

Characterization and Identification of Insects on Capital Chillies (*Capsicum frutescens* L.) in The Plantation Area of Keroit Village, West Motoling District, South Minahasa

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Abstract. The production of chili plants is affected by the presence of beneficial and harmful insects or pests. The sub-optimal chilli growth means that the amount of chilli on offer is very limited, which means that chilli prices skyrocket and, due to harmful insects or organisms that disrupt plants, experience a twofold increase. The aim of this study was to identify insects that are found in chili plants. In this study, 5 random points were determined (Random Sampling) on 500 meters of land that was planted with chilli in Keroit Village. Each sampling point consisted of 2 pit traps, 1 light trap, 2 insect nets and manual insect trapping by hand. The insect testing was carried out when the chilli plants entered the generative period (the time for the formation and development of flower buds) about 30 days after planting. Insect identification with the Google lens application, identification in the laboratory with a stereo microscope and insect identification key book. The results showed that the insects found were 11 orders and 24 families, of which 16 pest families were Gryllidae, Pyralidae, Gyrinidae, Acrididae, Scarabaeidae, Tettigoniidae, Nittidulidae, Acrididae, Chrysomelidae, Anobiidae, Thictidae, Reductidae, Coccinellidae, Gyrinidae, Arcinellidae. Predators with a total of 6 families are Siricidae, Agelenidae, Araneidae, Sclerosomatidae, Agelenidae, Tetragnathidae. Herbivores are 2 families, namely Mantidae, Acrididae. Contains insects in the net trap with a total of 213 individuals, as many insects are active during the day and are therefore diurnal.

Keywords: characterization, chili plants, *Capsicum frutescens*, identification, insects

Abbreviations (if any): All important abbreviations must be defined at their first mention there. Ensure consistency of abbreviations throughout the article.

INTRODUCTION

Indonesia is a country that has a diversity of natural resources, namely the types of plants that can be utilized. Cayenne pepper (*Capsicum frutescens* L.) is a plant known for its spicy taste sensation caused by the presence of the capsaicin compound contained therein. In addition, cayenne pepper is a horticultural plant that has high economic value, is useful as a food flavoring ingredient and has various nutritional content that is beneficial to the human body, which contains protein, carbohydrates, fat, calcium (Ca), phosphorus (P), iron (Fe), vitamin C and contains alkaloid compounds, such as capsaicin (Ali, 2015).

Chili plants can be planted in the lowlands, namely at an altitude of 2000 meters above sea level. Chillies can adapt well to temperatures of 24-27°C with humidity that is not too high. Chili plants can also be planted in paddy fields or moor soil which is overtime, not too clayey, sufficiently watery and fertile. Chili plants require sufficient watering. For planting chillies, the most ideal soil surface is flat with a slope angle of 0-10° and requires full, unshaded sunlight (environmental conditions that are favorable for plants). Optimal soil pH between 5.5-7. If there is a lack of water, the chili plants will be thin, stunted, wither and even die. Meanwhile, excessive amounts of water can stimulate the growth of diseases, fungi, bacteria and can cause high humidity (Setiawati et al., 2008).

Insect pests are animals that are identical as plant destroyers, in this case chili plants. This pest attack causes damage and reduces the production of chili plants and this causes big losses for farmers. One of the negative roles of insects is by eating plants (phytophagous), and as vectors of diseases in plants in the form of viruses, for example viruses are carried by insects when sucking on diseased plants and these insects move and suck on healthy plants, then the virus is infected to healthy plant. The virus that can cause this disease, namely Potato Virus Y, is transmitted by aphids and when the population of aphids is very high, they form wings so that they are easily carried by the wind (Meilin 2016). Pests are a very important problem for farmers, especially chili farmers. Therefore, the existence of these plant-eating animals is very undesirable because they damage plants (both fruit, leaves, twigs, branches, roots and flowers) which results in losses for farmers and even damage to plants (Basuki, 2019).

To be able to know and understand the existence of pests and the impact of damage that occurs on various plants, namely on chili, it is very necessary to have research to obtain data, namely about the characterization and identification of any insect pests that are found on chili plants. By knowing the characterization and identification of insects, farmers can effectively control pests and farmers can get ideas or the right way to control pests in a natural way that can reduce costs (Amrullah, 2019).

MATERIALS AND METHODS

Study area

The research was carried out in the Keroit Village Plantation Area (Figure 1).



Figure 1. Keroit Village, West Motoling, South Minahasa

Procedures

The location for sampling insects was carried out in the plantation area of Keroit Village. Sampling is done first by determining the location where the sample is taken. In this study, from + 500 meters of land that has been planted with chilies in Keroit Village, 5 random points have been determined (random sampling). Each sampling point consisted of 2 well traps, 1 light trap, 2 insect nets and the insects were caught manually by hand. flower buds) plant age of about 30 days. In this phase, insect pests begin to appear on chili plants. The results of sampling were then identified using the insect determination key book (Siwi, 1991), using the Google Lens application and identification in the laboratory using a stereo microscope. Furthermore, it is carried out to carry out observations consisting of observations with pit traps, insect net traps, light traps.

Data analysis

Data obtained from the field and laboratory are presented in a descriptive form: in the form of tables, pictures and photos.

RESULTS AND DISCUSSION

Result

The insect is obtained as follows:

Table 1. Insect Category

Number	Ordo	Famili	Species
1	Lepidoptera	Arctiinae	<i>Chionarctia nivea</i> (moth)
		pyralidae	<i>Plodia interpunchella</i> (moth)
2	Hymenoptera	Formicidae	<i>Solenopsis Fugax</i> (ant),
		Siricidae	<i>Sitophilus oryzae</i> (bee)
		Crabronidae	<i>Sirex Woodwasp</i> (wood wasp)
3	Coleoptera	Bruchidae	<i>Megalara</i> (wasp)
		Gyrinidae	<i>Dorymyrmex</i> (ant)
		Coccinellidae	<i>Gyrinidae</i> (swivet beetle)
		Curculioniadae	leaf beetle weevils
		Scarabaeidae	<i>Rhomborrhina japonica</i> (beetle of the caterpillar family)
		Chrysomelidae	<i>Galeruca</i> (leaf beetle)
		Nitidulidae	<i>Meligethes aeneus</i> (beetle)
4	Siphonaptera	Anobiidae	<i>Biscuit beelte</i>
		Pulicidae	<i>Pinjal</i> (lice)
5	Orthoptera	Gryllidae	<i>Xenogryllus marmoratus</i> (Jangkrik), cricket
		Acrididae	<i>Belalang Padi</i> , Silent slant-faced grasshoppers
		Tettigoniidae	(grasshopper), <i>Dichromorpha viridis</i> (short-winged green grasshopper)
			<i>Mecopoda nipponensis</i> (bush crickets)
6	Araneae	Tetragnathidae	<i>Leucage</i> (spider)
		Agelenidae	<i>Laba-laba harvestman</i>
7	Opiliones	Sclerosomatidae	<i>Leiobunum</i> (fake spider)
8	Thysanoptera	Thripidae	<i>Thrips</i> (aphids)
9	Mantodea	Mantidae	<i>Hierodula patellifera</i> (grasshopper)
10	Hemiptera	Berytidae	<i>Berytidae</i>
		Reduviidae	<i>Triatoma infestans</i>
11	Arachnida	Agelenidae	<i>Fake widow spider</i>

Hierodula patellifera (Grasshopper)

Overall body size is 44 mm, antenna length 4 mm, leg length 25 mm, and body length 20 mm. Most resemble twigs of plants with long, slender (small long) bodies and legs. When nymphs are green, adults turn brown. Some are like leaves, green, flat and thin. Generally wingless, the antennae are short. Acts as a plant destroyer. In general, it is not so detrimental but if the population is large it can also result in losses to cultivated plants.

Galeruca (leaf beetle)

Overall body size is 17 mm, body length 10 mm, leg length 6 mm and antenna length 65 mm. The forewings are hard like horns without veins, the forewings usually meet each other in a straight line down the middle of the back, the hindwings are membranous, narrow and usually longer than the forewings with only a few wing veins. Acts as a plant destroyer. destroying cultivated plants by eating young plant parts such as shoots, young leaves and young stems.

Leucage (spider)

Overall body size is 15 mm, leg length 8 mm, body length 5 mm. Most of the body and legs are long, looking like they are stretched along the leaves. The eyes are in two rows, the abdomen is oval, the body color is usually green, the abdomen is white with black stripes from the eye area to the back. Eggs covered with a thin layer of silk are laid by the mother on dry leaf petals without being guarded by the mother. Move places quickly. Some of the prey is caught with the net, some are hunted directly. Usually found on crop fields, especially in the leaves and is a wandering spider and not a pest. Therefore, these spiders are harmless to plant growth and act as predators.

Plodia interpunchella (Moth)

Overall body size is 13 mm, wing length 11 mm, leg length 3 mm, soft and slender body. The wings are rather broad, characterized by smooth wavy lines. The tip of the antenna is not bulging/spitting. Has a pair of wings, normal wings, long and slender, usually scaly, narrow forewings. The wings are larger than the body, the hind wings with a tail-like extension

are very conspicuous, Looks like a swallow. The tip of the antenna is gnarled but not curved. At rest the wings are folded but the abdomen is visible. Strong body, tapering towards the tip, sharp eyes like an eagle. Generally acts as a destroyer of various plants.

Mecopod nipponensis (bush cricket)

The overall body size is 61 mm, the leg length is 43 mm, the wing length is 21 mm, and the antenna length is 30 mm. The pronotum (the lining on the abdomen) does not extend backwards. Most are brown in color, have a vocal tract (tympana) located in the first abdominal segment. Has two pairs of wings, long and narrow front wings, usually hardened, hind legs with enlarged femurs used for jumping. Known as plant eaters and very detrimental to cultivated plants.

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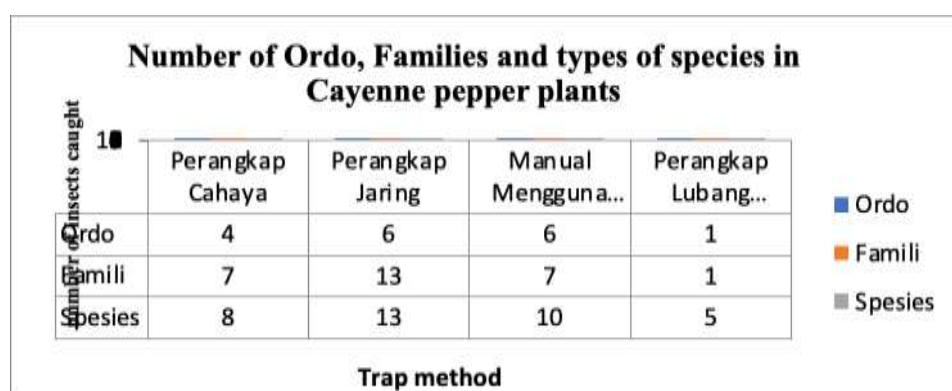


Fig. 2. Number of insects caught

The number of insect observations that were obtained consisted of 11 orders, with 25 families. Insect sampling that has been carried out is using light traps, net traps, pit traps and manual catching by hand. The four trapping methods used, the most insects found in chili plants were in net traps with a total of 13 species. This is due to a positive response from insects that are active during the day.

In this study, it was found that there were 441 individual insects associated (related or present) in chili plants, of which the most were as pests, namely 314 insects, as predatory insects there were 52 insects and as herbivorous insects there was 1 insect. These insects are found in the generative mass of plants, which is the time when the plant begins to flower until it bears fruit.

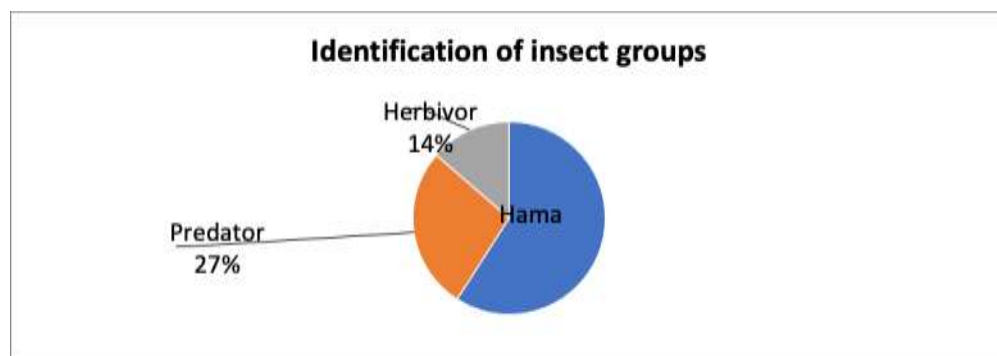






Fig. 3. Identification of insect groups

Table 2. Descriptions of insect pests

No	Picture	Description
1.	Ordo Coleoptera 	Pests belonging to the curculioniadae family damage and attack cultivated plants, namely chili in the dry season by eating young leaves from the edges to the top and bottom of the leaves. The leaves that are eaten become irregularly perforated and become irregularly perforated, causing the photosynthesis process to be disrupted. This pest eats the leaves until only the bones are left.
2.	Ordo Orthoptera 	Pests belonging to the <i>Acrididae</i> family attack chili plants by sucking the liquid from the leaves, stalks, flowers, shoots, and other plant parts. These insects attack young leaves so that they can cause chili leaves to curl and curl. While the chili leaves are old as a result the leaves will turn yellow and eventually fall off. This resulted in a lot of losses for farmers because chili production was not normal and decreased.
3.	Ordo Orthoptera 	Pests belonging to the <i>Acrididae</i> family attack chili plants by sucking the liquid from the leaves, stalks, flowers, shoots, and other plant parts. These insects attack young leaves so that they can cause chili leaves to curl and curl. While the chili leaves are old as a result the leaves will turn yellow and eventually fall off. This resulted in a lot of losses for farmers because chili production was not normal and decreased.
4.	Ordo Orthoptera 	Pests belonging to the <i>gryllidae</i> family, these insects attack young leaves so that they can cause chili leaves to curl and curl.

Discussion

Based on the results of characterization and identification obtained are 11 orders, 25 families, of 31 species of the various insects obtained can be grouped : Insects that are active at night or nocturnal are *Chionarctia nivea* (Moth), *Solenopsis Fugax* (Ant), *Sirex Woodwasp* (Wood Wasp), *Plodia interpunchella* (Moth), *Sitophilus oryzae* (Beetle), *Dorymyrmex* (Ant), *Biscuit Beetle* and *Flea* (Lice).

Insects that are active during the day or diurnal are *Xenogryllus marmoratus* (crickets), grasshoppers, *Gyrinidae* (spin beetles), leaf beetles, weevils, *Rhomborrhina japonica* (beetles of the caterpillar family), *Leucauge* (spiders), *Megalara* (wasps), *Araneus Ventricosus* (spiders), *Leiobunum* (false spiders), *Galeruca* (Leaf beetles), *Mecopoda nipponensis* (Bush crickets), *Thrips* (Aphids), *Hierodula patellifera* (Locusts), Silent slant-faced grasshoppers (Locusts), *Meligethes aeneus* (Beetle), *Dichromorpha viridis* (Short-winged green grasshopper), and *Orchard spider* (garden spider).

Based on the results of the identification of insect groups, most of them are classified as insect pests, namely *Xenogryllus marmoratus* (Cicada), *Plodia interpunchella* (Moth), *Gyrinidae* (Beetle), Grasshopper, *Rhomborrhina japonica* (Beetle of

the caterpillar family), *Mecopoda nipponensis* (Bush cricket), *Meligethes aeneus* (Beetle), *Dichromorpha viridis* (Short-winged green grasshopper), *Galeruca* (Leaf beetle); which are classified as predators, namely *Sirex Woodwasp* (Wood Wasps), Spiders; classified as herbivores, namely *Hierodula patellifera* (grasshopper), silent slant-faced grasshoppers (grasshopper).

The role of beetles, crickets, brown locusts, moths, ants, and fleas on chili plants is as pests. Meanwhile, wasps and spiders act as predators; There is also a green grasshopper that acts as a herbivore. These types of insects are directly related to chili plants.

CONCLUSION

Based on the results of research conducted in the plantation area of Keroit Village, West Motoling District, South Minahasa, it can be concluded as follows: In total there are 11 orders and 25 families of insects with each number of individual insects found as many as 441 insects. The insect group classified as pests consists of 16 families, namely gryllidae, pyralidae, gyrinidae, acrididae, scarabaeidae, tettigoniidae, araneidae, nittidulidae, acrididae, chrysomelidae, anobiidae, coccinellidae, gryllidae, gyrinidae, pyralidae, araneidae; Predatory insects (predators) in 6 families, namely siricidae, agelenidae, araneidae, slerosomatidae, agelenidae, tetragnathidae; Herbivorous insects (plant eaters) as many as 2 families, namely Mantidae, Acrididae, Tetragnathidae. Species classified as pests are *Xenogryllus marmoratus* (Cicada), *Solenopsis Fugax* (Ants), *Meligethes aeneus* (Beetle), Thrips (Aphids), *Chionarctia nivea* (Moth), Silent slant-faced grasshoppers (Grasshoppers); Species classified as predators are Megalara (Wasps), Orchard spiders (garden spiders); Species classified as herbivores are *Hierodula patellifera* (Grasshopper).

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