CHAPTER 3
MATERIALS AND METHODS

3.1 Studies location

All studies were conducted at the greenhouse experimental constructions located in the Faculty of Agriculture, Chiang Mai University. The experiments included the greenhouses experiment (Experiment I) and the multiple choice tests in laboratory and outside in the open air.

Figure 3.1a, b: UV open greenhouse (a) and UV opaque greenhouse and outside in the open air (b) in the greenhouse experimental sites in Chiang Mai University

The studies were conducted to determine the responses of Chilli thrips (*S. dorsalis*) to the influences of UV lights and the environment inside two greenhouses and outside in the open air. The variables conditions were air temperature, relative humidity, rain (outside) and wind speed (outside). These weather data were provided by the internet website of Weather Meteorological Department, (http://www.tmd.go.th/en/).

3.2 Host plants preparation

The Capsicum cultivar, Red Devil variety was used in this study. The Red Devil hybrid chilli variety was produced by East West Seed Company, Thailand. The host plants were grown from seeds as single plants in the plastic seedling trays. The seeds were soaked in the water for 24 hours before growing in the seedling trays. The seeds were grown in seedling trays using the medium of sterilized German potting soil. The seeds were grown on January 27, 2015 and transplanted to the experimental sites on March 13, 2015.

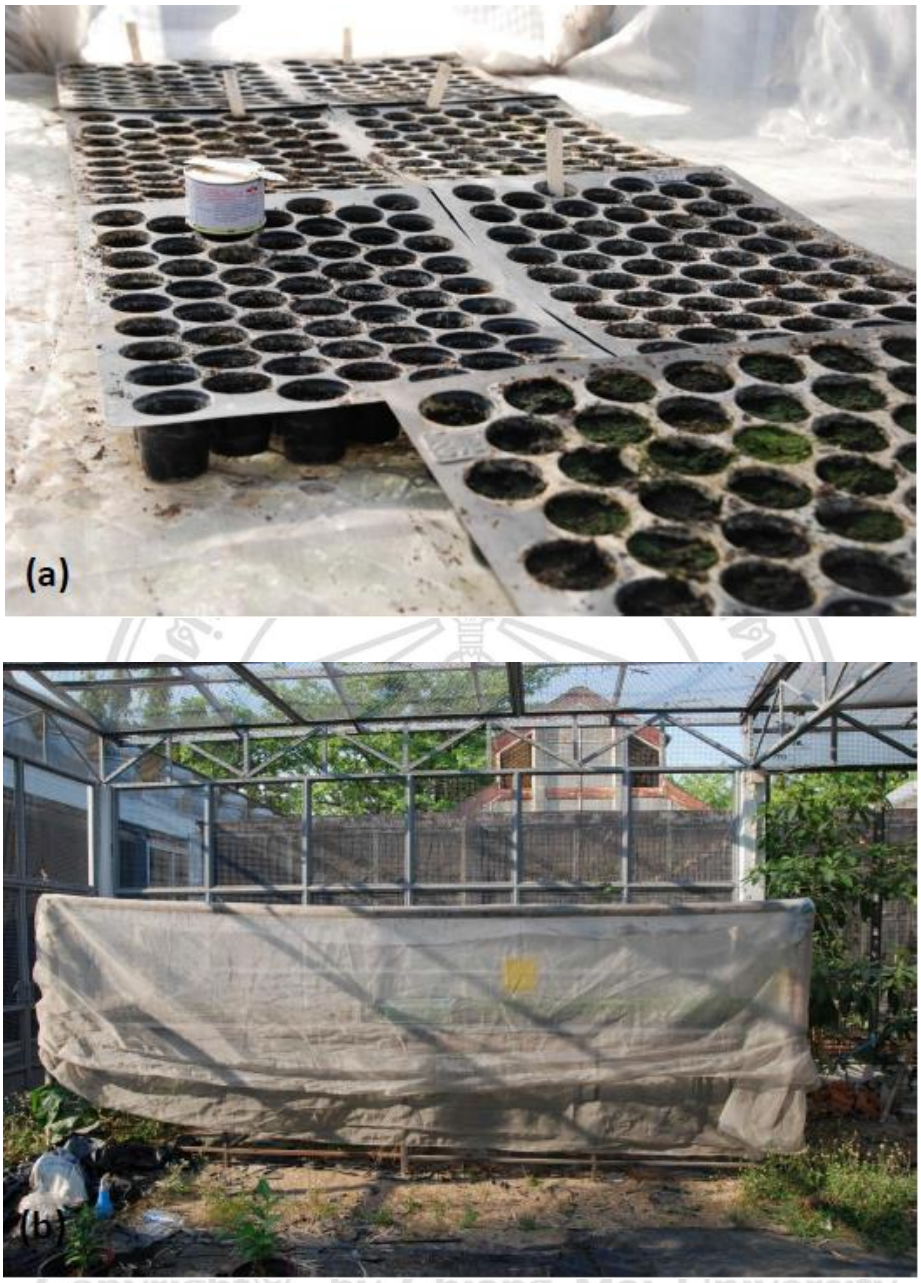

Figure 3.2a, b: The seedlings trays in the nursery (a), the seedlings covered by fine net in the nursery (b)

No pesticides were used during this experiment. The plants were irrigated manually twice a day in the morning and in the evening. Healthy pest free plants and disease free plants were selected for the experiment. The chilli thrips infested plants were collected from the rural habitat around Chiang Mai and placed around the experimental sites for the chilli thirps population as the source of inoculum.

Figure 3.2c, d: Young red devil chilli seedlings in the protected screenhosue

3.3 Experiment I: Greenhouses Experiments

The experiments were conducted from March, 2015 to May, 2015 so the weather data inside and outside environment were strongly influenced because of very high temperatures (17.8 ºC – 48.5 ºC). The greenhouse studies were conducted either in UV opaque greenhouse or in UV open greenhouse which are mounted with UV-stabilized HDPE insect screens. The screens consisted of 110/qm, transparent mesh size of 0.28 x 0.78 mm and they had a 20 % of shading effect.

Figure 3.3a: The greenhouses from the experiment. The one on the right is UV opaque and the left is UV open greenhouse

The UV open greenhouse was covered by FVG SUN SILVER 5 COOL plastic film and the UV opaque greenhouse was covered by FWG SUN 5 PRO plastic film. The plastic films were transparent and silver color which was 200μm coextruded PE/EVA films. The experiment was configured as follow; the white plastic growing bags were used to grow the chlili plants. The coconut fibers were used as a medium. Each bag consisted of 1 chilli plant and 30 chilli plants were replicated in three different environments such as the UV opaque greenhouse, the UV block greenhouse and outside in the open air.

Figure 3.3b, c, d: The replications of chilli plants from treatment 1 (UV open greenhouse) (b), treatment 2 (UV opaque greenhouse) (c) and the treatment 3 (outside) (d).

The plants were irrigated manually using the water bucket twice a day in the morning and in the evening during the experiment. The plants were fertilized with the fertilizer solution at the ratio of 50g of Calcinit fertilizer: 50 g of Kristalon fertilize with EC 1.2 solution. The fertilizer solution was applied twice a day early in the morning and in the evening for three times per week.

Figure 3.3e, f: The fertilizer solution for plant nutrition

The yellow perforated plastic cards were used as yellow sticky traps. In order to make the yellow sticky traps, perforated plastic cards were divided into sixteen identical squares to make it easy to count the number of thrips attracted on each square on the sticky traps measuring 6x6 inches. These yellow traps were placed into the clear plastic bags measuring 9x7 inches and closed with the tapes. The insect glue was applied on the surface of the yellow cards evenly and hung in each experimental site randomly. The yellow sticky traps consisted of perforated plastic cards coated with the insect glue. The five yellow sticky traps were placed in each treatment after all the plants moved to the experiments. The yellow sticky traps were changed two times per week and examined the number of chilli trips on the yellow sticky traps under the microscope.

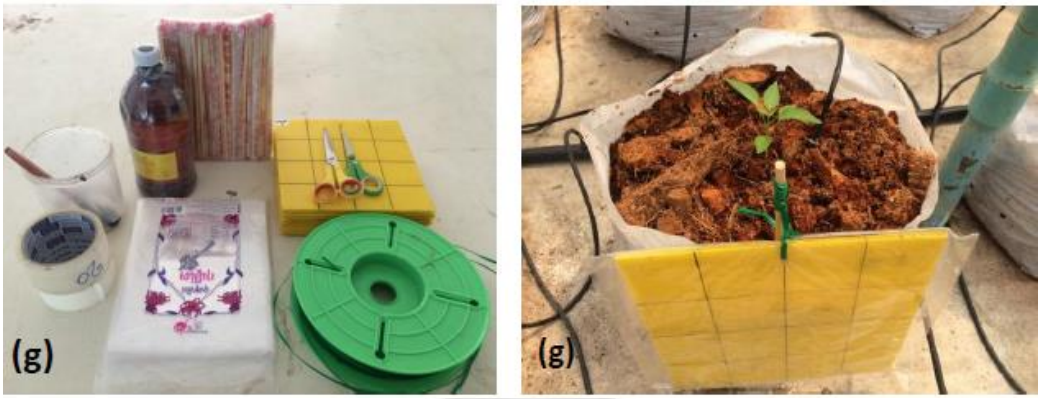

Figure 3.3g, h: Materials used in the experiment for yellow sticky traps (glue, yellow perforated plastic, clear plastic bags, tapes, bamboo sticks) (g) and Yellow sticky trap placed in the experiment to attract chilli thrips (h)

Figure 3.3i, j, k: The mature chilli plants in the UV opaque, UV block and outside conditions

3.4 Experiment II: Multiple choice experiments in the Laboratory and Outside conditions

This study was conducted in the department of Entomology in Chiang Mai University. The three different kinds of light bulbs were used in this experiment to determine the influences of UV light on the chilli thirps. The experiment consisted of three different intensity light fixtures conducted in the laboratory and outside to study the immigration pattern of chilli thrips according their preference among the three different lightings.

Figure3.4a. Multiple choice experiments with three different lighting treatments (UV light, Warm White and Yellow light) under the laboratory conditions

The three different kinds of light fixtures consisted of UV light bulb (EVE X-fire Black Light 15 Watt) as a treatment 1, warm white bulb (PHILIPS 14 Watt) as a treatment 2 and yellow light bulb (bioBULB Mosquito Repelling Lamp 23 Watt) as a treatment 3. The three light bulbs were hung from the table same distance apart. The clear plastic sticky traps measuring 11x8 inches were used to attack the chilli thirps in this experiment. In order to make the clear plastic sticky traps, the insect glue were applied evenly on the clear plastic and hang on each light fixture.

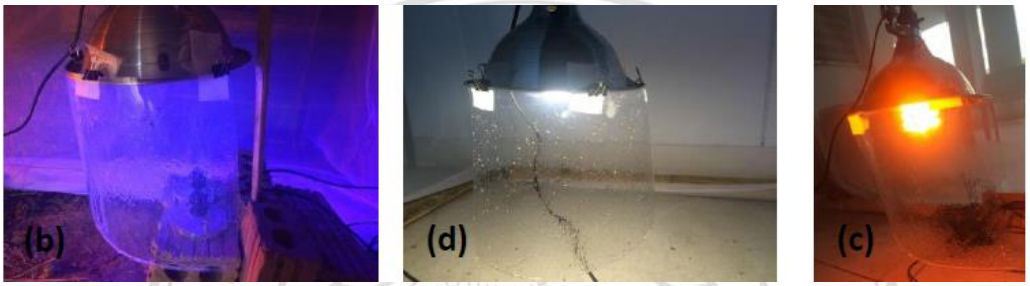

Figure3.4, b, c, d: Three kinds of light conditions, UV light (b), warm white (c) and yellow light (d)

The infested chilli thrips plants were placed in the middle of three different light bulbs to determine the responses of chilli thrips to each light bulb. The conditions were manipulated to assess the effect of different light intensities and the responses of chilli thrips to each lighting condition. The experiment was placed in the mosquito net in order to avoid entering other insets from outside. The lighting started in the evening 6 pm until 6 am for total of 12 hours per day. It was replicated three times. The clear plastic sticky traps were changed every day. Another experiment was conducted outdoors.

Figure3.4e. Multiple choice experiments with three different lighting treatments (UV light, Warm White and Yellow light) under outside conditions)