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Inventory and Potential of Natural Enemies (*Predators and Parasitoids*) as Pest Controller in Lemon Crops in Langkat, North Sumatera

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A B S T R A C T

Lemons are plant horticulture fruits, which kind of oranges are also known as designation citrus. The fruit is shaped as a round oval, colored bright yellow, and tasteful, sour, or sweet. Other roles of insects in nature besides insect potential herbivores (phytophagous) pests that is, as predators and parasitoids. The study aims to identify types and diversity of enemy potential natural (predators and parasitoids). as controller pests on lemon plants. The study was conducted on land lemons in Namo Terasi village, Sei Bingai District, Langkat Regency. Identification of insects was done in Laboratory Pests, Faculty of Agriculture, University of Sumatera Utara from March until June 2023. This study uses a purposive sampling method with five types: yellow sticky trap, red trap, black trap, blue ball trap, and net trap. Total insects identified on the lemon's vegetation (*Citrus lemon*) consist of 10 Orders, 38 Families, 49 Genera, and 2308 individuals. The highest population recorded from Aphidius (Hymenoptera: Braconidae) is as many as 481 individuals. The highest Density and Relative Density from the family Braconidae (D=481, RD=21.02%), whereas the lowest of the Mantidae Family (D= 3, RD=0.13%). The total population consisted of ten types of predatory insect families, four types of parasitoids,16 types of herbivores, five types of pollinators, and three types of decomposers.

INTRODUCTION

Lemons are plant horticulture fruits kind. Oranges are also known as designation citrus. The fruit is shaped as a round oval, colored bright yellow, and tasteful sour or sweet. More lemons are popular in the culinary industry because they have a fresh citrus aroma; the usual parts used are the juice and skin (Muaris, 2015).

Many obstacles are faced in cultivating plant local lemons, among other things, attacking pests. Generally attacking pests, including psyllids (*Diaphorina* et al.), aphids brown (*Toxoptera citricidus*), aphids black (*Toxoptera aurantii*), aphids green (Aphisgossypii), Thrips (*Scirtothrips citri),* Mites red (*Panonychus* et al.), rust mites (*Panonychus oleivora)*, scale lice or shield tick (*Lepidosaphes* et al.), caterpillar punnier leaves (*Phylocnistis citrella*), borer fruit (*Citripestis sagitiferella*), caterpillar leaves (*Papilio demolion*) and flies fruit (*Bactrocera* spp) (Endarto & Martini, 2016).

Other roles of insects in nature besides insect herbivores (phytophagous), which have potential pests, that is, as a predator, parasites, or parasitoids. Predatory insects become predators directly from Lots of other insects (prey), and parasite insects take nutrition from other insects (hosts) without killing him a way directly. Meanwhile, parasitoid insects make other roles of insects in nature besides insect

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herbivores (phytophagous), which have potential pests as a predator, parasites, or parasitoids. Predatory insects become predator directly from Lots other insects (prey), parasite insects take nutrition from other insects (hosts) without killing them directly, parasitoid insects make other insects (hosts) place larval development at once and kills its host after developing becoming an imago (Foottit & Adler, 2017).

Predators are long-term organisms in free life, kill their prey, usually more significant than their prey, and need more from One prey to finish their development. For example, bee Coccinelid, grasshopper praying, and predatory spiders. Predators at the larval and imago stages in general prey - their prey (Alston, 2015).

Frequent parasitoids are categorized into parasites, but parasitoids are persistent predators. Size their bodies the same as the host; they can kill the host and only need One host to develop to become a living imago. Parasitoids based on the host stage are classified into parasitoid eggs, larvae, and pupae. Parasitoid larvae of group that is endoparasitoids and ectoparasitoids (Mudjiono, 2016).

Research objectives This is to identify types and diversity enemy potential natural (predators and parasitoids). as controller pests on plant lemons in the Langkat Regency.

METHODS

Place And Time Study

This study was carried out in the lemon plantations in Namo Terasi Village, Sei Bingai District, Regency Langkat, North Sumatra Province, with a height of 85 MDPL. Study laboratory carried out in the Pest Laboratory Faculty of Agriculture, University of Sumatera Utara, with a height of 38 MDPL—a study held from March until June 2023.

Materials and Tools

Materials used in the study were butterfly net, water clean, detergent, plastic transparent glueadhesive, paper cardboard, tissue, rope plastic, formalin 4%, chloroform, needle insectarium 70% alcohol.

Tools used in the study were jar, microscope stereo, cloth gauze, YST (*Yellow* et al.), BST (*Black et al.), BBT* (*Blue ball trap*), RST (*Red et al.)*, SN (*Sweep net*), tweezers, scissors, knife, camera, tape, tools writing.

Design Study

The method used in the study was *purposive sampling*, which does observation in a direct way (visual). Land used as observation is Lemon plantations uses five traps, namely, Yellow Sticky Trap (YST), Black Sticky Trap (BST), Blue Ball Trap (BBT), Red Sticky Trap (RST), SN (sweep net) with five sampling of 25 traps, collection sample during eight times. Retrieval interval sample around seven days from every installation trap.

Implementation Study

Determining Research Locations

Study was carried out on lemon plantations in Namo Terasi Village, Sei Bingai District, Langkat Regency, North Sumatra Province, with a height of 85 meters above sea level (masl).

Installation Trap

Trap Insects were installed at five observation sampling points. Each sampling was installed as many as four traps of 4 types, namely Yellow Sticky Trap (YST), Black Sticky Trap (BST), Blue Ball trap (BBT), and Red Sticky Trap (RST).

Observation and Sampling

The observation was done for knowing type of insects and conditions at the location research. Retrieval samples are done as much eight times with time intervals taking samples seven days from installation trap.

Identification Insect

Insects caught at the location study were then identified at the Pest Laboratory K, Faculty of Agriculture, University Sumatera Utara.

Variable Observation

1. Quantity and type of caught insects
Caught insects were collected, identified, and counted by the group of each family of insects caught on each observation.
2. Frequency Value Absolute, Frequency Relative, Density Absolute, and Density Relative to each observation.

Knowing the population caught insects that have been identified, he can calculate mark frequency absolute, frequency relative, density absolute, and relative density in each observation.

A. Absolute Density (AD)

Density absolute shows of insects found in that habitat stated in a way, namely:

AD = Amount individual species caught x 100 %
Amount arrest

B. Density Relative (DR)

KR = KM X 100%
ΣKM
Where:
KM = Amount individual something type in every arrest
ΣKM=Total individuals in every arrest

C. Frequency Absolute (FA)

Frequency absolute shows amount individual insects and particular species found in the stated habitat in absolute (Suin, 1997).
FM = Total found something insect
Amount all over arrest

D. Frequency Relative (FR)

Frequency shows the frequent presence of insects in the habitat and can describe the spread type of insect.
FR = FM X 100%
ΣFM
FM = FM value of a type of insect every catcher
ΣFM = All FM values type insect every arrest

Function Status Insect

Caught insects identified differentiated insects as herbivores, predators, parasitoids, and insects.

Air Temperature and Humidity

Measurement temperature and Humidity of air in the planting area lemon is done with the use digital thermohygrometer with unit temperature °C and units humidity RH (%) placed on the land lemon and noted range temperature air and humidity air daily.

Rainfall

Bulk data Rain daily done measurement use tool to measure the rain gauge on the lemon plantations.

Data analysis

Data from results observations that include type insect pests and types enemy naturally caught in traps experiment, identification of insect pests and enemies experience both predators and parasitoids, number insect pests and enemies naturally caught in a trap Experiment on a lemon garden using Microsoft Excel 2013 and using SPSS 2021 with carried out the T-Test and 5% ANOVA with meets the assumption test normality and homogeneity.

RESULTS AND DISCUSSION

Amount And Type Insect Caught

From the research results, eight samples were taken on emon plantations, and the quantity and type of insects caught in the planting area of the lemon plantation can be seen in the table.

Table 1. Number and type of insects caught

Classification			Amount
Order	Family	Genus	
Hymenoptera	Ichneumonidae	*Pimple*	14
		Ophion	6
	Chalcididae	*Psilochalcis*	8
	Vespidae	*Vespula*	17
		Vespa	17
		Polistes	16
	Specidae	*Chalybion*	8
		Ammophila	16
	Pompilidae	*Ouplopus*	38
	Braconidae	*Aphidius*	481
	Apidae	*Xylocopa*	10
	Formicidae	*Messor*	38
Coleoptera	Curculionidae	*Rhynchophorus*	4
	Coccinelidae	*Coccinella*	17
		Oenopia	7
		Epilachna	9
	Attelabidae	*Rhynchites*	5
	Cerambycidae	*Dinoptera*	6
	Buprestidae	*Sternocera*	19
	Curculionidae	*Hypomeces*	6
	Carabidae	*Neocollyris*	5
		Cylinder	8
Diptera	Tipulidae	*Tipula*	109
		Neoitamus	9
	Muscidae	*Musca*	135
		Spilogona	31
	Challiphoridae	*Chrysomya*	11
	Tephritidae	*Bactrocera*	432
	Drosophilidae	*Drosophila*	129
	Stratiomyidae	*Hermetia*	84
	Cecidomyidae	*Trishormomyia*	29
Hemiptera	Alydidae	*Leptocorisa*	7
	Coreidae	*Acanthocephala*	12
		Pysomerus	6
	Lygaedae	*Caenocoris*	6
	Aphididae	*Aphis*	334

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	Florida	*Sanurus*	11
	Pentatomidae	*Trchopepla*	15
Lepidoptera	Nymphalidae	*Hypolimnas*	39
		Junonia	11
	Pieridae	*Appias*	8
	Hesperidae	*Erionata*	15
	Sphingidae	*Acherontia*	11
	Papilionidae	*Papilio*	21
Orthoptera	Acrididae	*Valanga*	6
Mantodea	Mantidae	*Mantis*	3
Thysanoptera	Thripidae	*Thrips*	51
Mecoptera	Bittacidae	*Hylobittacus*	18
Odonata	Libellulidae	*Pantala*	10
	Total		2308

Order with population highest on land lemon (*Citrus* Lemon) is the order Diptera as much 969 heads; assumed condition environment with a range of 29.7°C – 33.7°C and Humidity of 80 % - 87% supports the breeding process. Campbell *et al. 's* (2008) literature states that environment, life, and nature are dynamic, i.e., always changed over time. Change This happens quickly or slowly and can change the intensity factors in the environment. A number of factors in the environment, like temperature, light, and Humidity, can influence the diversity of organisms.

The population of the order Diptera originates from Family Tephritidae: genus *Bactrocera*. As many as 432 individuals matter. This is because several factors influence the life and development of fly fruit. Abiotic factors Climate has an influence on activity mating and laying egg matter This is by statement by Susanto et al. (2017), which explains fruit flies generally live and develop at temperatures of 10–30°C. On temperature between 25-30°C, egg fly fruit can hatch in relative time, namely 30-36 hours. Optimum Humidity required fly fruit for develop breed range between 70–80%. The rainfall connection is direct with an abundance of fly fruit (Seprima, 2018).

From the results of research that has been carried out, the Order of insects in the garden population lowest in the garden Lemons are of the order Mantodea with a total of 3 tails. The low population of mantodea influenced the low food availability in the garden lemon. This is by the statement of Sidabutar (2016) that in relationship with food m, each type of insect has its range of food (host). From one until Lots food (host). Food is a source of nutrients used by insects for continued sustainability, life, and development.

Based on the results, the highest genus research is the genus Aphidius, with a total of 481 heads, because Aphidius is one of the parasitoids that have the ability to adapt well enough on the plains, tall or plain low by the existing insect (host). This is by Stary (2014), who stated that Aphidids are cosmopolitan parasitoids that spread across various climatic zones and continents. Depending on the host. Spread insect host Aphdius, such as the related A. gossypii, tightly with distribution plant host and distribution A. gossypii influenced by ability adapt to condition environment.

Aphidius is the most numerous genus found on land lemons, affected by spread insect hosts like aphids (insect hosts), whose number is high in location observation. This thing, in accordance with Prado et al. (2015) literature, states Aphidius parasitoid insect sp (Braconidae) is aphid parasite that can control aphid pests with attacks at the first and second instar stages before aphids breed.

Calculation of KM, KR

Based on the quantity and type of insects that were obtained from observation on the land lemon (*Citrus Lemon* L), then obtained mark density absolute and density relative, which can be seen in the table under this.

Table 2. Calculation of KM, KR

Family	Genus	KM	KR
Ichneumonidae	*Pimple*	14	0.60
	Ophion	6	0.25
Chalcididae	*Psilochalcis*	8	0.34
Vespidae	*Vespula*	17	0.73
	Vespa	17	0.73
	Polistes	16	0.69
Specidae	*Chalybion*	8	0.34
	Ammophila	16	0.69
Pompilidae	*Ouplopus*	38	1.64
Braconidae	*Aphidius*	481	20.84
Aphidae	*Xylocopa*	10	0.43
Formicidae	*Messor*	38	1.64
Curculionoidae	*Rhynchophorus*	4	0.17
Coccinelidae	*Coccinella*	17	0.73
	Oenopia	7	0.30
	Epilachna	9	0.38
Attelabidae	*Rhynchites*	5	0.21
Cerambycidae	*Dinoptera*	6	0.25
Buprestidae	*Sternocera*	19	0.82
Curcunilonidae	*Hypomeces*	6	0.25
Carabidae	*Neocollyris*	5	0.21
	Cylinder	8	0.34
Tipulidae	*Tipula*	109	4.72
	Neoitamus	9	0.38
Muscidae	*Musca*	135	5.84

	Spilogona	31	1.34
Challiphoridae	*Chrysomya*	11	0.47
Tephritidae	*Bactrocera*	432	18.71
Drosophilidae	*Drosophila*	129	5.58
Stratiomyidae	*Hermetia*	84	3.63
Cecidomyiidae	*Trishormomyia*	29	1.25
Alydidae	*Leptocorisa*	7	0.30
Coreidae	*Acanthocephala*	12	0.51
	Pysomerus	6	0.25
Lygaedae	*Caenocoris*	6	0.25
Aphididae	*Aphis*	334	14.47
Flatidae	*Sanurus*	11	0.47
Pentatomidae	*Trchopepla*	15	0.64
Nymphalidae	*Hypolimnas*	39	1.68
	Junonia	11	0.47
Pieridae	*Appias*	8	0.34
Hesperidae	*Erionata*	15	0.64
Sphingidae	*Acherontia*	11	0.47
Papilionidae	*Papillion*	21	0.90
Acrididae	*Valanga*	6	0.25
Mantidae	*Mantis*	3	0.12
Thripidae	*Thrips*	51	2.20
Bittacidae	*Hylobittacus*	18	0.77
Libellulidae	*Pantala*	10	0.43
Total		2208	100

The study obtained results data calculations in Table 2 that the markdensity absolute and density relatively highest on land lemon is family Braconidae with mark KM = 481 And KR =20.84 %, whereas the lowest is the family Mantidae with mark KM =3 And KR = 0.12 %. This happens Because insects in the ecosystem are influenced by a number of factors, such as the amount of food or the environment physically, because not all environments are suitable for all types of insects. It is based on literature. Suin (2012) stated that the existence of insects somewhere in the environment is influenced by environmental, biotic, or abiotic factors. Abiotic factors cover land, water, temperature, light, and atmosphere. Whereas factor biotic is other organisms are also present in its habitat.

The Braconidae family has the highest KM and KR values because the Braconidae family is a large family caught, and the family Mantidae is small caught. This thing Is by Purba (2014), who stated that density absolute shows the number of insects found in the stated habitat.

Based on quantity and type of insects obtained from observation on the land lemon (*Citrus Lemon* L), mark frequency absolute and relative frequency seen in the table under this.

CALCULATIONS

Based on the quantity and type of insects obtained from observation on the land lemon (*Citrus Lemon* L), the obtained mark Frequency Absolute and Frequency relative can be seen in the table under this.

Table 3. Calculation of FM, FR

Family	Genus	FM	FR
Ichneumonidae	*Pimple*	6	2.09
	Ophion	4	1.39
Chalcididae	*Psilochalcis*	6	2.09
Vespidae	*Vespula*	8	2.78
	Vespa	8	2.78
	Polistes	6	2.09
Specidae	*Chalybion*	4	1.39
	Ammophila	7	2.43
Pompilidae	*Ouplopus*	8	2.78
Braconidae	*Aphidius*	8	2.78
Aphidae	*Xylocopa*	8	2.78
Formicidae	*Messor*	6	2.09
Curculionoidae	*Rhynchophorus*	2	0.69
Coccinelidae	*Coccinella*	5	1.74
	Oenopia	4	1.39
	Epilachna	4	1.39
Attelabidae	*Rhynchites*	3	1.04
Cerambycidae	*Dinoptera*	5	1.74
Buprestidae	*Sternocera*	7	2.43
Curcunilonidae	*Hypomeces*	4	1.39
Carabidae	*Neocollyris*	3	1.04
	Cylinder	5	1.74
Tipulidae	*Tipula*	8	2.78
	Neoitamus	4	1.39
Muscidae	*Musca*	8	2.78
	Spilogona	7	2.43
Challiphoridae	*Chrysomya*	6	2.09
Tephritidae	*Bactrocera*	8	2.78
Drosophilidae	*Drosophila*	8	2.78
Stratiomyidae	*Hermetia*	8	2.78
Cecidomyiidae	*Trishormomyia*	8	2.78
Alydidae	*Leptocorisa*	5	1.74
Coreidae	*Acanthocephala*	6	2.09
	Pysomerus	4	1.39
Lygaedae	*Caenocoris*	4	1.39
Aphididae	*Aphis*	8	2.78
Flatidae	*Sanurus*	4	1.39
Pentatomidae	*Trchopepla*	6	2.09
Nymphalidae	*Hypolimnas*	8	2.78
	Junonia	6	2.09
Pieridae	*Appias*	5	1.74
Hesperidae	*Erionata*	5	1.74
Sphingidae	*Acherontia*	6	2.09
Papilionidae	*Papillion*	8	2.78
Acrididae	*Valanga*	4	1.39
Mantidae	*Mantis*	3	1.04
Thripidae	*Thrips*	7	2.43
Bittacidae	*Hylobittacus*	6	2.09
Libellulidae	*Pantala*	6	2.09
Total		287	100

Based on research that has been carried out, the result data is obtained the calculation in Table 3 shows the Frequency Value Absolute (FM) and Frequency Highest Relative (FR). are the families Vespidae (*Vespula*), Vespidae (*Vespa*), Pompilidae (*Auplopus*), Braconidae (*Aphidius*), Apidae (*Xylocopa*), Muscidae (*Musca*), Tipulidae (*Tipula*), Tephritidae (*Bactrocera*), Drosophilidae (*Drosophila*), Stratiomyidae (*Hermetia*), Cecidomyiidae (Trishormomyia), Aphididae (*Aphis*), Nymphalidae (*Hypolimnas*), Papilionidae (*Papilio*), FM Value = 8 and FR value = 2.78%. Frequency Value Absolute (FM) and Frequency Lowest Relative (FR) Curculionoidae (*Rhynchoporus*) FM value = 2 and FR value = 0.69%. Siregar *et al*. (2020) stated that an enormous mark density is compared straight with mark density relatively high. Possible factors _ influence population organisms, which can form the suitability of habitat, environment, integrity of food, existence of enemy natural, and other supporting factors for the cycle of life. According to Saragih (2008), frequency relatively show often presents something insects in the habitat and can describe spread type insect.

Highest FM and FR values found in the families Vespidae (*Vespula)*, Vespidae (*Vespa)*, Pompilidae (*Auplopus)*, Braconidae (*Aphidius)*, Apidae (*Xylocopa*), Muscidae (*Musca*), Tipulidae (*Tipula*), Tephritidae (*Bactrocera*), Drosophilidae (*Drosophila*), Stratiomyidae (*Hermetia*), Cecidomyiidae (*Trishormomyia*), Aphididae (*Aphis*), Nymphalidae (*Hypolimnas*), Papilionidae (*Papilio*) due to insect the often present in land observation and distribution insect the area wide land observation lemon. This is by Purba (2014), who stated that Frequency absolute show the amount of frequent presence of certain species found in each habitat, and frequency relatively show the frequent presence of some insects in the habitat and can describe the spread type of insect the

Status Function Insect

Based on the results of identification carried out, functional status is obtained from insects on the land lemon juice, insects two types of decomposers family, insects 16 types of herbivores family, insects five types of pollinators families, ten types of predatory insects, four types of parasitoid insects familiar in the table under this.

Table 4. Function status insect

Classification			
Family	**Genus**	**Function Status**	**Amount**
Ichneumonidae	*Pimple*	Parasitoids	14
	Ophion	Parasitoids	6
Chalcididae	*Psilochalcis*	Parasitoids	8
Vespidae	*Vespula*	Predators	17
	Vespa	Predators	17
	Polistes	Predators	16
Specidae	*Chalybion*	Predators	8
	Ammophila	Predators	16
Pompilidae	*Ouplopus*	Predators	38
Braconidae	*Aphidius*	Parasitoids	481
Apidae	*Xylocopa*	Pollinator	10
Formicidae	*Messor*	Predators	38
Curculionoidae	*Rhynchophorus*	Herbivore	4
Coccinelidae	*Coccinella*	Predators	17
	Oenopia	Predators	7
	Epilachna	Predators	9
Attelabidae	*Rhynchites*	Herbivore	5
Cerambycidae	*Dinoptera*	Herbivore	6
Buprestidae	*Sternocera*	Herbivore	19
Curcunilonidae	*Hypomeces*	Herbivore	6
Carabidae	*Neocollyris*	Predators	5
	Cylinder	Predators	8
Tipulidae	*Tipula*	Herbivore	109
Asilidae	*Neoitamus*	Predators	9
Muscidae	*Musca*	Scavenger	135
	Spilogona	Scavenger	31
Challiphoridae	*Chrysomya*	Scavenger	11
Tephritidae	*Bactrocera*	Herbivore	432
Drosophilidae	*Drosophila*	Herbivore	129
Stratiomyidae	*Hermetia*	Scavenger	84
Cecidomyiidae	*Trishormomyia*	Predators	29
Alydidae	*Leptocorisa*	Herbivore	7
Coreidae	*Acanthocephala*	Herbivore	12
	Pysomerus	Herbivore	6
Lygaedae	*Caenocoris*	Herbivore	6
Aphididae	*Aphis*	Herbivore	334
Florida	*Sanurus*	Herbivore	11
Pentatomidae	*Trchopepla*	Herbivore	15
Nymphalidae	*Hypolimnas*	Pollinator	39
	Junonia	Pollinator	11
Pieridae	*Appias*	Pollinator	8
Hesperidae	*Erionata*	Pollinator	15
Sphingidae	*Acherontia*	Pollinator	11
Papilionidae	*Papillion*	Herbivore	21
Acrididae	*Valanga*	Herbivore	6
Mantidae	*Mantis*	Predators	3

Thripidae	*Thrips*	Herbivore	51
Bittacidae	*Hylobittacus*	Parasitoids	18
Libellulidae	*Pantala*	Predators	10

Based on Table 4. The highest parasitoid status is family Braconidae (*Aphidius),* with 481 individuals. The functional status of parasitoids is illustrative of the importance of the role of something type in the ecosystem that influences the amount of spread of insect hosts, like *Aphidius*, which has spread a Widespread host of aphids *Aphis* (Hemiptera: Aphididae). Aphidius own range enough host capable area parasitizes aphids. This is by Akhtar *et al.* (2011) literature, which states that there are many parasitoids found in aphid colonies iala *A. matriciae* (Aphidinae: Braconidae). *A. matriciae* own range of very knowledgeable and capable host parasitize aphid species. Dey and Akhtar (2007) described these parasitoids' ability to parasitize and power scatter is high in the Indian area, so often used as enemy experience aphids.

Predatory insects with the highest amount are Family Vespidae (*Vespula et al.)*, with 50 individual roles as enemies naturally occurring in plants. Lemons will reduce impact of attack pests, especially Lepidoptera larvae and Coleoptera larvae. This is in accordance with Untung's (2006) literature, which states predatory insects are insects that eat, kill, or prey insects; meanwhile, according to Agung (2014), predatory insects are actors important in the balance of the ecosystem and also as controllers of biological or

Insect's role as pollinator highest is *Hypolimnas* (Nymphalidae), numbering 39 functioning individuals help pollination of flowers lemon because at the time suck nectar; butterflies help the pollination process plant lemon so they can help phase generative. This thing, by literature Ruslan (2015) stated at the time, suck nectar, butterflies help the pollination process in plants. Existence butterflies as insect pollinators can help maintain Lots of species of plants in their habitat.

Apart from the order Lepidoptera, which dominates as insect pollinators, the order Hymenoptera, like bees (Family Apidae) genus *Xylocopa*, enter into the insect pollinators in plants lemon. This is by the study by Falahuddin (2015) that bees included in the order Hymenoptera own the ability to help pollinate plants because body-covered feathers have beneficial subtlety for catching pollen obtained from flowers.

Insect potential herbivore as a pest with amount highest is family Tephritidae (B*actrocera)* numbered 432 individuals show status pest important influences results in quality and quantity in something ecosystem agriculture, like as well as destructive *Bactrocera* larvae fruit that causes fruit lemons rot and fall. This is by the literature. Handayani (2015) stated that the larval phase of flies damages the fruit because the larvae will eat meat, fruit, oranges. This is also supported by Wuryantini (2016), who states that fly fruit is a pest important in planting oranges. The damage it causes by its larvae will cause fall fruit before it reaches the desired fruit.

Based on the functional state of insects on the land, lemon juice is categorized into two types of decomposers: 16 types of herbivores, five types of pollinators, ten types of predatory, and four types of parasitoids. In accordance with Untung (2006), the literature states that in the ecosystem, respective farm-type insects show characteristic typical populations. Besides, not all insect in the agroecosystem is insect pest, but is enemy experience pests (predators, parasitoids) insect pollinators.

Temperature air and Humidity

Based on physical data measurements carried out during observations for lemons, average temperature data was obtained from air daily range of 29.7°C – 33.3°, Humidity air range of 79%-85%. The average temperature air daily was highest on week eight at 33.3 ° C and on week three at 33.0°C. The average temperature air daily was lowest on week six at 29.7 ° C, and week 1 was 30.2°C. The Average humidity air highest on week 6 was 85 %, and the average humidity air daily lowest on week eighth was 79 %. The measurement results can be seen in Table 5 below this.

Table 5. Temperature air and Humidity

Physical Factors	Daily average Sunday to							
	1	2	3	4	5	6	7	8
Temperature air (°C)	30.2	31.5	33.0	32.6	31.7	29.7	32.3	33.3
Humidity (%)	84	83	79	81	82	85	81	79

Based on the results, measurement temperature in the field lemons average daily temperature is highest on Sunday at 8 33.3 °C with as many as 366 individuals, and the daily average temperature Lowest is on Sunday at 6 29.7 °C with as many as 232 individuals. Based on the comparison of caught insects, the range temperature air at the location observation classified the optimum temperature for life insects because temperature is between minimum and maximum. This is to the literature by Handani *et al.* (2015), which states that Insects are characteristic organisms poikilotherm, so the body of an insect Is influenced by the temperature environment. Insects own range temperature is certain. Where insects can live, they will die If they passes range tolerance. In general range effective temperature is minimum temperature 15 °C, optimum temperature of 25 °C, a maximum 45 °C.

Humidity daily average air around 79%-85% each Sunday for eight weeks of observation at location research. Humidity air contained in the land Lemons is optimal for breeding insects. This is by the opinion of Sodiq (1993), who stated that, in general, Insects are very vulnerable to drought, especially in oviposition, and the larval stage for pupation and imago emergence are also influenced by humidity optimal soil for Pupal life is between 80-90%. Whereas Riostone (2010) adds Humidity good air in the range of 80-95%, so support insect in continuity of life.

Rainfall _l

Based on physical data measurements carried out during observations lemons obtained bulk data Rain highest on week sixth as much as 149 mm and bulk Rain lowest on week the 8th was 25 mm.

Table 6. Rainfall _l

Physical Factors	Observation Sunday to							
Rainfall _	1	2	3	4	5	6	7	8
Quantity (mm)	12 2	87	30	4 8	85	14 9	4 5	25

The rainfall was highest on week 6, recorded at 149 mm, with a total caught insects of 232 individuals; bulk Rain was lowest in week eight by 25 mm, with a total caught insects _ of 366 individuals. The high and low bulk Rain influence the population of insects. This is to the literature by Aryoudi *et al.* (2015), who stated that bulk Rain can influence the population of insects. Bulk Rain can affect insects; if Rain is a significant insect pest, many die which can be influential, especially on growth and activeness of insects.

The rainfall was highest at the location observation by 149 mm on the week the 6th, arrested the fewest insects numbered 232 individuals. Rainfall can influence growth and activity insects, to cause death in insects. This is by a statement by Elphinstone et al. (2008), which states that rain, in a direct way, can influence the population of insects; if rain, big insects Are dead. This can influence growth and activity of insects.

Data analysis
T-test

Table 7. *T-test*

One-Sample Test[a]

Waktu Pengambilan Sampel		Unstandardized Coefficients		T	Sig.
		B	Std. Error		
1	Genus	25.225	.245	102.801	.000
	Total Serangga	2.332	.026	89.232	.000

Based on Table 7. on obtained results T- test testing using SPSS assumed deciding as follows:

1. Test results with SPSS for genus variable (X1) against sampling time (Y) are obtained with mark tcount amounting to 102.80 < 115.25 with level significance of 0.00 < 0.05 and coefficient regression worth positive of 25.25. This means the Genus variable (X1) has a positive effect and is significant on Collection Time sample (Y). On results, the can be concluded that H1 is accepted.
2. Test results with SPSS for total attack variable (X2) against time-taking sample (Y) is obtained calculated t- value amounting to 89.23 < 115.25 with level significance of 0.00 < 0.05 and coefficient regression worth positive of 2.32. This means the total insect variable (X2) has a positive effect and is significant to time taking sample (Y). Based on the results, we can conclude that H2 is accepted

ANOVA test

Table 8. ANOVA test

Waktu Pengambilan Sampel	Sum of Squares	Df	Mean Square	F	Sig.
Genus	2174.858	7	310.694	2.235	.029
Total_Serangga	40.996	7	5.857	3.730	.001

Based on Table 8. we can see influence from every variable in a way simultaneous can see that The Sig value of the Genus Variable (X1) is 0.028. The Total Insect Variable (X2) is 0.001 because Sig value of the Genus Variable (X1) is 0.029 < 0.05 and Sig value of Total Insect Variable (X2) is 0.001 < 0.05, indicating that the f value obtained the significant time taking sample. Linked with Existing theories, p This shows that variable free consisting from genus variable (X1) total insect variable (X2), respectively simultaneously (simultaneously) has an effect positive and significant to variable bound that is time taking sample (Y). So

H3 states there is an influence number of genera and total insects to time taking sample accepted and H0 rejected

CONCLUSIONS

1. The number of insects identified on the land Lemons (*Citrus lemon*) are 10 Orders, 38 Families, 49 Genera, and 2308 individuals. The highest population is from the Genus Aphidius (Hymenoptera: Braconidae), with as many as 481 individuals.
2. The D and RD values are highest on the land lemon is family Braconidae with mark = 481 and R =21.02 %, whereas the lowest is family Mantidae with a mark of D=3 And R = 0.13 %.
3. Amount population: 10 types of predatory, four types of parasitoids, 16 types of herbivores family, five types of pollinators, and three types of decomposers.

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For future research, determine the potency enemy experience in controlling pest major in plants lemons in Langkat Regency and other areas of North Sumatra.

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