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Studies on biology of red banded foliage thrips (*Selenothrips rubrocinctus*) under Bhubaneswar conditions of Odisha

SS Pragyana and SK Mukherjee

Abstract

Studies on foliage thrips of Cashew with special reference to Red Banded Thrips (*Selenothrips rubrocinctus* Giard.) was conducted at the Cashew Research Station (CRS), All India Coordinated Research Project (AICRP) on Cashew, Orissa University of Agriculture and Technology (OUAT), Bhubaneswar during 2016-17 and 2017-18. Periodical observation on the Red Banded Thrips infestation were recorded from unsprayed cashew plants in the germplasm block of 15-16 years old and the thrips incidence was correlated with corresponding weather parameters during the period of sampling. The total life cycle of the pest was completed in 14.60 ± 0.34 days (2 weeks). The study on biology of the insects revealed that the egg stage was 3.23 ± 0.76 days, the total nymphal period was 4 ± 0.38 days, the pre-pupal stage was 1.01 ± 0.37 days, the pupal stage was 2.53 ± 0.58 days and finally the adult stage was 3.85 ± 0.58 days.

Keywords: red banded thrips, cashew, biology

Introduction

Cashew (*Anacardium occidentale* L.) belongs to native of South America (Brazil) and is now found in many tropical areas. The English name cashew is derived from the Portuguese name "caju". The cashew tree was first described by Thivet (1558). In the 16th century cashew was introduced to India (Goa) by the Portuguese and it spread all along the laterite hill slopes in the Western area from Mumbai to Cape Comorian and to the sandy soil on the Eastern coast as well as over inland areas in the Southern states. The major cashew producing states in India are Kerala, Karnataka, Tamil nadu, Andhra Pradesh, Odisha, Maharashtra, Goa and West Bengal and interior tracts of Chhattisgarh, Andaman and Nicobar Islands, Gujarat, Jharkhand and North Eastern regions. The crop is also reported to be attacked by a number of insect pests as well as microbial pathogens causing diseases. About 400 species of arthropods are known to infest cashew till now, while 70 species of insect pests have been reported to infest cashew in different stages of crop growth in India (Pillai *et al.* 1979). Among these several insect pests cashew stem and root borer is the most important pest of this region followed by the incidence of Tea Mosquito Bug. Besides this Shoot Tip Caterpillar, Leaf Miner, Leaf and Blossom Webber, Apple and Nut Borer and Thrips also cause yield reduction in unmanaged plantations. Since last two years (2015-16) foliage thrips (*Selenothrips rubrocinctus*) had been recorded from Bhubaneswar seriously affecting the growth and yield of the cashew plants. Some cashew varieties in the germplasm block were observed to be highly susceptible to the pest. The affected trees showed leaf sheddings and drying of the branches and panicles. Red Banded Thrips was first reported in Cacao (Cocoa) plant in the country West Indies by Broadway (1898). The pest was found in the leaf with high population of 70-80 nymphs and adults per leaf and in high infestation, all the leaves are affected. Both nymphs and adults scrap and suck the cell content. Under severe conditions the leaves turn silvery white and shed off. 3 Red Banded Thrips was also found attacking grape, mango, avocado, guava along with cashew and cocoa. However available literatures on seasonal incidence, biology and management of the pest in cashew are very scanty. Therefore it was decided to conduct a thorough investigation of this pest in cashew at Cashew Research Station, Bhubaneswar.

Materials and Methods

"Studies on foliage thrips of cashew (*Anacardium occidentale* L.) with special reference to Red Banded Thrips (*Selenothrips rubrocinctus*) under Bhubaneswar conditions" were conducted during the cropping season 2016-17 and 2017-18 under field conditions at Cashew Research Station (CRS), Orissa University of Agriculture and Technology (OUAT)

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Ranasinghpur, Bhubaneswar (BBSR). The biology of the Red Banded Thrips was studied in the laboratory of Entomology, College of Agriculture, OUAT, Bhubaneswar. The adult males and females from the field collected samples were separated in pairs and transferred to individual leaves of cashew in the laboratory to study the life cycle. Pair of male and female adults were released on older uninfested leaves and kept in a petridish. The petiole of the leaf was plugged with cotton swab and that was moistened by putting few drops of water. The petri dishes were then placed in a rearing jar and the insects started reproducing. These eggs hatched and the nymphs that emerged were yellowish, transparent, white in colour, having very faint reddish markings on their abdomens. There were 2 nymphal stages, 1 pre pupal and 1 pupal stage which finally moulted into adults. The duration of the different life stages were then averaged out and presented in a tabular form. The data obtained from various experiments were subjected to statistical analysis after suitable transformation wherever necessary (Gomez and Gomez, 1984). The variations in the treatment were tested for significance by “f” test. The standard error of means [SEM (\pm)] and critical difference (CD) at five percent level of significance were calculated following the standard procedures and used for comparison of treatment means. Basing on this statistically analysed data the results of the investigation are presented in the subsequent chapters.

Result and Discussion

The biology of Red Banded Thrips was studied in the laboratory of Department of Entomology, College of Agriculture, OUAT, Bhubaneswar. The details of rearing procedure and life cycle study were described in the section Materials and methods. The following observations were made in the life cycle study of the insects and presented in a tabular form.

Table 1: The life cycle analysis of the Red Banded thrips

Stages in Life Cycle	Duration
1) Egg stage	3.23 \pm 0.76 days
2) 1 st instar larva	1.52 \pm 0.38 days
3) 2 nd instar larva	2.45 \pm 0.45 days
4) Total nymphal period	4.00 \pm 0.38 days
5) Pre-pupal stage	1.01 \pm 0.37 days
6) Pupal stage	2.53 \pm 0.58 days
7) Adult stage	3.85 \pm 0.58 days
8) Total life cycle	14.60 \pm 0.34 days

Eggs: Eggs were laid by the female below the epidermis of the leaf by inserting the ovipositor of the female. Eggs were kidney shaped and hyaline. On an average 38 eggs per leaf were laid by the female parthenogenetically. The female covers the egg with a drop of excrement which indicates the site of egg laying. The mean egg period was found 3.23 \pm 0.76 days.

1st instar nymph: The 1st instar nymph after hatching were yellowish, transparent having a faint reddish marking in the abdomen and the length varies from 0.2-0.3mm. Nymphs were found all along the leaf surface. The duration of the stage was 1.5 \pm 0.38 days.

2nd instar nymph: The 2nd instar nymphs were highly movable, length varies from 0.4-0.6mm having reddish marking in the 1st 3 abdominal segments and the anal segment. It lacerates and sucks the cell contents of the leaves,

insect carries a drop of excrement on the abdominal tip. The duration of the stage was 2.45 \pm 0.45 days. The total duration of the nymphal stage was 4 \pm 0.38 days.

Pre-pupa: The 3rd instar nymph of *Selenothrips rubrocinctus* passed into a non feeding movable stage (pre-pupa). The pre-pupa stage is well observed by naked eye where the congregation of nymph has taken place. In the pre-pupal stage the thrips behave like 2nd instar nymph without taking food having prominent red band, length of the pre-pupa measures 1-1.3mm and the duration is 1.01 \pm 0.37 days. The pre pupa is also marked with presence of red eye.

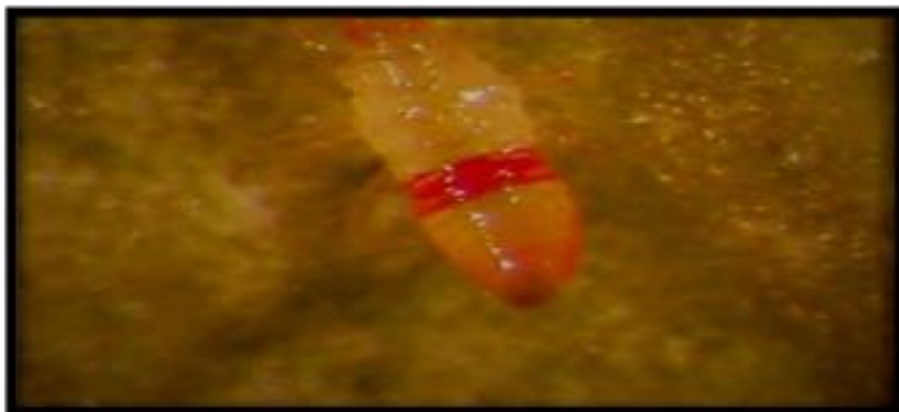
Pupal stage: The pre pupal stage is followed by pupal stage and the duration was 2.5 \pm 0.58days. The pupal instar was the non feeding instar and moulted to adult stage whose duration was 3.85 \pm 0.58days.

Adult stage: The adult emerges from the pupa having polygonally reticulate body and needle like terminal antennal joints, broad wings with strong and dark setae. The female were 1.2mm and possessed a sharp ovipositor where as males were 1mm and smaller in length than the female. The total life cycle of the thrips completed in 14.60 \pm 0.34days (2 weeks) having a very short life cycle, the overlapping generations of the thrips caused serious damage to the infested trees.

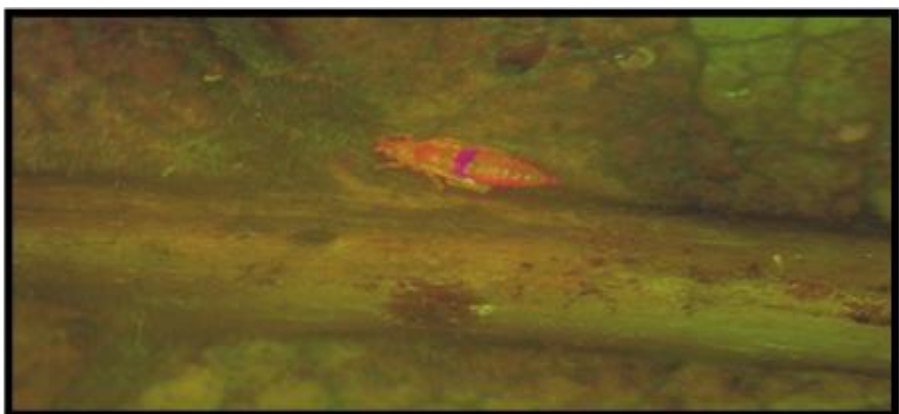
Eggs were laid by the female below the epidermis of the leaf by inserting the ovipositor of the female. Eggs were kidney shaped and hyaline. On an average 38 eggs per leaf were laid by the female parthenogenetically. The female covers the egg with a drop of excrement which indicates the site of egg laying. The mean egg period was found 3.23 \pm 0.76 days. The 1st instar nymph after hatching were yellowish, transparent having a faint reddish marking in the abdomen and the length varies from 0.2-0.3mm. Nymphs were found all along the leaf surface. The duration of the stage was 1.52 \pm 0.38 days. The 2nd instar nymphs were highly movable, length varies from 0.4-0.6mm having reddish marking in the 1st 3 abdominal segments and the anal segment. It lacerates and sucks the cell contents of the leaves, insect carries a drop of excrement on the abdominal tip. The duration of the stage was 2.45 \pm 0.45 days. The total duration of the nymphal stage was 4.00 \pm 0.38 days. The 3rd instar nymph of *Selenothrips rubrocinctus* passed into a non feeding movable stage (pre-pupa). The pre-pupa stage is well observed by naked eye where the congregation of nymph has taken place. In the pre-pupal stage the thrips behave like 2nd instar nymph without taking food having prominent red band, length of the pre-pupa measures 1-1.3mm and the duration is 1.01 \pm 0.37 days. The pre pupa is also marked with presence of red eye. The pre pupal stage is followed by pupal stage and the duration was 2.53 \pm 0.58 days. The pupal instar was the non-feeding instar. The adult emerges from the pupa in 3.85 \pm 0.58 days having polygonally reticulate body and needle like terminal antennal joints, broad wings with strong and dark setae. The female were 1.2mm and possessed a sharp ovipositor where as males were 1mm and smaller in length than the female. The total life cycle of the thrips completed in 14.60 \pm 0.34days (2 weeks) having a very short life cycle, the overlapping generations of the thrips caused serious damage to the infested trees. Life cycle of Red Banded thrips were studied earlier in its alternate hosts like avocado (Smith, 1964), cacao (Smith, 1964), and also in cashew (Ayyar and Margabandhu, 1940). The thrips more or less behave similarly in all the findings which might be due to the location of the experimental site which might be due to

the geographical situation having a warmer climate. Chin and Brown (2008) [8] reported the egg stage and other developmental stages which were longer than the present findings which might be due to the location of the experimental site which might be due to the geographical

situation having a warmer climate. The nature of egg laying, appearance of insects in different instars, its pre-pupal and pupal stages were also similar and this was in conformity with the findings of the previous scientists.



Pupal stage of Red Banded Thrip



Nymphal stage

Conclusion

The study of life cycle indicated that the pest had completed its life cycle in less than 3 weeks, thus several generations of the pest were completed during the crop growth stage. However the influence of environmental factors played a great role on the seasonal activity indicating low to nil population during the stress periods i.e extreme hot summer months as well as during the cold months of the year. During rainy season also lowest population was observed

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