CHAPTER 4
RESULTS

4.1 Experiment I: The Result of responses to chilli thrips with three different treatments at 12 different days

The insect pest infestation of chilli plants was influenced by three different greenhouses during the experiment period. There were significant differences among the days of experiments ($P<0.05$). At day 1, the number of chilli thrips collected from traps in the UV opaque greenhouse and UV open greenhouse which provided to protect rain were range from 2.0±1.5 and 3.0±4.28 insects per trap while the number of thrips at outside was 20.0±10.63 insects per trap. However, there was not significant difference in all treatments. The number of thrips remained in the same pattern for 4 days. After that there was rain outside. However in the outside the number of thrips decreased. On the other hand, in both greenhouses the number of thrips increased. The number of thirps in the UV opaque greenhouse and UV open greenhouse at Day 11 and Day 12 had significantly higher number of thrips than outside (Table 4.1). The number of chilli thrips in the UV opaque greenhouse was the highest number attracted by the sticky traps at day 11(198±58.13) (Table 4.1). The lowest number of chilli thirps (2±1.58) occurred in the UV opaque greenhouse at the beginning of the experiment at day 1.

Table 4.1. The number of chilli thrips per trap caught in 12 days in screen house covered with UV opaque, UV open plastic and outside screen house. Means in each row and column followed by the same letters are not significantly different (*P<0.05*)

Day	Sample Size (no.of yellow sticky traps)	Sample Size (no.of chilli plants)	Treatments No. (mean ± SD) of chilli thrips trapped by yellow sticky traps in three different greenhouses		
			T1 (UV Opaque)	T2 (UV open)	T3 (Outside)
Day 1	5	30	2.0±1.58e	3.60±4.28e	20.0±10.63de
Day 2	5	30	2.8±2.17e	8.0±5.34de	52.2±24.40cde
Day 3	5	30	2.6±1.14e	7.0±6.41de	50.8±28.31cde
Day 4	5	30	3.6±3.71e	3.4±1.52e	52.8±23.73cde
Day 5	5	30	17.6±8.96de	10.4±4.77de	43.2±14.10cde
Day 6	5	30	18.4±7.96de	28.2±21.5cde	42.6±13.07cde
Day 7	5	30	39.6±23.65cde	28.6±11.3cde	38.8±14.04cde
Day 8	5	30	37.6±22.19cde	27.4±13.3cde	39.2±12.76cde
Day 9	5	30	53.6±26.76cde	45.4±23cde	20.0±9.87de
Day 10	5	30	73.4±27.29bcd	54.6±3cde	21.6±14.43de
Day 11	5	30	198±58.13a	89.4±35.7bc	23.4±2.07cde
Day 12	5	30	160±109.69a	132±49.6ab	14.6±4.34de

There were significant interactions (*P <0.05*) between treatment and the day of experiment (P = 0.00, df = 2, P = < 0.0001 (Table 4.1). There was significant difference among treatments (P = 0.0029) and among days (P = 0.000). The chilli thrips infestation was much higher inside the greenhouse, especially the UV opaque greenhouse followed by the UV block greenhouse than the outside. The infestation with aphid was very high in the UV open greenhouse while there was no infestation with chilli thrips and aphid at outside (Figure 4.1a, b and c).

Figure 4.1a, b: Effects of aphid on the chilli plants in the UV open greenhouse (a) and Aphid (*Myzus* spp.) infestation on the chilli plants under the microscope (b)

Figure 4.1c: Chilli thrips under the microscope

The UV intensity enhances the response of chilli thrips differently ($P<0.05$).There is interaction between days of UV exposure ($P<0.05$). The fewer number of thirps were caught at the first four days of the experiment in the UV opaque and UV open greenhouses, in contrast to the higher number of thrips caught at the outside was found. Comparing the outside and inside the greenhouse, there was gradual rise after day 4 in the UV opaque and UV open greenhouse and a dramatic rise after day 10 in the UV opaque greenhouse. The number of thrips gradually decreased after day 4 with the outside treatment until the end of the experiment. The number of thrips at the UV opaque greenhouse increased after day 4 until the end of the experiment.

According to the results, the number of thrips was not significantly higher in the UV opaque greenhouse than in the UV open greenhouse at the beginning of checking until day 5. Number of thrips gradually increased in each treatment. The outside treatment was the only treatment affected by rain. However the number of thrips inside in the UV opaque and UV open were not significantly different up to day 10. Only on day 11 and 12 of the observation, the number of thrips was significantly higher in UV opaque treatment. This heavy infestation occurred in all treatments and the UV opaque received the heaviest infestation.

4.1.1 The influence of weather on the number of thrips in three different treatments

Rainfall amounts of Chiang Mai area was very considerably over the life of the experiment. The range of the rainfall amount started with a big rain on the first day of the experiment increased over the next two months. In March, there were four days of rain with the maximum of 22.4 mm on the first day of experiment and the minimum of 0.3 mm per day. In April, the rainfall amount increased to 8 days with the maximum of 29.6 mm per day after the day 9 of the experiment which was the highest amount of rainfall during the experiment. There were three days of continuous rain staring April 7. Comparing the number of thrips between inside and outside screenhouse, there was a higher number of thrips outside the screenhouse than insides during day 1 to day 7 (Figure 4.1.1a). The number of thrips at the outside experiment number of thrips in the

UV block greenhouse also increased significantly but not as much as UV opaque greenhouse. dropped steadily after this rain. The number of thirps slowly increased until the day 11 when the number of thrips dramatically increased in the UV opaque greenhouse.

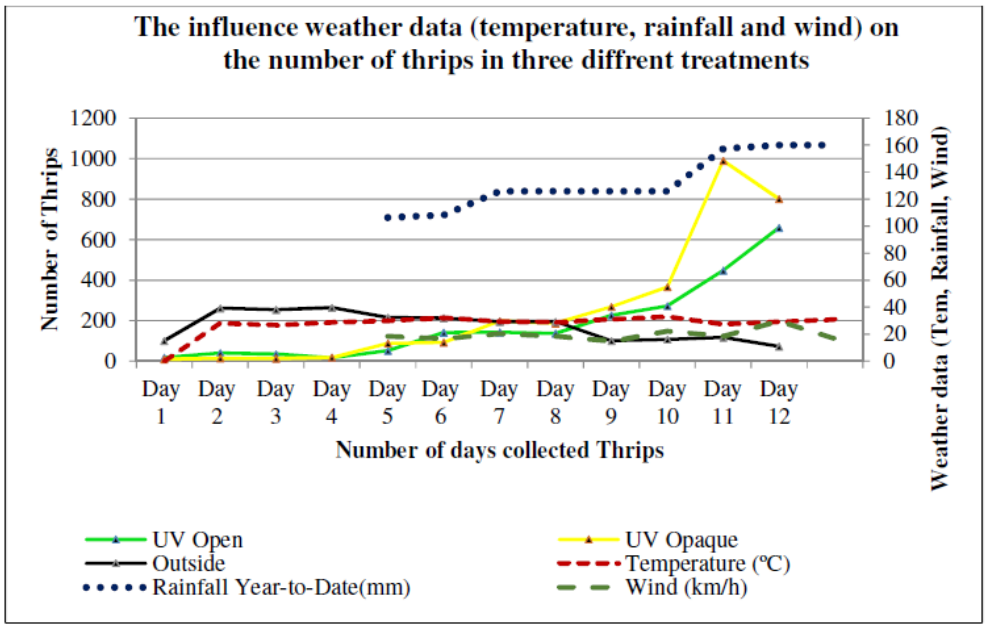

Figure 4.1.1a. The influence of weather data (temperature, rainfall* and wind*) on the number of chilli thirps in three different environmental conditions. The screenhouse were rainproof. The weather data of Chiang Mai was provided by the Weather Meteorological Department, Thailand (Online) (http://www.tmd.go.th/en/). (Rainfall*, Wind*= the first four days of weather information was not available)

At the beginning of the experiment, the relative humidity was quite high at about 70 % in March after a substantial rain. In April, the relative humidity was the highest at about 73 % after day 4 of the experiment and then decreased for the next two weeks and then gradually increased in the week of April. The relative humidity in May was the highest of the three months after a big rain (Figure 4.1.1b).

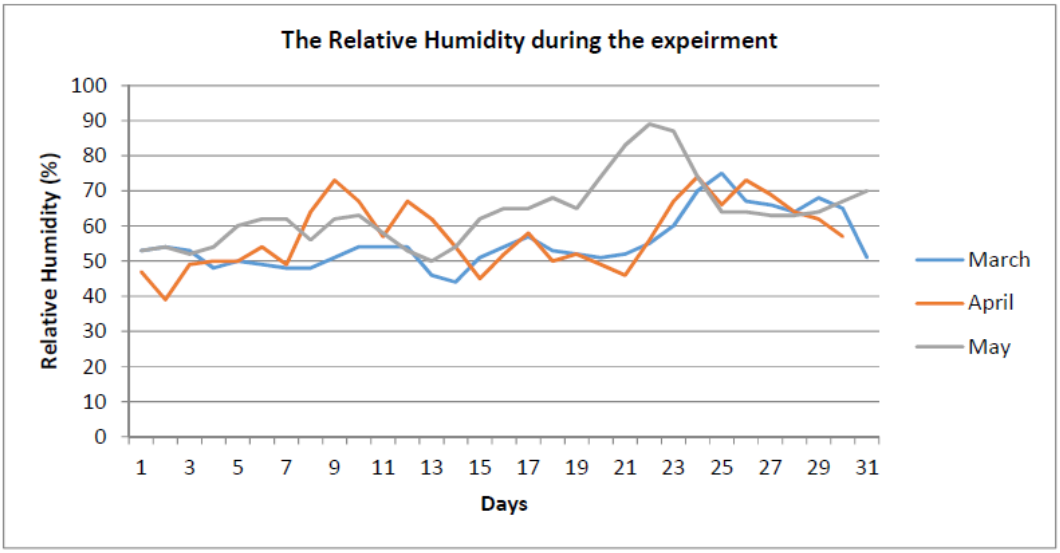

Figure 4.1.1b: Daily amount of relative humidity (%) during the experimental period (Weather Meteorological Department, (http://www.tmd.go.th/en/)

The temperature range in Chiang Mai region was from 30 ºC in March to 39.6 ºC in April during the experiment. March temperature remain relatively low at the beginning of the experiment began to rise in April. Temperatures in May remained relatively high to around 39.5ºC (Figure 4.1.1c).

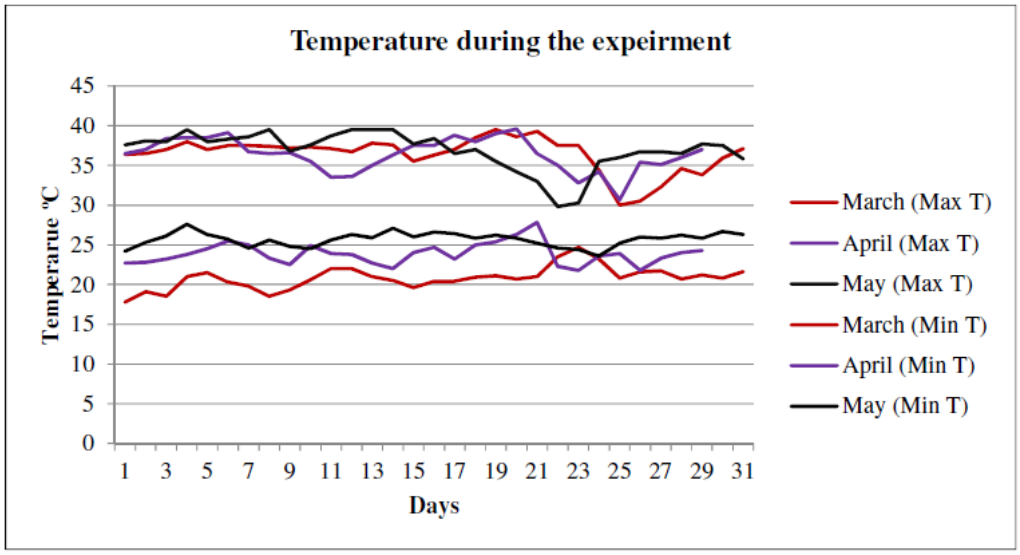

Figure 4.1.1c.Daily maximum and minimum temperature during the experimental period (Weather Meteorological Department, (Online) (http://www.tmd.go.th/en/)

4.2 Experiment 2: Multiple choice experiments

Results of the response of thrips to three different light intensities under the laboratory and outside conditions

There was significantly different (*P<0.05*) among blocks. The numbers of thrips were transformed for a normal distribution curve by using square root and then analyzed by the analysis of variance. The three treatments were significantly different among each other (*P<0.05*) (df= 2) (P= 0.0062). The number of thrips in the UV light sticky traps was significantly higher than the yellow light bulb sticky traps (Table 4.2). The highest number of thrips (6.74±3.3) was attracted to the UV light followed by the warm white light (6.53±2.11). The fewest thrips were attracted to yellow light bulb sticky traps (4.16±2.43) (Table 4.2). However, the attraction of chilli thrips to UV light trap and Warm white was significantly higher than yellow light bulb trap (Table 4.2), but the UV light trap and warm white were not significantly different to the attraction of chilli thrips (Table 4.2).

Table 4.2 Means (±SD) of number of chilli thrips in three different treatments (UV light, Warm White, Yellow light) caught by sticky traps)

Sample (day=n)	Treatments (Lights)			
n= 6	T1 (UV light)	T2 (Warm White)	T3 (Yellow Light)	P
Number of thrips Mean±SD	6.74±3.3a	6.53±2.11a	4.16±2.43b	0.0062

Data are mean±SD of number of thrips in each sticky trap

Different letter indicates significant different among three different lights based on significant ANOVA results followed by LSD all-pairwise comparison test *(P<0.05)* (Statistix 8.0). For statistical analyses, all data were transformed by square root and number of replications in each group compared was 6.