

POPULATION AND ATTACK PERCENTAGE *Spodoptera litura* Fabricius (LEPIDOPTERA: NOCTUIDAE) ON TOMATO PLANTS IN SEKAAN VILLAGE, KINTAMANI DISTRICT, BANGLI REGENCY

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ABSTRACT

Tomato plant (*Solanum lycopersicum* L.) is a type of horticultural plant that has many benefits for human health and is widely developed in Indonesia, especially in Bali. Pests of tomato plants are *Spodoptera litura* Fab. (Lepidoptera: Noctuidae). This study aims to calculate the total population and the percentage of *S. litura* pest attacks on tomato plants in Sekaan Village, Kintamani District, Bangli Regency. The research was conducted from July to September 2022 in Sekaan Village, Kintamani District, Bangli Regency, Bali. This research was conducted using the direct survey method. Sampling was carried out by purposive sampling using the diagonal sampling method with 10 sample points and 5 plant clusters were taken at each sampling point so that a total of 50 plant families were observed. The variables observed were the number of populations and the percentage of pest attack by *S. litura*. The data obtained were analyzed and presented in the form of tables and graphs. The results showed that *S. litura* was found on tomato plants in farmers' fields. Pests began to be found at 14 DAP (Day After Planting) with an average of 2 individuals and the highest population was found at 70 DAP with an average of 29 individuals on tomato plants. The results of the analysis show that the high percentage of attacks occurring at 70 DAP is 40%. In general, the high number of pest populations affects the high percentage of *S. litura* attacks.

Keywords: Population, Attack Percentage, *Spodoptera litura* and Tomato Plants

1. INTRODUCTION

Tomato (*Solanum lycopersicum* L.) is a plant that is widely cultivated in Indonesia. Tomato is an important vegetable commodity in Indonesia with quite high production and consumption values (Annisyah, 2019). Ichsanudin (2017) states that Indonesian people use tomatoes to meet nutritional and medicinal needs. The composition of vitamins A and C in tomatoes is very good at helping the process of healing pain in the body, one of which is canker sores (Hidayati, 2012). The importance of the benefits of tomatoes for health, tomato plants are still cultivated today in Indonesia, especially in Bali. One way to increase tomato production is by planting superior varieties and supported by an intensive cultivation system (Fitriani, 2012).

Constraints that are often encountered in tomato cultivation in the tropics, namely plants that are susceptible to pests and diseases, high rainfall, high temperatures and low fruit quality. One of the factors causing the decline in the quality of cultivated tomatoes is pest attacks (Annisyah, 2019). Pest attacks can cause plants to not grow

properly so that production decreases. One of the insect pests that attack tomato plants is the *Spodoptera litura* Fab.

S. litura is one of the most important leaf-eating pests. Yield losses due to these pests can reach 80%, even causing crop failure (Trizelia, *et al.*, 2011). Dewi (2007) explained that to overcome this, it is necessary to control the *S. litura* pest using the right method. Proper control should be carried out by research on the population and percentage of pest attack by *S. litura*. So far, there is not much information about the level of attack by *S. litura* pests that attack tomato plants in Sekaan Village, Kintamani District. On this basis, it is necessary to conduct research to determine the population and percentage of *S. litura* pest attacks on tomato plants.

2. RESEARCH METHODOLOGY

2.1 Time and Place of Research

The research was conducted from July to September 2022. The research was carried out in the tomato planting fields in Sekaan Village, Kintamani District, Bangli Regency, Bali.

2.2 Tools and Materials

The tools used in this study were stationery, cameras, counters, plastic bags, markers, ropes and scissors, while the materials used in this study were tomato seeds

2.3 Research Design

This research was conducted by means of a survey. The method of determining the research location was determined by purposive sampling with direct observation. Sampling was carried out diagonally in one wide expanse of plants by taking 10 sampling points, then in 1 point taking 5 tomato plant clusters so that a total plant of 50 plant families

2.4 Observation Variables

The variables observed were the number of pest populations and the percentage of attacks, the population numbers were calculated manually while the percentage of attacks was measured using the formula:

$$P = \frac{n}{N} \times 100\%$$

Description P : Attack percentage (%)

n : Affected plants

N : Total sample plants

The second observation variable is the pest population. Pest population is done by counting the number of pests at each sample point based on the type of pest.

2.5 Analysis

The data obtained were analyzed using SPSS (Statistical Package for the Social Sciences) software version 20 (IBM Inc., Release 2011). Then the population data and the percentage of pest attacks are presented in the form of tables and graphs.

3 RELATED RESEARCH/LITERATURE REVIEW

3.1 Tomato (*Solanum lycopersicum* L.)

Tomato (*Solanum lycopersicum* L.) is the most widely planted vegetable in the Solanaceae group after potatoes. Tomatoes contain several important nutrients for health, namely, potassium, folic acid, vitamin C, vitamin E and lycopene (Gumelar *et al.*, 2014). Tomatoes have a high water content, soft texture and high respiration rate so they are easily damaged mechanically, microbially and biochemically degraded (Paul, *et al.*, 2018). The taxonomy of tomato plants is as follows: Kingdom: Plantae, Sub-kingdom: Viridiplantae, Division: Tracheophyta, Subdivision: Spermatophytina, Class: Magnoliopsida, Superorder: Asteranae, Order: Solanales, Family: Solanaceae, Genus: *Solanum* and Species: *Solanum lycopersicum* L. (Annisyah, 2019)

3.2 Pest *Spodoptera litura* Fab.

Pest *Spodoptera litura* Fab. is a pest of tomato plants that can cause significant losses to plants. Caterpillar *S. litura* often found in Asia, including Indonesia, India, Japan, and China and several countries in the world (Kundu, 2018). Classification of *S. litura* according to Annisyah (2019) are as follows: Kingdom : Animalia, Subkingdom: Bilateria, Phylum: Arthropoda, Subphylum: Hexapoda, Class: Insecta, Subclass: Pterygota, Superorder: Holometabola, Order: Lepidoptera, Family: Noctuidae, Genus: *Spodoptera* Species: *Spodoptera litura* Fab.

4 RESULTS AND DISCUSSION

Spodoptera litura Fab. included in the plant pest organism which is one of the pests of tomato plants. *Solanum lycopersicum* L. *S. litura* is a polyphagous insect that has the reproductive capacity and ability to migrate so that it is considered the most important and influential pest on agricultural crops (Mallik, *et al.*, 2004). Tjahjadi research (1989) states that *S. litura* belongs to the order Lepidoptera which comes from the words lepidos (scales) and pteron (wings).



Figure 1. *Spodoptera litura* Pest Larvae
Source: Personal Documentation

Life development holometabola (egg-larva-pupa-imago). In Figure 1, larvae of *S. litura* pests were found in tomato farms. *S. litura* pest attack starts from instar-1 larvae, although they are small in size but can damage leaves and attack simultaneously and in groups leaving remnants of the upper, transparent epidermis, and usually the larvae are on the underside of the leaves. This attack is in accordance with the opinion of Kalshoven (1981) that the *S. litura* insect is also one of the insect pests of agricultural crops.

The results of the study are shown in Table 1 which shows that *S. litura* pest attacks were not found in 7 DAP (Days After Planting), the pests started attacking tomato plants at 14 DAP with a small population (2 in average). Evidenced by the presence of attack symptoms found. This is in accordance with the research by Leonardo *et al.*, (2022) that *S. litura* pest attacks began to attack tomato plants at the age of 14 DAP. Larval attack is usually in the vegetative phase, namely the larvae eat the young leaves of tomato plants. Plant damage in the vegetative phase will disrupt the production process. Ramlan (2020) states that pest attacks during the development process will disrupt the process of fruit formation.

Table 1. Average Total Population and Percentage of *S. litura* Pest Attacks

Observation	Total Population	Attack Percentage
	(Individuals)	(%)
7 DAP	0	0
14 DAP	2	4
21 DAP	5	8
28 DAP	8	13
35 DAP	12	17
42 DAP	13	21
49 DAP	18	25
56 DAP	21	32
63 DAP	23	36
70 DAP	29	40

Description : DAP is Day After Planting

The results showed that there was an increase in the population every week on tomato plants, the highest population was found in 70 DAP (average 29 individuals). This happens because *S. litura* pests get enough food. The development of *S. litura* pests will develop well if food is sufficient and will attack plants in groups. This is supported by the statement of Fand, *et al.*, (2015) which stated that the *S. litura* pest has great potential to attack new areas and reproduce well if the food is sufficient, and can adapt in various ecological situations. Leonardo *et al.*, (2020) also stated that *S. litura* attacks simultaneously in groups.



Figure 2. Symptoms of *Spodoptera litura* Pest Attack
 Source: Personal Documentation

Table 1 shows that there is an attack and Figure 3 shows the symptoms of *S. litura* attack on tomato plants. The results of the analysis show that attacks are converted into attack percentages. There are 4% pest attack on 14 DAP. The increase in the percentage of attack was shown by pests every week from 14 – 70 DAP observations. *S. litura* attacked tomato plants with the highest attack percentage at 70 DAP (40%). The high percentage of *S. litura* pest attacks was caused by the increase in the number of pest populations on tomato plantations (Figure 3). According to Ludji research (2017) that a large population of pests will cause high attacks and damage to tomato plants.

The relationship between the population and the percentage of pest attack by *S. litura* is shown in Figure 3. The results showed that the greater the number of pest populations from instar -1 to instar -3, the greater the damage it would cause, as evidenced by the high percentage of pest attacks in 70 DAP with a total population average 29 tails and attacks by 40%. The population relationship is supported by Annisyah's statement (2019) that the total pest population will affect pest attacks on tomato plants. This happened because the larvae from instar-1 to instar-3 ate the leaves of the tomato plant.

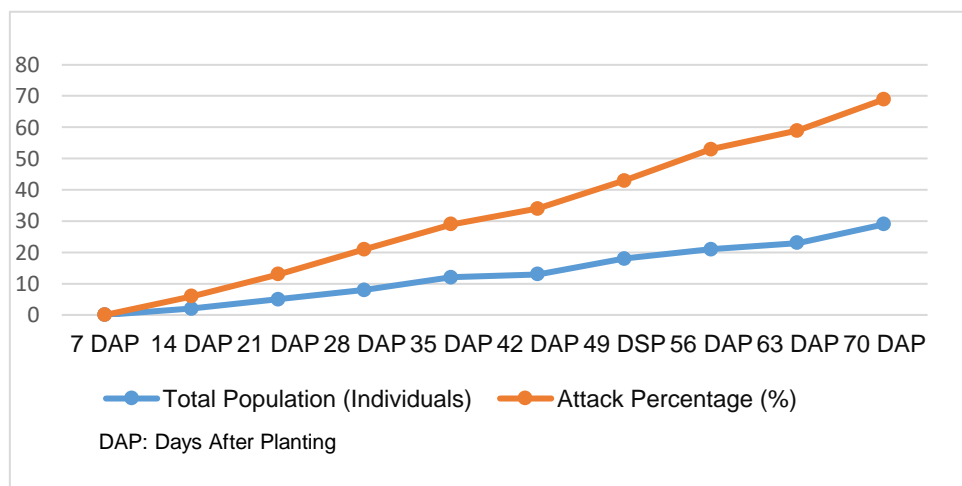


Figure 3. Population Relationship with *Spodoptera litura* Pest Attack Percentage

The relationship between the population and the percentage of attacks can be seen in Figure 3, the more the number of pests, the more leaves are eaten, the pest's greed occurs because it supports the development process of these pests to regenerate and survive. Kundu (2018) states that pests need a lot of nutrients to change developmental phases, survive and maintain offspring of *S. litura* pests.

5 CONCLUSION

1. The amount population was found at 14 DAP (average 2 individuals) while the high population was found at 70 DAP (average 29 individuals).
2. Pest *Spodoptera litura* showed a high percentage of attack (40%) due to the high number of population (average 29 individuals) at 70 DAP

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