

Developmental aspects of mycophagous thrips *Elaphrothrips procer* (Schmutz) (Thysanoptera: Phlaeothripidae)

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Abstract

Thrips are minute insects which are usually a few millimetres long. In spite of their small size, thrips shows some remarkable structural peculiarities unobserved among the other insects. The thrips shows many peculiarities in their behaviour and life history. In most species of mycophagous thrips fertilization of the eggs is by means of bisexual union. Also some species of thrips express a specific matting behaviour. In this paper some aspects of developments including life history, duration of developmental stages, oviposition and incubation periods of eggs of mycophagous thrips *Elaphrothrips procer* (Schmutz) are presented.

Keywords: *Elaphrothrips procer*, mycophagous thrips

1. Introduction

Thrips are distributed worldwide predominating in tropical, subtropical, and temperate regions. They enjoy a wide range of distribution, habits and ecological habitat. They occur on the tender, succulent parts of the plants, under the barks of dead and drying twigs, among decaying leaves of grass, feeding on fungus spores and hyphae. Though most of them are phytophagous, very few are predaceous feeding on mites, scales, psocids. While mycophagous or fungus feeding thrips are more common.

The western Vidarbha region of Maharashtra is rich in flora and a variety of insect fauna. The studied insect Thrips, *Elaphrothrips procer* (Schmutz) abundantly found in and around Akola district. It is a mycophagous thrips and feeds on fungal spores and generally occurs on the fungus infected dry leaves of *Butea monosperma* plant during humid seasons of the year. They are found within the curved folds of fungal infected dry leaves of the said plant.

2. Materials and Methods

Collection and rearing of thrips

For collection of these species the methods of Ananthakrishnan (1969) was followed. The thrips were collected from their host plant *Butea monosperma* dry fungal infected leaf during the humid periods of the year when they mostly occur.

The collected specimens of *Elaphrothrips procer* (Schmutz), adult male, female, larvae and eggs were kept in large plastic bowls along with fungus infected dry leaves. Then they transfer to the separate plastic rearing bowl to avoid overcrowding and food limitation. The newly hatched larvae were regularly fed on fungus infected dry leaves of *Butea monosperma*. For protection bowls were covered by muslin cloth. Light 12:12 and temperature (25 ± 1 °C) were maintained. Relative humidity maintained at 80% by keeping

wet filter paper in the rearing bowl, sometime wet cotton plug also used.

Field Observation and photo-micrograph

For field photography and documentation, images were captured directly by using Olympus digital camera (SP-550UZ). Photographs of adults, eggs, larvae prepupa and pupa were capture and photographs of matting behaviour were also imaged.

3. Results and Discussion

Life History: The life history of *Elaphrothrips procer* (Schmutz) started from egg with two active larva, prepupa, pupa I, Pupa II and complete into adult. The larvae resembled in many respects to adults. The larvae are very active. They feed on the fungal spores as adult do. The larval instars are followed by a prepupa occurring in between the larva II and pupa I. There are two pupal stages, the pupa I and pupa II. The pupa are inactive quiescent and are non-feeding. The eggs are glued vertically and occur in cluster, dull white in colour. Larvae prepupa and pupa I and pupa II are red in colour while adults are black in colour.



Fig 1: A) *Elaphrothrips procer* colony on fungus infected dry leaf of *Butea monosperma*, B) Female along with eggs

Duration of developmental stages

The time taken by an embryo to hatch into larva varies from 1-2 days in ovoviparous eggs and in oviparous eggs 6-8 days. The embryo hatches into larva I.

It is observed that the larvae emerged from the viviparous female appears larger than oviparous or ovoviviparous female.

The larva I: feeds actively for 4-6 days and then changes or moults to larva II. At the time of moulting the larva show movement which causes ruptures of the cuticle along the dorsal side. Through the gap the larva II comes out.

The larval II: feeding for 5-7 days with continues its life and after proper growth, they moults to prepupa. The larval

exuviate are grey in colour. In an average total larval period is about 10-15 days.

The prepupa: life is very short, only 1 to 2 days. Then it changes into the pupa I.

The Pupa I: The life duration of pupal stage of the pupa I is also short being 1 to 3 days and it moults to pupa II.

The pupa II: as like other it also shows short days 2-4 and moults to the adult. During the pupa II stages the pupa undergoes metamorphic changes and adult moults. During pupation it gives out pupal exuviae which are thin whitish in colour with the posteriorly grey in coloured. A total pupal period is 4-9 days.

Just after emergence the adults start mating and female starts laying egg within 6-9 days depending upon the climate conditions and food availability

Oviposition behaviour: The egg laying pattern and the number of eggs laid vary considerably, depending upon the aggregation patterns and sub-social behaviour of the thrips concerned.

The host specificity of *Elaphrothrips procer* (Schmutz) are not specified, but the host *Butea monosperma* from where the insects collected, the female lays eggs in the leaf folds of *Butea monosperma* dry fungus infected leaves. The eggs are protected from direct exposure of sunlight.

The female lays eggs in the range of 10-40 in a group and each egg is vertically glued to the leaf. The oviposition period lasts for 2 to 4 days. On an average each female lays about 30-40 eggs.

Fecundity occurs in viviparous forms with 5-8 larvae/female, 1-3 larvae/day. The oviposition period is higher in ovoviviparous forms, 2-7 days.

Incubation Period: The incubation period is determined by the nature of the ovary and the type of reproduction, which in turn are governed by the environmental factors like availability of food, temperature and photoperiod. In partial ovoviviparous *Elaphrothrips procer* (Schmutz) incubation period is just one day, whereas in oviparous from 2-4 days.

In the month September to November, the eggs hatch within 2-4 days when temperature and relative humidity are 27 ± 3 C and 60% - 70% respectively. In the months of December and January when the temperature is 23 ± 3 C and humidity 50%-60%, more time is taken for hatching.

In the life history of *Elaphrothrips procer* (Schmutz) the prepupal stage has been lie in between the larva II and pupa I. Therefore, the following terminology is used in *Elaprothrips procer* (Schmutz) i.e. first stage larva I, second larva II, prepupa, pupa I and pupa II. This terminology is similar with the study on *Elaphrothrips greeni* (Watane, 1985) [12].

In the life-history of the thrips it is common that the life-span of the first larva is always shorter than that of the second one (Bailey, 1933; Sharga, 1933) [4, 12].

Eggs of many thrips are usually whitish in colour, in *Limothrips cerealium* the eggs are whitish initially and then become brownish with a paired red spots (Sharga, 1933) [12].

Even in other thrips the eggs are whitish, pinkish yellow or dark coloured (Ananthakrishnan *et al.*, 1983; Kumm, 2002) [2, 7]. In *Elaphrothrips procer* (Schmutz) the eggs are initially dull white and later on change white to pink colour.

In *Elaphrothrips procer* (Schmutz) the eggs are initially dull white and later on change white to pink colour which support and agree with the above record. *Elaphrothrips procer* (Schmutz) females in a colony lay their eggs in cluster. When they form aggregations, the oedymorous male guard and protect the colony and egg mass by both, thus tend to exhibit division of labour. It also observed that *Elaphrothrips brevicornis*, a West Indian species, sits over her eggs after laying them on the leaves and protects the eggs from the predators (Bagnall, 1915) [3].

The rate of developmental stages further determines the total period of life cycle. Ecological conditions temperature humidity greatly influence the period of life-cycle of thrips. Therefore it is not advisable to correlate the life-cycle of the species reared in cold and warm climate. The entire postembryonic development, from hatching to the adult condition is competed in 30-35 days in *Limothrips cerealium* (Sharga, 1933) [12], while in all days in *Frankliniella tritici* (Watts, 1936) [14] and the second larval stages is all thrips so far studied (Lewis, 1973) [8]. In *Elaphrothrips greeni* total period of post-embryonic development varies between 15.5 to 23.5 days and also the second larval stage is longest (4-6 days) and the pre-pupal stage the shortest (1-1.5 days) (Watane, 1985) [13].

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Pupa I has a life of one days and pupa II 2-3 days in *Trichinothrips breviceps* (Seshadri, 1953) [11], pupa I, 1.4 days and pupa II 3.7 days in *Haplothrips niger* (Loan and Holdaway, 1955) [9], Pupa I, 2-3 days and pupa II 5-7 days in *Bagnalliella yuccae* (Derbeneva, 1959) [5] and pupa I, one days pupa II 2.8 days in *Halporthrips aculeatus* (Koppa, 1970) pupa I, 1-2.5 and pupa II, 2.5-3.5 days in *Elaphrothrips greeni* (Watane, 1985) [13].

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