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Variations of pest and disease attacks on horticultural and non-horticultural crops in South Sumatra

Variasi serangan hama dan penyakit pada hortikultura dan non hortikultura di Sumatera Selatan

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ABSTRAK

Tanaman hortikultura jenis olerikultura yang banyak diberikan pestisida kimiawi menyebabkan banyak dampak negatif seperti munculnya hama dan patogen yang kebal terhadap pestisida, kemunculan hama baru, populasi hama meningkat dan pathogen sekunder, populasi serangga yang bermanfaat (predator) berkurang. Tujuan dari penelitian ini adalah untuk mempertimbangkan penggunaan pestisida oleh petani untuk membasmi hama dan penyakit pada hortikultura dan non hortikultura di Sumatera Selatan. Penelitian dilaksanakan di Provinsi Sumatera Selatan. Penelitian dilakukan di 7 kecamatan dan 1 kota, yaitu Kecamatan Indralaya, Kecamatan Indralaya Utara, Kecamatan Air Kumbang, Kecamatan Pemulutan Selatan, Kecamatan Gelumbang, Kecamatan Belitang Mulya, Kecamatan Tanjung Batu, dan Kota Palembang, yang dilaksanakan pada bulan Mei sampai dengan September 2022. Pengambilan data menggunakan metode Peubah Sekunder dengan teknik *Purposive sampling* dan diolah menjadi data teranalisis. Hasil penelitian ini diketahui bahwa holtikultura yang paling banyak dibudidayakan oleh Petani ialah Terung (*Solanum melongena* L.). Sedangkan untuk non holtikultura yang paling banyak dibudidayakan oleh petani ialah jagung (*Zea mays*). Persentase serangan hama pada lahan non hortikultura adalah 57,36%, persentase serangan hama pada lahan hortikultura adalah 68,28%. Variasi serangan hama dan penyakit yang terjadi di 180 lahan pertanian pada tanaman hortikultura dan non hortikultura di Sumatera Selatan. Tanaman hortikultura yang banyak di budidayakan di Sumatera Selatan antara lain mentimun, kacang panjang, dan terung. Sedangkan, pada tanaman non hortikultura adalah jagung, padi, dan karet. *Spodoptera frugiperda* ini adalah hama yang telah banyak ditemukan merusak pertanaman jagung dan spesies *Leptocorisa* sp yang merusak tanaman pangan (No Hortikultura). Penyuluhan dilakukan kepada petani untuk mengetahui jenis-jenis hama yang dapat menyerang dan gejala serta penyakit pada tanaman untuk diketahui pengendaliannya.

Kata kunci: terong, Olerikultura, *Solanum melongena*, *Zea mays*

ABSTRACT

Horticultural crops of olericultural types that were given a lot of chemical pesticides cause many negative impacts such as the emergence of pests and pathogens that were immune to pesticides, the emergence of new pests, increased pest populations and secondary pathogens, reduced populations of beneficial insects (predators). The study aimed to consider the use of pesticides by farmers to eradicate pests and diseases in horticulture and non-horticulture in South Sumatra. The research was conducted in South Sumatra Province. The research was conducted in 7 districts and 1 city, namely Indralaya District, North Indralaya District, Air Kumbang District, South Pemulutan District,

Gelumbang District, Belitang Mulya District, Tanjung Batu District, and Palembang City, which was conducted from May to September 2022. Data were collected using the Secondary Variables method with *Purposive sampling* technique and processed into analyzed data. The results of this study showed that the most horticulture cultivated by farmers was eggplant (*Solanum melongena* L.). While for non-horticulture the most widely cultivated by farmers was corn (*Zea mays*). The percentage of pest attacks on non-horticultural land was 57.36%, the percentage of pest attacks on horticultural land was 68.28%. Variations in pest and disease attacks that occur in 180 farms on horticultural and non-horticultural crops in South Sumatra. Horticultural crops that are widely cultivated in South Sumatra include cucumber, long beans, and eggplant. Meanwhile, non-horticultural crops are corn, rice, and rubber. *Spodoptera frugiperda* was a pest that has been found to damage corn crops and *Leptocorisa* sp species that damage food crops (No Horticulture). Counseling was provided to farmers to find out the types of pests that could attack and the symptoms and diseases in plants to know how to control them.

Keywords: eggplant, Olerikultura, *Solanum melongena*, *Zea mays*

INTRODUCTION

Indonesia is an agrarian country where the average livelihood of its people as farmers. Horticulture comes from the word "hortus" which means garden and the word "colere" which means cultivation (Hasyim AWSLL, 2015). It is concluded that horticulture is the cultivation of plants carried out on land that has been prepared like a garden. Horiculture has 4 types of cultivated fields, namely fruticulture (fruit plants), floriculture (ornamental plants), biopharmaca (medicinal plants) and olericulture (vegetable plants). The term is not limited in use, can be flexible, can apply according to its function (Nurilmi et al., 2017). However, there are problems that can affect the results of these horticultural crop activities. One of the obstacles in the development of horticultural and non-horticultural crops is the attack of pests and diseases (Muzuna, 2021). Cultivation of horticultural crops can never be separated from the attack of plant disrupting organisms. Attacks of plant disrupting organisms can be in the form of pests and diseases that can result in decreased production and quality of horticultural cultivation plants (Sudewi S, 2020). The attack of plant disrupting organisms can result in a decrease in crop production of up to 25–100%. Damage to plants can be seen physically or must go through a study. The decrease in production due to the attack of plant pest organisms is caused by physiological disorders and physical damage to plants due to their presence in horticultural cultivation plants (Pakpahan, 2019). This decline makes farmers experience huge losses in terms of economy, making farmers look for solutions to inhibit the attack of these organisms.

Previous research on plant-disrupting organisms or pests is a problem in the cultivation of horticultural and non-horticultural crops. One of the pests that often disturb agriculture in Indonesia is the armyworm that attacks corn plants. Currently, there is a new endemic type of armyworm, namely, Fall Armyworm (FAW) or Spodoptera frugiperda (Waliha et al., 2021). This insect belongs to the order Lepidoptera, family Noctuidae. Spodoptera frugiperda attacks food crops such as corn, rice and wheat (Syarifah et al., 2018). This pest is very difficult to control, this pest spread rapidly from the American continent in 2016 (Mohamed et al., 2022), then entered the African continent and spread throughout Asia to Thailand in 2018 (Arsi, et al., 2021). In addition, there are pathogenic fungi that often damage corn plants, including Rhizoctonia solani, which causes blight of midribs and leaf blades and Bipolaris Maydis, which causes leaf blight (Djaenuddin et al., 2017). In previous studies there was also leaf blight in rice causing symptoms of HDB disease can be seen from spots on the edges of leaves with a grey colour (Laraswati et al., 2022). The results of the research data show that the symptoms of leaf blight are 37.21% of 16 Horticultural Lands planted by Farmers in the South Sumatra Region.

Control by utilising natural enemies reduces the impact on the environment (Fitriani, 2018). As an alternative to chemical pesticides, pest control can also be done using organic pesticides or biopesticides. Biopesticides are pesticides that can be used to control pests but the ingredients

used come from nature (Kusumaningtyas & Wulansarie, 2018). Farmers can learn the varieties of pests and diseases that attack, then change the control method using resistant varieties or technical culture techniques. Data was obtained through the Purpose sampling method. Purposive sampling is a non-random sampling method, sampling where researchers ensure the quotation of illustrations through the method of determining special identities that match the research objectives so that they are expected to respond to research cases (Lenaini, 2021). Based on the description above, the purpose of this research was to determine the number of varieties of pests and diseases that attack horticultural and non-horticultural crops and evaluate the use of pesticides by farmers in the South Sumatra region.

MATERIALS AND METHODS

The research was conducted in 7 sub-districts and 1 city, namely, Indralaya sub-district, North Indralaya sub-district, Air Kumbang sub-district, South Pemulutan sub-district, Gelumbang sub-district, Belitang Mulya sub-district, Tanjung Batu sub-district, and Palembang city, which was conducted from May to September 2022 (Figure 1). In this field practice the tools used were 1). Camera. 2). Questionnaire sheet, and 3). Macrolens. In this field practice the materials used were data on the use of pesticides and pest data obtained from farmers and the field. References from journal sources related to horticultural and non-horticultural crops and the use of pesticides.

This reseach used purposive sampling method, namely by conducting interviews with 180 horticultural and non-horticultural farmers in 8 locations spread across 7 districts and 1 city with a total sample of 36 plants per land. Interviews with respondent farmers were conducted using a list of questions in the form of a questionnaire sheet.

The object of this observation was the behaviour of farmers in using pesticides and observations of pests and diseases that exist on the land of respondent farmers, this observation was carried out directly by visiting the farmer's land. The observation parameters were; a). Observations were made about pest and disease attacks on 180 field practice fields. Observations were made by observing the symptoms of pest and disease attacks and other pests found on 36 sample plants in the field practice, then calculating the percentage of attacks using the formula according to (Prabaningrum & Moekasan, 2014).

$$P = \frac{a}{a+b} X\ 100\%$$

Description:
P : Percentage of attack %
a : Number of infested plants
b : Number of sample plants

Figure 1. Locations in district and cities in South Sumatra

Data Analysis

In this study, the results of the data obtained will be presented in the form of tables and figures. The data obtained were then analysed descriptively and presented in tabular form.

RESULTS

The results showed that there were 5 pest species from 5 families and 4 different orders attacking non-horticultural crops. The percentage of pest attacks on non-horticultural land was 57.36%. The most common pest attack was Spodoptera frugiperda with a percentage attack of 67.44%. Under it followed by pest attacks of the species Leptocorisa sp. With a percentage of 6.98%. While the lowest pest attack was the attack of Coptotermes sp. which only attacked 1 rubber plantation with a percentage attack of 2.33% (Table 1).

Based on the results of observations there were 23 species from 18 families showing the percentage of pest attacks on horticultural land was 68.28%. The highest percentage of pest attacks was found in Bactrocera spp species with a percentage attack of 28.4%. It was followed by pest attacks from Spodoptera litura species with a percentage attack of 24.09%. The lowest pest attack that only attacked 1 field was from the species Paracoccus marginatus, Helicoverpa armigera, Achatina fulica, and Nezara viridula with a percentage attack of only 0.73% (Table 2).

Table 1. Number and percentage of pests in non-horticultural fields

Famili	Spesies	Number and Intensity of Pests in Non-horticultural Fields (43 fields)	
		Amount of Land	Percentage (%)
Alydidae	*Leptocorisa* sp.	3	6.98
Crambidae	*Scirpophaga innotata*	4	9.30
Noctuidae	*Spodoptera frugiperda*	29	67.44
Orthoptera	*Valanga nigricornis*	4	9.30
Rhinotermitidae	*Coptotermes* sp.	1	2.33
Percentage of Attack			57.36%

Table 2. Number and percentage of pests in horticultural fields

Family	Spesies	Number and Percentage of Pests in Horticultural Fields (137 fields)	
		Amount of Land	Percentage (%)
Aphididae	*Aphis gossypii*	27	19.71
	Aulacophora spp	31	22.63
	Leucinodes orbonalis	12	8.76
	Myzus persicae	2	1.46
	Paracoccus marginatus	1	0.73
	Spodoptera litura	33	24.09
Achatinidae	*Achatina fulica*	1	0.73
Acrididae	*Valanga nigricornis*	6	4.38
Agromyzidae	*Liriomyza* sp.	10	7.30
Aleyrodidae	*Bemisia tabaci*	9	6.57
Alydidae	*Leptocorisa* spp	3	2.19
Chrysomelidae	*Altica oleracea*	2	1.46
Ciccadellidae	*Empoasca* sp.	2	1.46
Coccinellidae	*Epilachna* sp.	26	18.98
Coreidae	*Mictis longicornis*	5	3.65
Crambidae	*Diaphania* sp.	8	5.84
Diaspididae	*Aspidiotus destructor*	5	3.65
Gracillaridae	*Phyllocnistis citriella*	11	8.03
Noctuidae	*Helicoverpa armigera*	1	0.73
Pentatomidae	*Nezara viridula*	1	0.73
Pseudococcidae	*Plannococcus citri*	7	5.11
Scarabaeidae	*Protaetia* sp.	5	3.65
Tephritidae	*Bactrocera* spp	39	28.4
Percentage of Attack			68.28%

Non-horticultural crops were attacked by several types of diseases caused by fungi. Such as the cause of leaf rust disease in corn plants caused by the fungus Puccinia sp., downy mildew on corn plants caused by the fungus Peronosclerospora spp., corn leaf spot disease caused by the fungus Bipolaris sp., Fusarium wilt caused by the fungus Fusarium sp., leaf fall disease in rubber plants caused by the fungus Pest alotiopsis sp., and corn leaf blight caused by the fungus Helminthosporium sp. The most common type of disease attack was leaf blight. The percentage of leaf blight attack was 37.21%, high temperature and rainfall caused a high percentage increase because these factors were suitable for the development of fungal life and also caused by plant varieties that were susceptible to disease. Meanwhile, the disease attack The lowest was Fusarium wilt disease attack with a percentage of 2.33% (Table 3).

There were 16 types of diseases that attack horticultural crops, most of which are caused by fungal pathogens, caused by land conditions and humidity that were suitable for fungal growth. While the highest percentage of disease attack was the type of viral mosaic disease that was with a percentage attack of 36.50% (Table 4). The high percentage of mosaic virus attack was partly due to the high percentage of attack by the vector insect, Aphis gossypii, which was 19.71%. Meanwhile, the lowest disease attack was downy mildew, which only attacked 1 field with a percentage attack of 0.73%. This low percentage of attack was due to the host plants of downy mildew were corn and sorghum, not horticultural crops.

Table 3. Number and percentage of diseases in non-horticultural fields

Pathogenic	Pathogens/Diseases	Number and Percentage of Diseases in Non-Horticultural Fields (43 fields)	
		Amount of Land	Percentage (%)
Cendawan	Rust of leaves	13	30.23
	Downy mildew	3	6.98
	Leaf Spot	4	9.30
	Fusarium wilt	1	2.33
	Leaf Fall	9	20.93
	Leaf blight	16	37.21
Percentage of Attack			64.41%

Table 4. Number and percentage of diseases in horticultural fields

Pathogenic	Pathogens/Diseases	Number and Percentage of Diseases in Horticultural Fields (137 fields)	
		Percentage (%)	Persentase (%)
Bakteri	CVPD	8	5.84
	Leaf blight	4	2.92
	Citrus cancer	6	4.38
	Bacterial wilt	4	2.92
Cendawan	Anthracnose	19	13.87
	Leaf spot	36	26.28
	Cerkospore Spot	3	2.19
	Downy mildew	1	0.73
	Feather dew	10	7.30
	Sooty Dew	4	2.92
	Flour Dew	5	3.65
	Leaf Rust	6	4.34
	Citrus Scabies	4	2.92
	Fusarium wilt	3	2.19
Virus	Gemini Virus	12	8.76
	Mozaik Virus	50	36.50
Percentage of Attack			72.93%

Visual observations on horticultural crops showed the presence of pest attacks and symptoms, especially Bemisia tabaci found on citrus plants m Aulacophora sp. on eggplants, Phyllocnistis citriella attack symptoms on citrus leaves, Diaphania sp. found on bitter melon plants, Protaetia sp. on long bean plants, Plannococcus citri found on citrus trees, Nezara viridula on long bean plants, Paracoccus marginatus on citrus trees, Aphis gossypii on citrus trees, symptoms of Liriomyza sp. on long bean plants, symptoms of locust attack on long beans, Empoasca sp. (Figure 2).

Based on visual observations made in horticultural crops, 4 pictures of symptoms of the types of diseases that attack. The types of diseases that attack were leaf rust disease in long beans, CPVD Citrus Vein Phloem Degeneration disease in citrus plants, anthracnose disease in red chilli plants, and canker disease in citrus fruits (Figure 3). Visual observations on nonhorticultural land have provided an overview of pests and symptoms of pest attack on nonhorticultural crops, especially *Spodoptera frugiperda* attacking corn, *Leptocorisa* sp. attacking rice plants, symptoms of *Coptotermes* sp. on rubber trees and *Scirpophaga innotata* on rice (Figure 4). The results of observations on non-horticultural land also found images of 2 types of diseases, namely leaf spot disease in corn plants and leaf blight disease in corn plants (Figure 5).

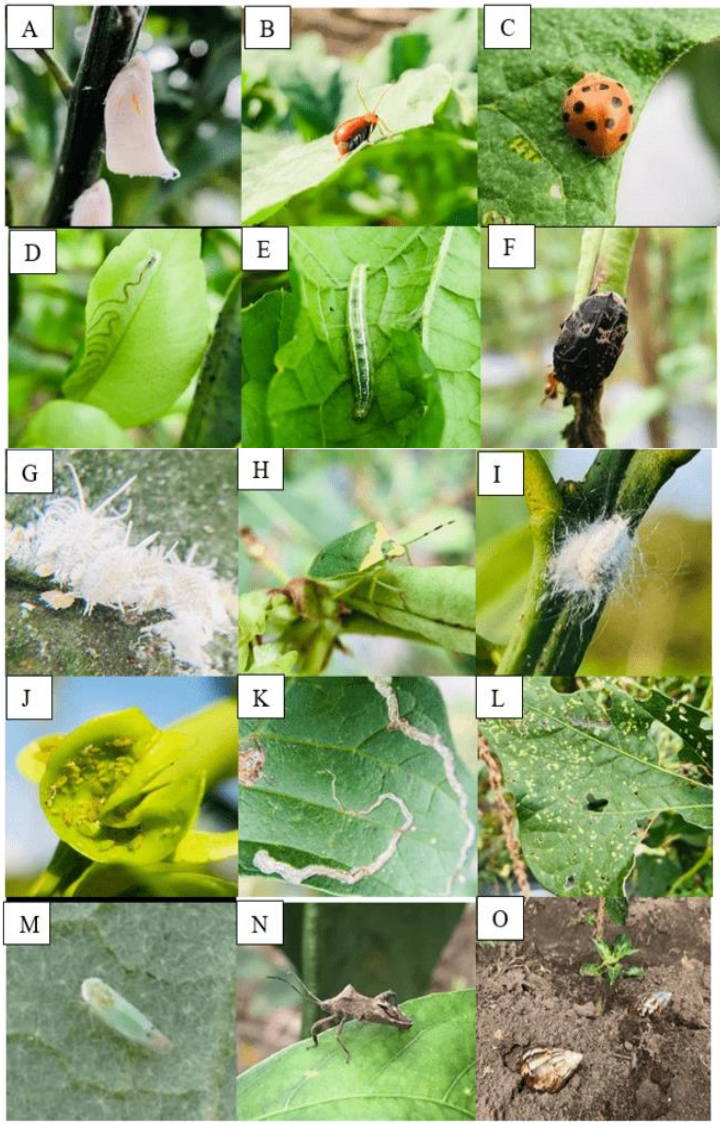

Figure 2. Pests and symptoms in horticultural fields: *Bemisia tabaci* (A), *Aulacophora indica* (B), *Epilachna* sp. (C), *Phyllocnistis citriella* (D), *Diaphania* sp. (E), *Protaetia* sp. (F), *Plannococcus citri* (G), *Nezara viridula* (H), *Paracoccus marginatus* (I), *Aphis gossypii* (J), *Liriomyza* sp. attack symptoms (K), *Locust* attack symptoms (L), *Empoasca* sp. (M), *Mictis longicornis* (N), and *Achatina fulica* (O)

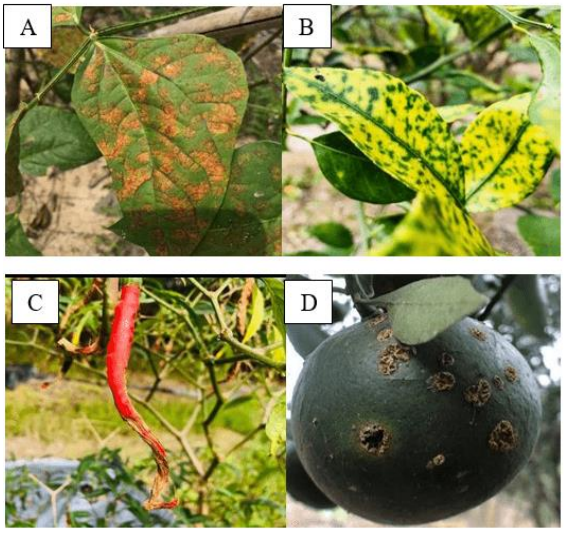

Figure 3. Disease symptoms in horticultural fields; leaf rust (A), CVPD Citrus Vein Phloem Degeneration (B), anthracnose (C), citrus canker (D)

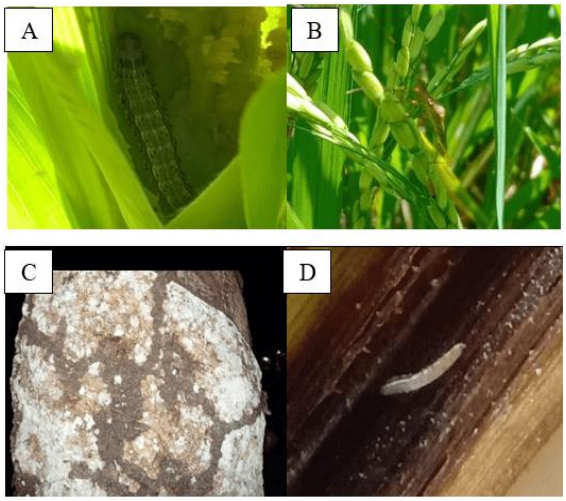

Figure 4. Pests in non-horticultural fields: *Spodoptera frugiperda* (A), *Leptocorisa* sp. (B), *Coptotermes* sp. (C), and *Scirpophaga innotata* (D)

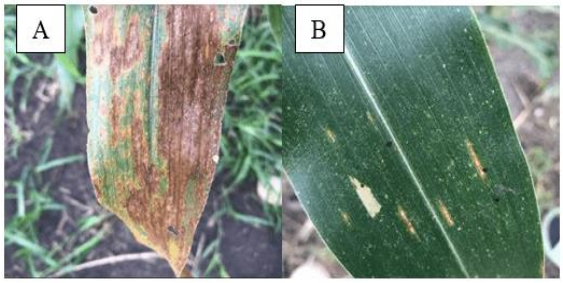

Figure 5. Disease infestation symptoms in non-horticultural fields: leaf spot infestation symptoms (A), and maize leaf blight infestation symptoms (B)

DISCUSSION

Horticultural and non-horticultural crops are one of the commodities that are quite popular with the community. Based on observations of 180 farmers' fields in South Sumatra, there are several pest and disease attacks. Pests and diseases are factors that are very detrimental to the cultivation of horticultural and non-horticultural crops. Horticultural crops that are widely cultivated in South Sumatra include cucumber, long beans, and eggplant. Meanwhile, the non-horticultural crops are corn, rice, and rubber.

The percentage of pest attacks on non-horticultural land is 57.36%. Commonly found pest attacks are pest attacks from the species Spodoptera frugiperda with a percentage attack of 67.44%. Spodoptera frugiperda is a pest that has been found to damage corn crops with a fairly heavy attack rate with a larval population of around 2-10 heads per plant (Novita et al., 2021). It was followed by pest attacks from the species Leptocorisa sp. And finally pest attacks from the species Coptotermes sp. which only attacked 1 rubber plantation with a percentage attack of 2.33%. In rice, there is a Walang Sangit pest (Leptocorisa acuta) this pest is a potential pest that can suck rice grains that have matured milk so that the rice grains become not full, even empty (Sumayanti et al., 2021).

Symptoms that occur on the leaves are dark brown spots and the edges of the leaves have light brown spots. Rice seeds look yellow and partly blackish in colour. This disease is caused by a fungus member of the species Fusarium sp. (Walascha et al., 2021). Maize plants have many types of diseases, mainly caused by fungal and bacterial pathogens (Jeniria & Mukarlina, 2015). One type of disease that often attacks corn plants is leaf blight caused by the fungal pathogen Helmithosporium sp (Girsang et al., 2020). Like horticultural crops, non-horticultural crops such as rubber trees also suffer from several types of diseases that attack the four main parts of H. brasiliensis, namely leaves, stems, panels, and roots. Among the severe diseases of rubber trees are Corynespora leaf disease caused by Corynespora casicola, South American leaf blight caused by Microcyclus ulei, a species of Phytophthora that causes abnormal leaf fall. (Mazlan et al., 2019)

Horticultural land is 68.28%. The highest percentage of pest attack was found in the species Bactrocera sp. with a percentage attack of 28.4%. It was followed by pest attacks from Spodoptera litura species with a percentage attack of 24.09%. The lowest pest attack that only attacked 1 field was from the species Paracoccus marginatus, Helicoverpa armigera, Achatina fulica, and Nezara viridula with a percentage attack of only 0.73%. In long bean plants, there is an aphid pest attack (Aphis craccivora) which causes long bean production to decrease by up to 30% and results in losses for farmers. This pest usually colonises under the surface of the leaves or between the leaves, sucking the liquid leaves, petioles, flowers, plant tops, leaf stems and fruit (Setiawan & Oka, 2015). In cucumber plants, the pests that always attack plants are aphid pests, these pests cause plants to lack fluids by sucking plant fluids from the shoots to the lower leaves. This pest attack is more sporadic and causes the leaves to harden, roll down, and dewy black symptoms so that the photosynthesis process is disrupted and inhibits fruit growth. Eggplant is a vegetable that is widely consumed by the community so that the production of eggplant plants continues to increase (Arsi et al., 2021). However, the increase in demand for eggplant production has not been met by an increase in the amount of production, one of which is caused by the low productivity of eggplant due to insect pests. Then the area of eggplant cultivation is also still small and the form of cultivation culture is still sideline and not intensive, causing eggplant production to remain low (Lusiana, 2018).

CONCLUSION

The percentage of pest attacks on non-horticultural land was 57.36% of pest attacks commonly found were pest attacks of Spodoptera frugiperda species with a percentage attack of 67.44% followed by pest attacks of Leptocorisa sp. species and finally pest attacks of Coptotermes sp. While on horticultural land was 68.28% of the highest percentage of pest attacks found in Bactrocera sp. species with a percentage attack of 28.4.

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