro-ecosystems there are various types of insects, either as herbivores, predators, parasitoids, or as saprophages. There are 266 species of insects associated with soybean plants consisting of 111 species of pests, 53 non-target insects, 61 species of predators and 41 species of parasitoids (Marwoto, 1992).

In Indonesia there are no less than 17 organizations that can become pests in soybean crops (Directorate of Plant Protection, 2004). The main pest on Seedlings (Ophiomya phaseoli), Caterpillar Grayak (*Spodoptera litura*), *Helicoverpa armigera*, *Riptortus linearis*, and pod borer (*Etiella zinckenella*) (Puslitbangtan, 2007). Helicoverpa armigera Hubner (*Lepidoptera*: *Noctuidae*) has great potential loss when attacking soybean plants during flowering phase, early pod formation or development phase of pod and seed filling (Tengkano & Soehardjan, 1985). This study aims to study the abundance and diversity of arthropod species in soybean crops.

II. METOHODOLOGY

The assessment was conducted in Kampung Karya Bumi with coordinate position 140º13'37 " east longitude and 2º35'2 LS Namblong district, Jayapura district. Activities are carried out starting from April to November 2017. Sample planting is done by using systematic sampling method. The sampling of arthropod sampling is done by using sweepnet trap. Nine samples of arthropods using sweep net are done only once with 10 x 10 m2 plots. area, in each plot repeated 3 times that is when the plant is 90 days after planting. Arthropod sampling is done by swinging the net to the left and right alternately 20 times on each plot. The observational data were analyzed using the diversity index of Shannon and Wienner diversity (Michael, 1995):

$$H' = - \Sigma [(ni / N) \ln (ni / N)]$$

Information :
H '= Insect Diversity
ni = Number of Individuals Each Type of Insect
N = Total Number of Individuals All Insects

The greater the value of H 'indicates the higher the species diversity. The criterion of diversity index (H ')

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according to Odum (1971) as follows:

- Low species diversity when H '<1 (unstable environmental conditions)
- Medium species diversity when 1≤H'≤3 (medium environment condition)
- High species diversity when H '> 3 (stable environmental conditions)

III. Results and Discussion

Regional General Situations of Assessment

Geographically Jayapura District lies between 129 ° 00'16 "- 141 ° 01'47" East Longitude and 2 ° 23'10 "North Latitude and 9 ° 15'00" South Latitude, with administrative boundaries as follows:

- North Pacific Ocean and Sarmi Regency.
- South of Pegunungan Bintang Regency, Yahukimo Regency and Tolikara District.
- East of Jayapura City and Keerom Regency.
- West side of Sarmi Regency.

According to Altieri (1999), by knowing the diversity of the compilers of an agroecosystem it can be done a management of pests that is with the increase of natural enemies. The result of observation on arthropod level of soybean planting age 90 days after planting in Table 1. The observation of one sweep net in soybean crop was obtained 575 individual arthropods consisting of 6 orders, 15 families, and 221 species (Table 1). In Table 1 shows that most of the artifacts found are insect classes.

Table. 2. The composition of the number of predatory arthropods caught in soybean shoot habitat at Kampung Karya Bumi District Namlong, Jayapura 2017

Ordo	Famili	Spesies	Jumlah (ekor)
Coleoptera	*Carabidae*	*Ophionea nigrofascita*	18
	Staphynilidae	*Paederus fuscipes*	46
		Paederus tumulus	5
	Coccisillidae	*Coccinella arcuta*	58
		Coccinella repanda	16
	Carabidae	*Ophionea nigrofascita*	24
Hemiptera	*Pantatomidae*	*Andralus spinidens*	4
	Redufidae	*Rhinocoris Fucipes*	3
Orthoptera	*Grylidae*	*Metiochi Sp*	12
		Conocephalus	2
Hymenoptera	*Formicidae*	*Solenopsis gemminata*	19
Dermatera	*Carcinophoridae*	*Atipena adelinae*	2
Aranidae	*Linypiidae*	*Erogone bifuca locket*	2
		Pardosa birmanica	3
	Oxypidae	*Oxyopes javanus*	6
	Salticidae	*Myrmarachna caliraya*	4
	Tetarahgnathidae	*Tetragnatha virescens*	1
	Aranedae	*Aranneus inustus*	2
	Clubionidae	*Clubiona Sp*	4
Total			231

The total number of arthropod species in planting habitats of soybean cultivars is comprised of 6 orders and 16 families and with a total population of 231 with a composition based on orders and families (tables 1). In addition also that in the species of arthropod also in it found a predator. Here predators are insects that can travel on all types of ecosystems of the ecosystem and wet ecosystems and some species are able to live in non-vegetated habitats, so that their presence will emit into several types of ecosystems.

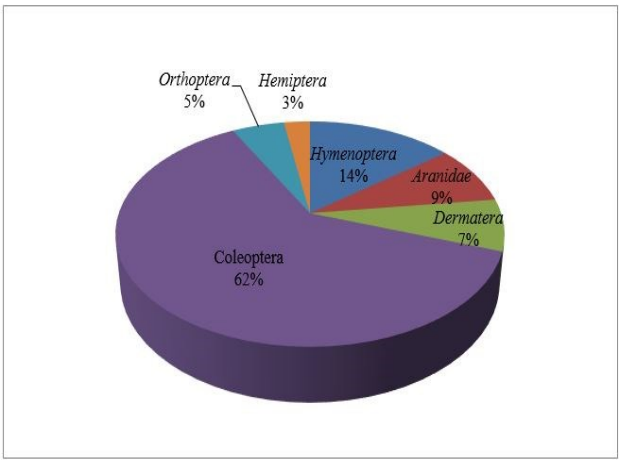
When viewed from the predefined population of predator arthropod of all types of catches, the predatory population of the Coleoptera order is the highest population (167 heads).

From table 2. It is seen that the population of the Coleoptera order including the occupants of the most dominant shoots of soybean with the level of spread/diversity is quite high (1.83). Apart from the insects also found predators from the order of Hemiptera that the spread/diversity is high enough that is 1.78. According to Marc et al., (1999) that predators of the Arachnid Order (Araneae) are effective in suppressing pest development on agricultural land but also have a negative impact on other natural enemy populations. Coppel & Mertins (1977) argues that foliage predators have a high ability to adapt to the environment, and have a fast dispersive ability and are able to switch prey if the major prey is reduced.

Table. 2. Level of distribution and and diversity of arthropods in soybean cultivation in Kampung Karya Bumi District Namlong, Jayapura 2017

No	Ordo	Number of Species	Population	Diversity Index (H')
1.	*Aranidae*	3	15	1,07
2.	*Dermatera*	2	9	1,64
3.	*Coleoptera*	2	113	1,83
4.	*Orthoptera*	2	17	0,94
5.	*Hemiptera*	1	11	0,43

Figure 1 shows the difference in the distribution of arthropod populations where the arthropod population distribution of the Coleoptera order is dominant when compared to other orders. Where in an ecosystem, when the type of Arthropoda is relatively large then the population of each species is relatively small, and vice versa (Andrewartha and Birch, 1984; Krebs, 1987). Thus, the degree of diversity of an ecosystem is characterized by the many types of arthropods in the ecosystem. In ecosystems with high diversity indexes, such as cropping and non-pesticides, Arthropods are relatively large but low in population.



Gambar. 1. The biodiversity of the arthropod population in the inhabitants of the plant shoots.

Therefore, the higher the diversity of the Arthropod species the more stable the ecosystem, so that the population exploration of an Arthropoda type will not happen. In other words, the distribution of the number of individuals can affect the value of the diversity index. Nelly et al., (2015) argues that the high value of the diversity of insects in an ecosystem is determined by the distribution of the number of individuals in each ecosystem.

IV. Conclusion

Arthropod abundance was dominated by Ordo *Coleoptera* with 167 heads with arthropod diversity index of 1.83 highest in shrimp leaf resident ecosystem whereas the lowest population was owned by order of *Dermatera* the population of 9 tail with Index of Diversity of arthropod 0,43, where Diversity and the abundance the arthropod is positively correlated with soybean plant performance.

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