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Influence of Some Packages of Technology on Pests Development on Chili Plants in Highland Area

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ABSTRACT

Chili is a type of plant that can grow in various types of area, in lowland and highland areas and also can adapt well at a temperature of 24-27 ˚C. The purpose of this research in order to know the influence and effectiveness of the packages technology of Trichoderma sp. mixed with compost, rain shelter and pesticides to control the development of pests in cayenne chili plants and long chili in the highland area. This research was conducted from September 2017 to February 2018, in Pancasari Village, Buleleng Regency, Bali. The study used a Factorial Randomized Block Design with two factors and four times replications. The first factor was chili type (cayenne chili and long chilli), and the second factor was the use of technologies, compost plus Trichoderma sp., rain shelter, and pesticide. The variable was observed in this research were population of aphis, percentage of fruit fly and yields. The results showed that all treatment technologies effectively suppressed pests development when compared with control. The result show that the damage population of the highest aphis pest was found in control about 194 of Aphids, and population of aphids on pesticide treatment were not found. The result show that damage percentage of the highest fruit fly pest was found in control treatment with the percentage of 76,55% while the lowest percentage was found in pecticide treatment. The rain shelter treatment showed the highest yields were reached 405,87 gr and the control treatment showed the lowest yields were reached 12,03 gr.

Keywords: aphis, fruit fly, packages technologys, chili plant, and highland

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1.1. INTRODUCTION

Chili is a commodity that can grow in various types of soil, with an altitude of 1,200 m (asl) and can adapt well to temperatures of 24-27˚ C (Hapsari, 2011). Pancasari Village, Sukasada District, Buleleng Regency is at an altitude of 1,282 m (asl) with temperatures between 18-24˚C. Those climates are very suitable for chili plants. On the other hand some factor usually effect to production of chili as well as pests and diseases. Based on the results of interviews with farmers, the main problem faced by farmers is the number of aphids and fruit flies that attack chili plants, causing losses of up to 50%. Aphids can cause dwarf plants, curly, roll leaves. In extreme cases, colonized aphids can abort leaves and fruit. Aphids can stick the mouth (stylet) into the leaves, buds and stems, then suck the nutrients of the host plant. In addition aphids also have been reported as a vector of some viruses. On the other hand the fruit fly was reported attack chili fruit by placing eggs into the fruit, after the eggs hatch into larvae the chili will rot and cannot be harvested. Efforts to increase chili productivity can be done with several cultivation technologies, such as the use of compost containing *Trichoderma* as an antagonistic microorganism, the use of rain shelter and the use of synthetic chemical pesticides.

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Trichoderma able to maintain soil fertility, as well as being a decomposition of nutrients that were previously unavailable to become available. (Herlina dan Pramesti, 2009). Cultivation technology using rain shelter is a technology by providing plastic shade on a crop, one of the goals is to protect plants from rainwater splashes (Nirwanto, 2007). Kerky (2006) reports that the use of rain shelter during drought or rainy season can withstand heavy rain water, reduce pest attacks, and reduce pesticide use.

The utilization of synthetic chemical pesticides can be used as the last alternative in pest control, but the use of pesticides is often have negative effect if use excessively, therefore it is necessary to test the effectiveness of several cultivation technology packages that can reduce pest attacks on plants. The technology package is the use of *Trichoderma* compost, rain shelter, and synthetic chemical pesticides which have the potential to control pests in plants.

II. METHOD

2.1. *Time and Place of Research*

The study was conducted from September 2017 to February 2018 at Pancasari Village, Sukasada District, Buleleng Regency, Bali.

2.2. Tools and materials

The tools used in the research are hoes, shovels, knives, meters, trays, plastic bottles, tissue, scissors, plastic roofs, bamboo, mulch, label paper, ropes, stationery and cameras. The materials used were cayenne chili seeds (Camelia varieties) and long chili varieties is Cosmos, compost made from cow manure and leaves, *Trichoderma* compost fertilizer, synthetic chemical pesticides.

2.3. Experimental design

This study used factorial randomized block design (RBD) with 2 factors. The first factor is chili species which consists of 2 levels, namely cayenne pepper (V1) and long chili (V2). The second factor is the use of cultivation technology which consists of 4 levels, namely: the use of compost Trichoderma sp. (P1), use of rain shelter (P2), pesticide use (P3) and control (P0), so that 8 combinations (V1P0, V1P1, V1P2, V1P3, V2P0, V2P1, V2P2, and V2P3) were repeated 4 times Each treatment unit was planted with 10 chili plants with 5 sample plants, bringing the total to 320 plants and 160 sample plants.

2.4. Experimental activity

2.4.1. Compos Trichoderma sp.

Trichoderma is mixed with compost made from cow manure and leaves with a ratio of 1: 5. The mixed compost is incubated and kept moist for 1 week until it can be applied on the ground before the mulch is installed.

2.4.2 Land preparation

The land is cleared from weeds, grazed with hoes and then made beds with a length of 2.5 m and a width of 1 m with a distance between beds of 0.5 m. Then the land is left exposed to direct sunlight for 1 week with the aim of minimizing the presence of pests in the soil. After 1 week, the bed is installed with mulch and plant holes are made with a distance of 40 cm x 60 cm.

2.4.3 Treatments

The treatment of *Trichoderma* compost is done by making a ditch in the planting hole and given *Trichoderma* compost which has been mixed with the assumption that one planting hole gets 1 kg of compost. The next treatment is the

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installation of rain shelter which is done 7 days after the seedlings are planted. The pesticide treatment was given after the plant was 14 days old, using insecticide with active ingredient Abamectin 36 g/l at a dose of 0.75 ml/liter, spraying interval every 2 weeks.

2.4.4 Transplanting and crops maintain

The seeds planted are healthy seeds and are 45 days old after planting or there are approximately 4 leaves. Plant maintenance is done by watering the plants 2 times a day, in morning and evening. Plant maintenance is also carried out weeding, installation of stakes to keep the plants upright, do the patching by removing all the water buds that grow in the axillary leaves to reduce the risk of pest attacks, strengthen plants and optimize sunlight and fertilizer.

2.5 Observation

The data sought in this study are pest data and supporting data. Pest data observed in the form of aphids pest population, and percentage of fruit is attacked by fruit fly, while supporting data observed in the form of total marketable yields.

III. RESULT AND DISCUSSION

The important pests found in the field that attacked cayenne chili (Capsicum frutescens L.) and long chilli (Capsicum annuum L.) were aphids and fruit flies. Both of these pests appear in each treatment for both cayenne chili and long chili with different populations and percentages.

3.1 Effect of Treatment on Population of Aphis

Observation of aphid population was carried out since the plants were 21 days after transplanting until the last harvest, however aphids appeared when the plants were 8 weeks after transplanting. Observations were conducted by looking at the number of aphids that colonized under the leaf surface in each treatment. According the Sugiyono and Mudjiono (2014) the general symptom of aphids is leaves will wrinkle (become wrinkled), stunted growth, roll, then wither and die. The population of aphids was calculated every week and the result show in Figure 1.

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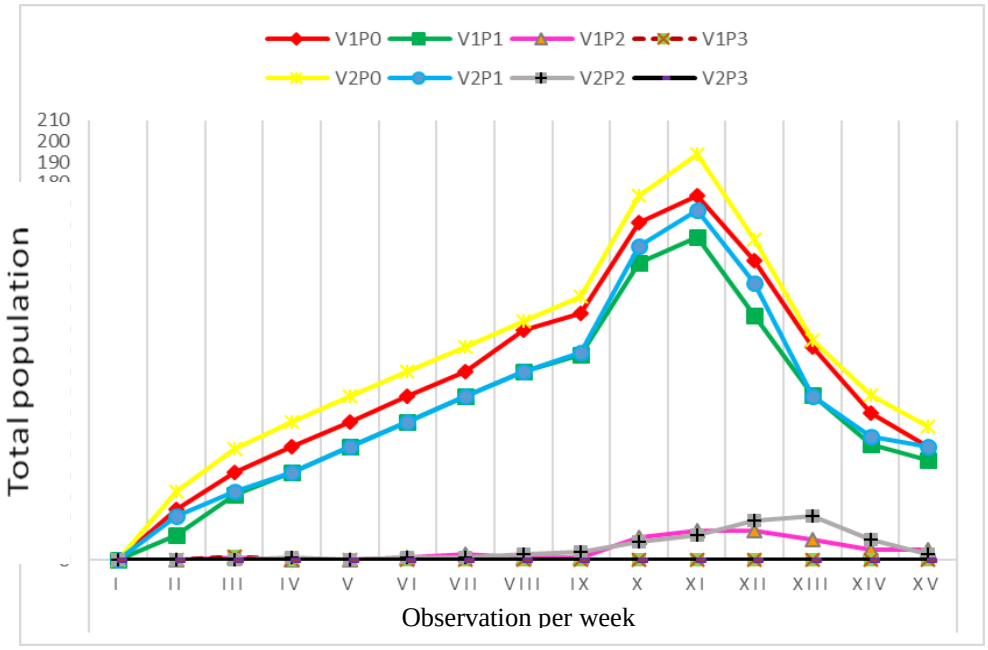

Figure 1. Total population of *Aphis* spp.

Note :

VIP0	: Cayenne Chili control
V1P1	: Cayenne Chili *Trichoderma*
V1P2	: Cayenne Chili rain shelter
V1P3	: Cayenne Chili with pesticide
V2P0	: Long chili control
V2P1	: Long chili *Trichoderma*
V2P2	: Long chili rain shelter
V2P3	: Long chili with pesticide

The data in Figure 1 showed the highest population of aphids was found in control of both cayenne chili and long chili with a population of 174 and 194 at XI observation respectively, while the lowest population is shown in pesticide treatment. On the other hand the population of aphids in the V1P2 treatment (cayenne chili with rain shelter treatment) was 14, while in the V2P2 treatment (long chili with rain shelter treatment) there were 21. The data indicated the rain shelter is effective to control aphid and comparable with the control. Kratky (2006) and Stoyenoff (2001) reports that the use of rain shelter during rainy season can withstand heavy rain water also reduce pest and disease attacks.

3.2 Effect of Treatment on Percentage of Chili that is attack by fruit flies

Observation of the percentage of chili that is attacked by fruit flies is done when the plant has entered the generative period precisely at the time of harvest. Cayenne chili to start of generative period at age 11 weeks after transplanting and long chili at the age of 10 weeks after transplanting. Symptoms of a fruit fly attack appeared when the plant was 18 weeks after transplanting both on cayenne chili and long chili. Observations are made by looking at the symptoms that arise on the fruit. The results of the

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observation of the percentage of chili is attacked by fruit fly can be seen in Figure 2.

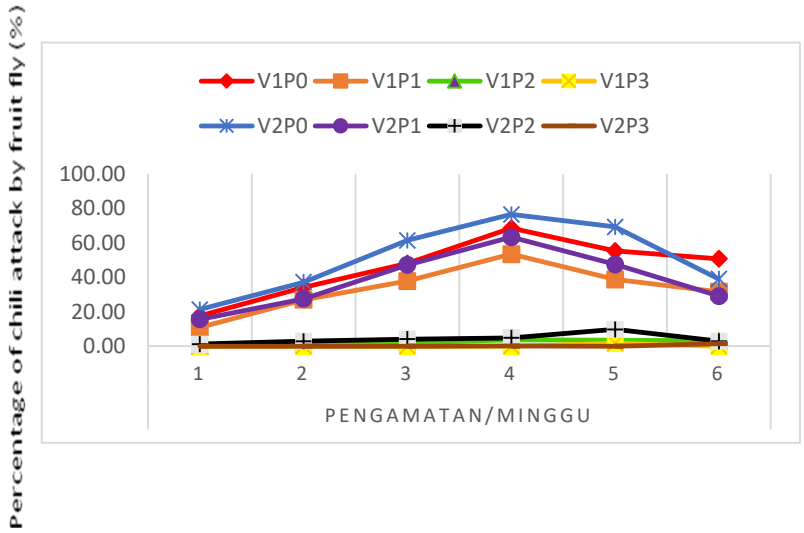

Figure 2. Percentage of chili is attacked by fruit fly

The percentage of chili is attacked by fruit fly in V1P2 treatment (cayenne chili with rain shelter treatment) is 3.76%, while in V2P2 treatment (long chili with rain shelter treatment) is 4.90%. The percentage of chili is attacked by fruit fly in rain shelter treatment for both cayenne pepper and large chili was less than the control treatment. Wu *et al.* (2008) reported that the use of rain shelter can also reduce some kind pests and disease infection.

3.3 Effect of Treatment on Harvesting Results

Observation of yields on cayenne and long chili plants is carried out from the first harvest to the last harvest. Observation of harvest is done on healthy fruit or marketable yield. Observations were made in several periods by calculating the yield of healthy chilli from 5 sample plants in each treatment. Observation of fruit yields can be seen in Figure 3.

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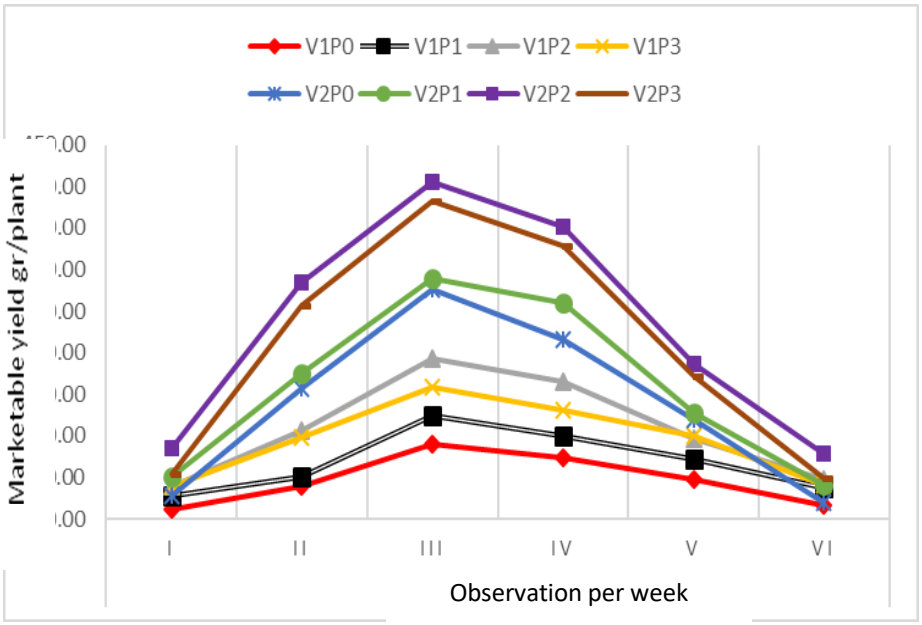

Gambar 3. Marketable yield of chili g/plant

The results of the analysis of variance showed that the treatment (P) had a very significant effect on the yield of chili. Based on observations, the rain shelter treatment showed the highest yield of 405.87 g, followed by pesticide treatment, namely 382.22 g, *Trichoderma* which was 349.86 g, and the smallest one in the control treatment was 305.88 g. According to Kratky (2006) compared to open land rain shelter can reduce the washing of nutrients, so that nutrients can be used by plants to produce optimally.

IV. CONCLUSION

Rain shelter can control the population of aphids and fruit fly and also rain shelter treatment shows the highest yield production of 405.87 g/plant, followed by pesticide treatment which is 382.22 g/plant, compost *Trichoderma* sp reaching 289.86 g/plant, and the last control treatment reached 275.88 g/plant.

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