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Diversity of Insect Pests in Watermelon (*Citrullus vulgaris*) in Farmers Land in Juata Permai Area, North Tarakan

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ABSTRACT

Pest attack is a limiting factor in watermelon cultivation and requires control measures. Identification of pests is the first step that must be done before starting pest control efforts. Identification of pests that aims for effective and efficient control. In addition, it is also necessary to know the biology of the pest and the symptoms of damage associated with control. This study aims to determine the types of insects that attack watermelon plants and determine the type of damage caused by insects to watermelon plants. The research uses active collection and passive collection methods, active collection uses direct collection and passive collection uses traps such as pitfall traps and yellow traps. The insects then identify and analyze the data using the Shannon-Wienner (H') diversity index. The data obtained at the time of the study were collected using a survey in the field and observations of the locations used as research sites by using observational plots. From the results of data analysis, it was obtained that H' or species diversity on watermelon cultivation land in the Juata scenic area of North Tarakan, namely H' = 0.80 which is included in the category of low diversity. There are 8 types of pests attack watermelon plants in the research area, namely walang sangit (*Leptocorisa acuta*), wood grasshopper (*Valanga nigricornis*), green grasshopper (*Oxya hyla*), aphids (*Aphis gossypii*), leaf beetle (*Aulacophora similis*), flies fruit (*Bactrocera dorsalis*), leaf caterpillar (*Plutella xylostella*), gangsir/cricket (*Gryllotalpa orientalis*). There are 3 types of damage caused by insects, namely curling of leaves caused by insects of the order hemipteran with a piercing-sucking mouth type, Hollow and torn leaves caused by insects of the order Ortoptera with a chewing-biting mouth type, then holes in plant fruit caused by fly attacks fruit.

Keywords:

Diversity, insects, watermelon

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INTRODUCTION

Tarakan City has several types of horticultural plants including fruit-producing plants which are generally cultivated to meet the needs of the community's consumption. One type of fruit that is commonly cultivated is the watermelon plant. The watermelon plant (*Citrullus vulgaris*) is a plant from the Cucurbitaceae family which has many benefits including as a component for making food, beauty ingredients, and medicine. The production of watermelon plants in Tarakan City is only 5,805 quintals (580.5 tons) with a land area of 17 ha [1], which is still lacking. According to [1], watermelon production in 2018 reached 481,767 tons while in the previous year, it reached 499,469 tons. Watermelon production has decreased by 3.54% compared to 2017, so it is necessary to import watermelons from outside the region. Cultivating watermelon plants cannot be separated from pest attacks. The occurrence of pest attacks on plants is due to the relationship between plants and pests related to the resources available to pests such as the number of flowers, and fruits, the distance between plants, and distance to find food [2].

Efforts to increase the cultivation of watermelon plants, both in quality and quantity, require the maintenance of watermelon plants, especially in pest control activities. Pests attack plants in all parts of the plant, for this reason, it is necessary to carry out identification efforts so that you can find out the type of insect pests that attack watermelon plants and know the type of plant damage so that it makes it easier to carry out proper pest control.

METHOD

This research was conducted on the land of farmers in Juata Permai North Tarakan. The tools and materials used in the study were insect nets, pitfall traps, yellow pan traps, brushes, tape measure, sample bottles, stationery, cameras, 70% alcohol, liquid soap, and insect needles.

This study used active collection and passive collection methods, active collection used direct collection and passive collection used traps such as pitfall traps and yellow traps. The insects obtained were then identified and analyzed descriptively. Data analysis used the Shannon-Wienner diversity index [3] with the following formula.

$$H' = -\sum_{i=1}^{s} (pi)(In\ pi)$$

Description:

H' : Shannon-Wienner diversity index

s : Number of species

pi : Proportion of total samples belonging to species i

RESULT AND DISCUSSION

Based on the results of research on insect pests caught in watermelon cultivation land using pest traps in the form of pitfall traps, yellow traps, insect nets, and hand counting, can be seen in the following table:

Table 1. Data on Names of Insect Pest Species Obtained.

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Sunday To	Species Name			
	Pitfall Trap	Yellow Trap	Insect Net	Handcounting
1		1) *Valanga nigricornis*	1) *Leptocorisa acuta* 2) *Oxya hyla* 3) *Aulacophora similis*	1) *Aphis gossypii* 2) *Plutella xylostella*
2	1) *Aulacophora similis*	1) *Oxya hyla* 2) *Aulacophora similis*	1) *Valanga nigricornis* 2) *Oxya hyla* 3) *Aulacophora similis* 4) *Leptocorisa acuta* 5) *Valanga nigricornis*	1) *Aphis gossypii*
3		1) *Valanga nigricornis*	1) *Oxya hyla* 2) Bactrocera dorsalis	1) *Bactrocera dorsalis* 2) *Gryllotalpa orientalis*
4		1) *Aulacophora similis*	1) *Leptocorisa acuta* 2) *Oxya hyla* 3) *Bactrocera dorsalis*	1) *Aphis gossypii*

Table 2. Analysis of the Shannon-Wienner diversity index

No	Nama Spesies	Amount	Pi	LnPi	pi.ln pi
1	*Leptocorisa acuta*	4	0.0051	-5.2794	-0.03
2	*Valanga nigricornis*	6	0.0076	-4.8739	-0.04
3	*Oxya hyla*	8	0.0102	-4.5862	-0.05
4	*Aphis gossypii*	720	0.9172	-0.0864	-0.08
5	*Aulacophora similis*	8	0.0102	-4.5862	-0.05
6	*Bactrocera dorsalis*	37	0.0471	-3.0548	-0.14
7	*Plutella xylostella*	1	0.0013	-6.6657	-0.01
8	*Gryllotalpa orientalis*	1	0.0013	-6.6657	-0.01
		785			-0.40
				H'=	0.80

The diversity index is classified into the following criteria:

H'≤ 1 : Low Diversity

2 < H'≤ 3 : Moderate Diversity

H' > 3 : High Diversity

From the results of the analysis of the data obtained, it was found that H' or species diversity on watermelon cultivation land in the North Tarakan area, namely H' = 0.80, where this value is included in the low diversity category, due to the small number of pests found during the research implementation. The factors that caused the few pests to be obtained were the application of chemical pesticides on plants by farmers which were very intense, namely 3 times a week or 3 days, and the presence of predatory insects so that pest populations could be controlled naturally.

Insects are active in optimal environmental conditions, while less optimal conditions in nature cause insect activity to be low. Insect life is very closely related to the state of the environment. Furthermore, it is also said that environmental factors that also influence the life of insects are physical, biotic, and food factors. In addition to the abiotic factors that affect the life of insects, there are biotic factors that can interact with insects, the biotic factors themselves occur between insects and with other types [4].

Intensive use of insecticides by farmers according to research is strengthened according to [5] types of insects in cultivated land are more susceptible due to the application of fertilizers and the use of insecticides. In addition to the use of insecticides that affect the low diversity of insects, namely monoculture cultivation systems, not a few predators of these insect pests are found, such as black ants, dragonflies, and ladybugs. This is also one of the factors for the lack of insect pests found on cultivated land.

According to [6], the diversity of organisms will tend to be lower in ecosystems that are exposed to the use of synthetic pesticides, whereas diversity will tend to be higher in ecosystems that are regulated by biological mechanisms. According to [7], the diversity of predatory insect species in a habitat is influenced by the complex structure of plant vegetation (polyculture). The more complex the habitat, the higher the species richness of predatory insects.

Types of Damage Caused by Pest Insects

There are several types of damage caused by insect pests in the research area, namely:

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1. Curling Plant Leaves

Damage caused by sucking-mouth aphids. Aphids attack by sucking plant nutrients so that the plant leaves will shrink and curl until they are curved at the shoots.

Figure 1. Curly plant leaves

2. Transparent Hollow Plant Leaves

The perforated leaf surface with a translucent characteristic is damage caused by a caterpillar with a type of mouth tool that destroys leaves. Leaf-destroying caterpillars attack by making holes in the epidermis or leaf flesh so that the leaves will have holes like a dreamy window.

Figure 2. Transparent perforated plant leaves

3. Hollow plant leaves

Holes in the leaves on the leaves of plants are damage caused by locust pests. The locust pest has a type of mouthpart that bites and chews causing the plant parts to become hollow.

Figure 3. The leaves of the plant are perforated and torn

4. The watermelon is rotten

Rotten watermelons and holes on the surface of the fruit are damage caused by fruit flies. The characteristics of the damage caused by fruit flies are in the form of punctures that turn black over time.

Figure 4. Rotten watermelon

CONCLUSION

8 types of pests that attack watermelon plants in the study area, namely walang sangit *(Leptocorisa acuta*), wood locust (*Valanga nigricornis*), green grasshopper (*Oxya hyla*), aphids (*Aphis gossypii*), leaf beetle (*Aulacophora similis*), fruit flies (*Bactrocera dorsalis*), leaf caterpillars (*Plutella xylostella*), gangsir/crickets (*Gryllotalpa orientalis*).

There are 3 types of damage caused by insect pests, namely curling of leaves caused by insect pests of the order Hemiptera with a piercing-sucking mouth type, hollow leaves caused by

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insect pests of the order Orthoptera with a type of biting-chewing mouthparts, and fruit rot and holes caused by fruit fly attack.

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