

Life Cycle of Thrips (*Megalurothrips* spp.) on Long Bean (*Vigna unguiculata*)

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ABSTRACT

The study has been done to identify the life cycle of *Megalurothrips* spp. starts from egg, larvae, pre pupa, pupa and adult stages. The host plants that have been used in the study were long bean (*Vigna unguiculata*). The objective is to determine the life cycle of thrips from egg until the emergence of adult. Result from the experiment found that the life cycle of thrips range from 15 to 19 days with mean of life cycle was 16.25 ± 0.11 days. As conclusion, the result obtained could be useful information as a guideline data to formulate Integrated Pest Management (IPM) in term of controlling techniques such as in selecting type of insecticide, mode of action and also combination of others techniques such as biological control in controlling thrips

Key Words: thrips, life cycle

Introduction

Thrips are relatively small insect pests that are less than 2 mm long that causes serious damage to the growth and development of crops especially on ornamentals, vegetable and fruit crops worldwide. These insect pests are causing major damage to the crops through direct and indirect condition. Thrips belong to the insect order of Thysanoptera which means fringe wings (the wings of adult thrips are fringed with long hairs). They have a narrow wing that are present or absent with few or no veins in the wing. Thrips mouthparts are piercing-sucking with only a left mandible. The antennae are short with four to nine segments and they can reproduce sexually or asexually. Thrips are divided into two suborders, Terebrantia and Tubulifera and can be differentiated based on shape of the last abdominal segment and the development of ovipositor. Thrips normally have the ability to run, crawl, jump, and move rapidly. Flight is the major way of active dispersal of thrips but normally they dispersed by drifting in wind current. A great number of thrips (larvae and adult) are plant feeders that feed on flowers, leaves, twigs or buds by using their piercing-sucking mouthparts that cause structural abnormalities of foliage in the form of leaf malformation (distorted, dwarfed, and matted), leaf fold, leaf roll, leaf blisters, and sometimes defoliation; causing discoloration of petals, deformation, or scarring of flowers as well as transmission of virus diseases.

In recent years the thrips has spread from Southeast Asia to most of the rest of Asia and to many Pacific Ocean Islands, North Africa, Australia, Central and South America, and the Caribbean. In the United States, it was first detected in Hawaii in 1982, followed by Puerto Rico in 1986, and Florida in 1990. It has the potential to infest greenhouse crops widely, but under field conditions, its distribution limited to tropical areas. In Florida, so far it is a field pest only at the south of Orlando. Thrips is a polyphagous species, but is best known as a pest of Cucurbitaceae and Solanaceae families. Among vegetables injured are bean, cabbage, chilli, Chinese cabbage, cowpea, cucumber, eggplant, lettuce, melon, okra, onion, pea, pepper, potato, pumpkin, squash, and watermelon. Cucurbits were more preferred than eggplant, whereas pepper was less preferred than eggplant. Other crops infested include avocado, carnation, chrysanthemum, citrus, cotton, hibiscus, mango, peach, plum, soybean, and tobacco (Capinera, 2004).

The life cycle thrips includes egg, two actively feeding nymphal stages, non-feeding pre pupa and pupa stages and adult. Thrips have a metamorphosis that is intermediate between complete and gradual. Thrips nymphs are often called larvae. Last-instar nymphs change greatly in appearance, and they are often called pupa even though thrips do not have a true pupal stage. Thrips eggs are elongate, cylindrical to kidney shaped, and relatively large in relation to the female. Females of most species insert their tiny eggs into the plants, commonly into leaves or buds where nymphs feed. The pale pre pupa and pupa most species of thrips drop to the soil or leaf litter or lodge within plant crevices. The greenhouse thrips commonly pupate openly on lower leaf surfaces while pupa and eggs of some gall-making species, such as the Cuban laurel thrips, occur on leaf surfaces but are enclosed within distorted plant tissue. Thrips have several generations up to eight or more in a year. The life cycle from egg to adult may be completed in as short a time as two weeks when the weather is warm (Dreistadt and Phillips, 2001).

At 25°C, the life cycles of thrips from egg to egg may last only for 17.5 days. The life cycles differ little from that of most phytophagous Thripidae: the adults emerge from the pupa in the soil and go to the leaves or flowers of the plant, where they lay their eggs (Shelton et.al, 1995 and Smith et.al, 1992). The life cycle of thrips is greatly influenced by host plant, temperature and diet. Females lay from 10 to over 100 eggs dependant on species and host plant. Flower thrips reproduction is greatly increased with pollen added to diet. Eggs are placed into plant tissue and generally hatch in three

to five days, but they can last 10 to 12 days under cold conditions. The two larval instars are the only feeding immature stages and last 3.6 to 12 days dependent on species and temperature. The pre pupa and pupa stages generally occur in the soil and last 2.5 to 13 days. The life cycle from egg to adult is two to three weeks during favorable weather but can be greatly extended during the winter condition. Adult thrips can live for about one month (Sparks *et al*, 2003). The life stages of thrips include an egg, larva I, larva II, pupa I, pupa II and adult. Developmental times of egg, larvae, and pupae are about 6, 5, and 5 days respectively. The adults of all species feed on pollen which increases longevity and the number of eggs produced (Funderburk *et.al*, 2002). One cycle generation of thrips is commonly completed in about 20 days at 30°C, but it is lengthened to 80 days when the insects are cultured at 15°C. Thrips are able to multiply during any season that crops are cultivated but are favoured by warm weather. When crops mature, their suitability for thrips declines, so thrips growth rate diminishes even in the presence of warm weather. In Southern Florida they are damaging vegetable crops both in autumn as well as in spring. In Hawaii, they also become numerous on vegetables during summer growing season (Capinera, 2004).

The objective of this study is to determine the life cycle of thrips from egg until the emergence of adult. This research was conducted due to lack of information regarding thrips especially in the stage of eggs development because previously no research has accomplished to identify eggs stage of thrips. Furthermore, by obtaining this data we will be able to control this particular pest that cause major problem in agriculture sector.

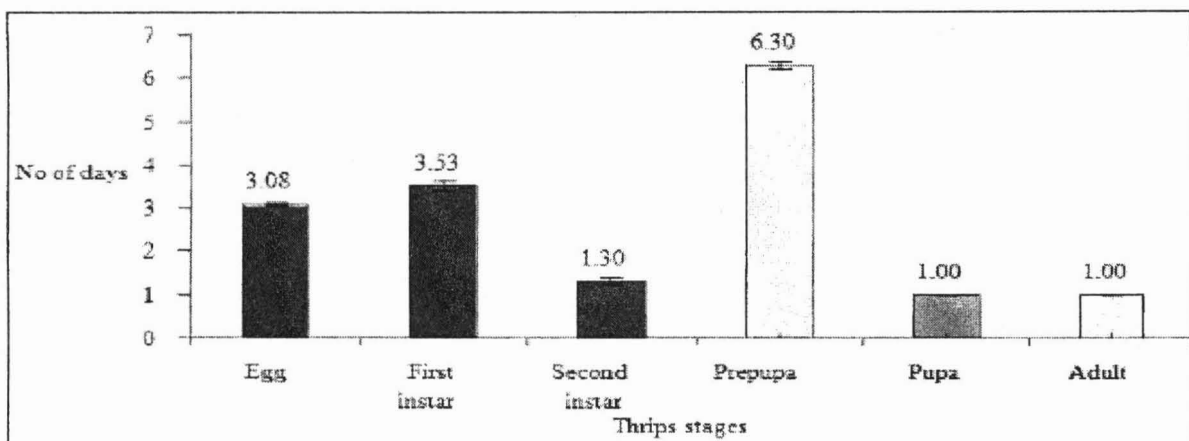
Materials and Methods

Host plants that been used in this study were Long bean (*Vigna unguiculata*) since *Megalurothrips* spp. that was collected from Kanchong Tengah farm mainly infested on this plants. Single leaf was arranged properly per container with two pairs of adult thrips were introduced on top of the leaf in each container at ratio of 1:1 (male to female). The containers were then inoculated for 72 hours to 96 hours after introduced. The adult thrips were then removed based on the symptoms on the leaf in the containers when the leaf turns to silvery, yellowish and browning spot. This symptom showed that the eggs of thrips have been laid on the leaf surface. Due to difficulties to see the eggs because of it is transparent and inserted into the leaf surface, the emergences of first instars were used to represent numbers of eggs that have been produced. This study was repeated 40 times for two pairs of thrips. Developmental stages of thrips were observed daily until the life cycle completed. The behaviors, movement orientations and developments of immature stages of thrips such as shape, size, and colour were observed and recorded daily. Temperature is one of the factors that influence the life span of thrips. Therefore, this study was conducted in a controlled room temperature at 24±2°C with controlled dark and light ratio of 1:1 (12 hours: 12 hours). Parameter of this study focus on life cycle of thrips and the data observation on life cycle were analyzed by using SPSS programme (version 11.5) and presented in graph and table.

Results

Results from the study showed that there was significantly different in the duration of egg, first instar, second instar, prepupa, pupa and adult ($P<0.05$). But there were no significantly different between pupa and adult of this particular species of thrips (Figure 1).

Figure 1: Development of thrips from eggs to adult under laboratory conditions



From the graph, it showed that, thrips laid their eggs between 72 to 96 hours after the mating process and hatched within three to four days of oviposition at an average of 3.08 ± 0.04 days. The laid egg were transparent and could be noticed through the silvery symptom that appeared on the leaf and also yellowish and browning in colour. The larvae developed through two instars i.e first instar and second instar. The duration of first instar larvae was ranged between two to five days with an average of 3.53 ± 0.13 days. The first instar was transparent in colour and actively crawled. The

duration for the second instar larvae to emerge were from one to three days with an average of 1.30 ± 0.08 days. These instar larvae were much easier for visibility because the colour has change from transparent to orange in colour. Result also showed that prepupa stage to emerge ranged between six to eight days with an average of 6.30 ± 0.08 days. This stage showed that the thrips changed in structure by appearing new form of wing that were still short and became less aggressive as compare to instar stages however the shape of thrips still the same as second instar stage. The pre pupa became pale orange in colour and move in passive movement. Moreover, the development pupa from pre pupa took within one day. The wing was longer than prepupa stage and formed elongated from mesonotum until the end of abdomen. For the adult development, the total developmental period of thrips from egg to adult was 16.25 ± 0.11 days. The adults have two pair of fringed wings and the colour changed became shiny and whitish.

Discussions

The observation conducted in this study was to observe the morphological characteristics in every stages of the lifecycle and behaviors of thrips. Result revealed that the duration of life cycle was ranges between 15 to 19 days at temperature of $24 \pm 2^\circ\text{C}$. Base on Shelton *et al.*, (1995) stated that thrips can completed the life cycle in 14 to 30 days whereby Dreistadt and Phillips, (2001) stated that life cycle of thrips completed in as short time as two weeks when the weather was warmed. In current study, the eggs hatched within three to four days at an average of 3.08 days. The laid egg was transparent and difficult to be identify but cloud be noticed through the silvery symptom and yellowish and brownish colour that appeared on the leaves surface. First and second instars took about two to five days and one to three days respectively to emerge. For pre pupa, it takes about six to eight days while pupa takes about a day before turned to adult. The total life cycle of thrips from egg to adult is about 15 to 19 days. Base on current study, the study agree with Shelton *et al.*, (1995) and Dreistadt and Phillips, (2001) indicated that the life cycle completed with 15 to 19 days.

Conclusion

In conclusion, the life cycle of thrips reared on long bean had not much differ with thrips found on other crops in term of morphological characteristics but the variation in lifecycle for each stage very much depend on temperature and relative humidity factors.

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