

# Association Between Thrips And Ants On Chili And Watermelon Plants

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## Association between thrips and ants on chili and watermelon plants

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**Abstract.** Ants have a positive impact on agricultural land as predator on thrips. This study aims to evaluate the association between thrips and ants on chili and watermelon plantations which were conducted in the Maros Regency, South Sulawesi. Samplings of the thrips from the chili and watermelon plants were carried out by using a plastic lid that was placed under the plants, which were then patted by hand until the thrips fall onto the plastic lid and was then counted. The ants were captured using pitfall traps. The results showed that there were two types of thrips, namely *Thrips parvispinus* and *Thrips palmi*. The population with the highest average number of thrips was found on farmers' land averaging at 20.4 thrips, with *T. parvispinus* averaging at 6.4 thrips/observation and *T. palmi* at 14 thrips/observation. Meanwhile, the lowest average population was found on watermelon plants with only 10.3 thrips/observation with *T. parvispinus* at 1.1 thrips/observation plus *T. palmi* at 9.2 thrips/observation. The highest ant population was found on chili plants combined with watermelons ie 373.3 ants/observation, while the lowest ant population were found on chili plants on farmers' land averaging around 104.3 ants/observation. Based on the data, it can be concluded that the ants play a role in reducing the population of thrips.

### 1. Introduction

Red chili and watermelon plants are important horticultural commodities that are mostly preferred by various herbivorous insects. Every part of the plant is vulnerable from pest infestation. Some of these pests damage certain parts, but some can damage certain parts of the plant. In addition, the damage often becomes severe since some pests such as thrips associate with virus transmission.

A group of thrips has a significant association with chili plants since they pose detrimental effect of crop production such as Tomato Spotted Wilt Virus (TSWV) which is globally well known as major tomato disease [1]. According to Altieri [2], the most common cause of pest insect problems is the expansion of monoculture plants at the expense of natural vegetation, thereby reducing the diversity of local habitats. This affects the abundance and efficiency of natural enemies, which depend on the complexity of habitats for finding prey, alternative hosts, pollen/nectar and shelter/nesting in extreme environments.

According to Untung [3], in a balanced ecosystem, no one type of organism becomes dominant and its population stands out compared to the population of other organisms. He said that in ecosystems, arthropods, including insects, are not only herbivores or detritivores, but also occupy a dynamic position and function where insects play an important role in maintaining the balance or stability of the ecosystem.



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Ant species are the most dominant group of insects in terrestrial habitats [4]. Ants can also sense pressure that is in their environment [5] so that it can be used as an indicator of habitat disturbance [6] and also an indicator of the effect of pesticide application [7,8].

Ants sometimes have an ecological function to assist plants in spreading seeds (dispersal), loosening the soil, or as predators to other insects [9]. Thus, ants are also expected to help control agricultural pests. The social behavior of ants as predators and decomposers in ecosystems has become an interesting object to be examined in all its aspects [10]. Ant interactions with animals can also act as predators [11]. Seeing the large potential of ants in the agricultural ecosystem, this research was conducted to find out the association that occurs between ants and thrips that attack red chili and watermelon plants.

## 2. Materials and methods

Field trials were carried out in the Cenrana Subdistrict (main red chili and watermelon producer in the Maros Regency) from June 2018 to June 2019. Field trials were carried out on farmers' land by planting chilies or watermelons on farmland measuring 14.4 m x 5 m which was then made into 12 beds measuring at 1.2 m x 5 m for each treatment. For each bed planted with chilies using a spacing of 50 cm x 70 cm with a population of 20 beds for each tree so that there are 240 chili trees per treatment. While watermelon planted 2 trees at each end of the bed so that there were 4 trees/beds (population of 24 trees/treatment).

The treatments observed were: 1) chili planted using plastic mulch without the use of pesticides, 2) chili planted using plastic mulch and using pesticides (according to the farmers' treatment), 3) watermelons planted monoculture, and 4) chili planted together with watermelon.

Before planting, chilies were raised for thirty days, while watermelons were seeded for ten days. Chili seedlings were planted two weeks earlier on the beds due to consideration of the productive age of the chili is longer than watermelons in the hope that the plant growth could be uniform.

The parameters observed were the average population of thrips and ants. Observation of the thrips was done once a week starting when the chili plants were three weeks old after transplanting. Systematic random sampling was performed on twelve sample plants per observation. Thrips were captured using a 20 x 30 cm clear plastic bag, the way to cover the top of the plants and then pat it until the thrips fell into a plastic bag. Thrips are then put into collection bottles to be counted and identified. While ants were observed from pitfall traps which were installed biweekly in between four beds per treatment.

To calculate the relative species abundance (RSA), the following equation was used:

$$KR = \frac{ni}{N} \times 100\%$$

Description :

RSA = Relative species abundance %

ni = The number of individuals and species to-i

N = Total number of individuals

## 3. Results and discussion

### 3.1. Thrips

From the experimental plants, there were two thrip species in the red chili and watermelon plants namely *Thrips palmi* and *Thrips parvispinus*. The average population of *T. palmi* was higher than that of *T. parvispinus* in both red chili and watermelon plants (figure 1). Likewise, observations of their relative abundance showed that the percentage of *T. palmi* was higher than that of *T. parvispinus* (figure 2).

The like or dislike of a plant by insects against a host plant can be caused by physical (mechanical) and chemical stimuli that exist in these plants [10]. The population of *T. palmi* was higher than that of *T. parvispinus* due to various factors, the possibility of these factors as expressed by Kakkar et al. [12],

namely: 1) mismatches of plants as hosts of certain thrips species, 2) the low natural abundance of thrips species in the region around host plants, 3) unwanted plant parts or 4) competition with other species.

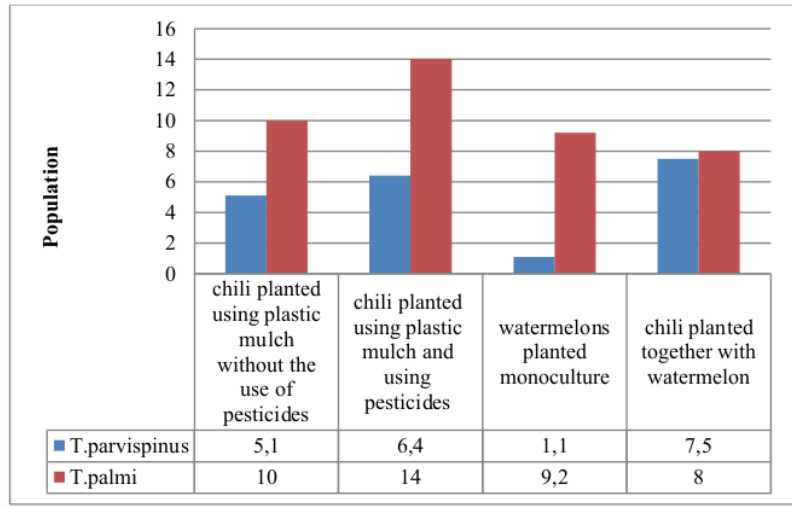


Figure 1. The average population of thrips in red chili and watermelon/observation

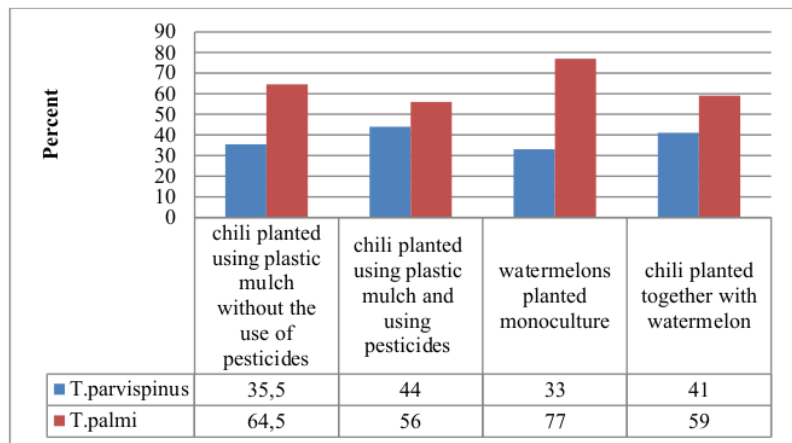


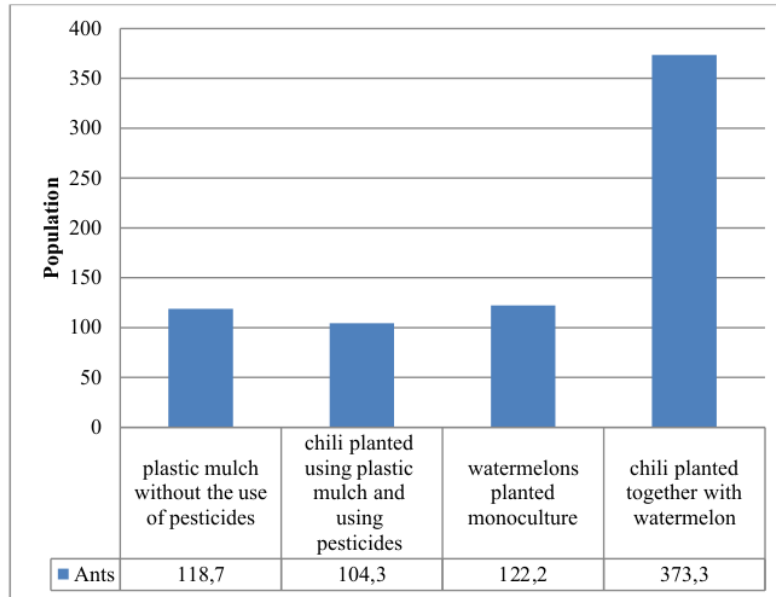
Figure 2. The relative abundance of thrips in red chili and watermelon / observation

3.2. Ants

The ant trapped in the pitfall traps in this experiment were *Solenopsis* sp. These ants are reddish to brown in color, make nests in dry soil, like a place warmed by sunlight, look for food up to several meters from the nest, prey on various types of insects and small animals, and carry seeds from the land to their nests, there are worker ants on duty specifically to crush grains into edible forms for young ants.

The observations showed that the highest average ant population was found in chili plantations combined with watermelon, which was 373.3 ants, while the lowest ant population was found in chili

plants that were from the farmers' fields, 104.3 ants. Further details can be seen in the following figure 3:



**Figure 3.** The average ant population in the red chili and watermelon/observation plantations

If the average ant population table is juxtaposed with the average thrips population table, it is found that the higher the ant population, the lower the thrips population and vice versa. Economically, ants are less directly beneficial to humans, but when viewed ecological<sup>[4]</sup>, it can be beneficial to other animals and plants because the food chain has a very important role<sup>[4]</sup>. Ants can be used as predators to reduce pests on plantations, as Rossi and Fowler [14] reported that *Solenopsis* sp in Brazil can be used as an agent to control the density of *Diatraea saccharalis* larvae on sugarcane.

**4. Conclusion**

Ants play a role in reducing the population of thrips so that they can be a reference in the management of thrips pests on red chili and watermelon plants.

**Acknowledgements**

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