CHAPTER 5
DISCUSSION

According to the results of the experiment with the multiple choices, we found that the chilli thrips preferred the UV light condition more than any other choice. In our laboratory experiment, *S. dorsalis* was attracted the most toward the UV light condition. It has been reported that the thrips, *Ceratothripoides claratris* have maximum visual acuity in the UV range (Matteson et al., 1992) and they moved toward UV-A radiation source (Mazza et al. 2002). Paul and Gwynn-Jones (2003) reported many microbes, plants and animals use UV-B and UV-A radiation as a source of information about their environment affecting many ecological processes. Vernon and Gillespie (1990) also noted that high UV reflectance environment lose attraction with UV when comparing with yellow or blue traps contained with fluorescence pigments.

We found the warm white light also showed the preference of the chilli thirps because of the less intense UV amount in the light. Several studies have shown that whiteflies (Matterson et al., 1992; Weintraub et al., 2008), thrips (Ben-Yakir et al., 2008), aphids (Chyzik et al, 2003) and leafhoppers (Weintraub et al, 2008) either choose environments where UV radiation is present or disperse less where there is no UV radiation. Apparently many insects can perceive UV light as a unique color (Koshitaka et al., 2008; von Helversen, 1972). One recent study revealed that the thrips gave a very sensitive response to the changes in UV environment and preferred to enter inside UV-rich environment in a concentration-dependent manner (Prabhat Kumar and H-M. Poehling, 2006). Since the yellow light had no UV intensity, the chili thirps were not directly attacted to the yellow light condition. The yellow color of the light has tendency to reduce insect approaches.

The weather conditions played an important role in insect development and ecology. The outside weather conditions were high in relative humidity produced by rain and wind. On the other hand, the weather condition inside the two greenhouses was quite stable because of the protective nature of the greenhouse from the outside elements. The temperature and relative humidity was quite stable but was relatively higher than the outside conditions. According to Ananthakrishnan (1993), the abundance and distribution patterns of different host plants in space and time influence thrips population dynamics within an agro-ecosystem. Knowledge on the seasonal abundance, peak periods of pest attack and estimates of change in pest density is the fundamental requirement in the development of an effective and sustainable pest management strategy (Kakkar et al., 2012).

In the UV open greenhouse, all the chilli plants were exposed to high concentration of aphid which overwhelmed the conditions and made the experiment more problematic. The great numbers of the aphids seem to interfere with the chili thrips development. The leaves were shrinking adversely affected by the aphid population explosion. It is reported that aphids (*Myzus persicae*) will propagate 1.5-2 times longer under regular film compared to UV-absorbing film, UV-exposed aphids gave birth to more new progeny (Chyzik et al., 2003). Recent studies (Kirchner et al., 2005) show that aphids have photoreceptors in their compound eyes sensitive to light in the UV-A range of the light spectrum.

Ironically at the same experimental site at the facilities of Chiang Mai University (Sringarm et.al., 2013) found that other pests such as aphids (*Myzus persicae* Sulzer) and whiteflies (*Bemisia tabaci* Gennadius) were very high under outside condition and lower in the two greenhouses, even though the results were different than the current experiment. They concluded that there was medium thrips infestation in the UV open greenhouse where as in this experiment the infestation was lower in the UV opaque. The results in this experiment indicated a much higher concentration of chili thirps existed in the UV opaque greenhouse.

One possible explanation to account for the different in the number of chilli thips is the natural environment outside condition included other predators that helped reduce the number of chill thrips attracted. There are natural enemies of chilli thrips in

their environment. It has been reported that the natural enemies attacking chilli thrips were identified as: *Orius insidiosus*, *Frankliniella vespiformis*, and Chrysoperla externa (Yelitza et al., 2013) and including other mites species such as *Neoseiulus cucumeris* and *Amblyseius swirskii*. We found that many different kinds of insects were attracted to the yellow sticky traps at the outside experiment including bugs, thrips and other kinds of insects. On the other hand, we found that there were less other insects from the outside attracted to the yellow sticky traps inside the greenhouses. The number of chilli thrips were probably suppressed by their natural enemies in the outside condition.

However there was still a potential problem with small insects such as thrips and aphids under the protective cultivation system. The insect screen used in the greenhouses was not totally capable of preventing for the invasion of smaller insects such as chili thrips and aphids. The experiments did not control for other pests and no pesticides were used. The weather conditions were not manipulated inside both greenhouses. Sometime the temperature and humidity were almost oppressive and the plants looked wilted and stressed even though water was given regularly twice a day. Good ventilation is a prerequisite for greenhouses without expensive cooling devices (Michelle and Baker, 2000 and Ajwang et al., 2002). Materials need to hinder insect invasion but permitting adequate ventilation are desired.

The beginning of the experiment, the UV opaque greenhouse had the lowest number of chilli thrips. Over the course of the experiment, this greenhouse proved that the highest concentration of chilli thirps occurred. All the plants in this greenhouse appeared to have a high concentration of thrips on all their leaves. The plants appeared to be much stressed. The weather conditions inside this greenhouse were not favorable. This may have exacerbated their stress conditions. The chilli thrips seem to thrive under these adverse conditions and the infestation became worse until the plants die. Reducing the immigration of pests in the greenhouse can potentially lead to a lower initial pest population density, which is a key factor for successful and effective control (Xu et al. 1984).

During this experimental period, the outside weather conditions were very favorable for the chili plants. All the plants appeared to be healthy. The chilli plants were less susceptible to chilli thrips and other pest invasion. It need to be noticed the

outside weather conditions during the experiment were often erratic and at time extreme with variable high temperatures, heavy rain and strong wind. At this time, the weather conditions inside the two greenhouses were much more stable with consistence temperatures, relative humidity and no wind.

For the best protective cultivation system, we need proper weather conditions and management inside the greenhouses. For example, proper ventilation and water management plus natural pest control. Adjustments have to be made according to outside variables in temperatures, wind and dry conditions. The data in this experiment does not include the measurement of UV intensities and weather conditions inside the two greenhouses. The tropical region presents a number of challenges must be addressed. Temperature fluctuation can be one of the strongest influences under the protective cultivation system.