

# Life Cycle of *Eterusia aedea* Linn. (Lepidoptera: Zygaenidae) on new host plant from Amba Reserve Forest, Kolhapur, North Western Ghats, Maharashtra

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**Abstract:** The present paper provides information on life cycle of polyphagous moth *Eterusia aedea* Linn. (Lepidoptera: Zygaenidae). It breeds in rainy season and two generations are possible in a year from this region. About 42 to 54 are required days for completion of life cycle. *Careya arborea* Roxb. (Lecythidaceae) and *Sapium insigne* (Royle) Benth. (Euphorbiaceae) were recorded as new larval food plants of *E. aedea* Linn. from Amba Reserve Forest, Kolhapur, North Western Ghats, Maharashtra.

**Index Terms:** Larva, Polyphagous, Western Ghats, India, Lepidoptera, Life cycle, Zygaenidae

## I. INTRODUCTION

Plants and insects have specific associations with each other, plants are producers and insects are primary consumers. The entomofaunal studies in the tropical forests showed that they are exhibit high species diversity (Barbosa & Schultz, 1987; Mittermeier et al., 1998; Grimaldi and Engel, 2005; Nair, 2007; Kier et al., 2005; Brooks et al., 2006; Singh et al., 2019). Among all insect species, phytophagous insects as herbivores shows different levels of morphological diversity, seasonal oscillation in populations, percent of folivory and polyphagy according to the type of vegetation, availability of food plants and surrounding climatic conditions. Earlier investigations on the entomofauna of tropical forest reveals that all insect orders are present in the tropical forest ecosystem except Grylloblatoidea and Mantophasmatodea. However, some insect orders are dominant, that is more abundant and economically important because of their negative impact on trees. The widespread and highly diverse orders are Coleoptera, Lepidoptera, Hymenoptera, Hemiptera, Isoptera and Orthoptera (Nair, 2007).

To find out the insect herbivore complex from the forests of Kolhapur district, an extensive study has been carried out from 2010 to 2012. The study revealed 106 insect herbivores associated with 53 forest plants. Among the 106 species of insect herbivores, Order Lepidoptera represents 32 species belonging 11 different families. Among these, Zygaenidae is one of them.

In the study of Lepidopterous pests of economically important forest plants from Amba reserve forest, 32 species of moths were recorded on different forest plants which are distributed within 11 families of Order Lepidoptera. Among these, the caterpillars of *Eterusia aedea* Linn. were recorded.

The moths of family Zygaenidae are commonly called as burnet moths (Barlow, 1982), smoky moths (Evans, 2007), or foresters (Zborowski and Edwards, 2007). The moths of this family are distributed worldwide with 1200 species. During the present study, only *E. aedea* Linn. from Zygaenidae was recorded from the Amba Reserve Forest of Kolhapur District. The larvae of *E. aedea* Linn. feed on foliage of *Careya arborea* Roxb. (Lecythidaceae) and *Sapium insigne* (Royle) Benth. (Euphorbiaceae).

## II. MATERIAL AND METHODS

The life cycle of *E. aedia* Linn. was studied during rainy season in 2010 and 2012 under field and laboratory conditions. The immature stages were collected from study area. Collected larvae were reared in glass jars (20 x 20 x 17 ½ cm) by providing fresh *C. arborea* Roxb. leaves daily. Male and female adults obtained were released in cages for egg laying. After egg laying, eggs were transferred to petri dishes containing fresh tender *C. arborea* Roxb. leaves at room temperature. A moistened filter paper (Whatman No. 3) was kept in each petri dish to prevent drying of leaves.

The caterpillars were maintained in petri dishes up to second

instar. Later on, they were transferred and reared in separate glass jars (20 x 20 x 17 1/2 cm) and allowed them to complete first generation. The duration of each stage and morphometric data is given in Fig. I and II. The body length and width of first instar were measured by using ocular micrometer while second to last instar, pupal morphometric data were recorded by using a standard graphic method. The duration of developing stages and change in colour were also recorded.

### III. RESULTS AND DISCUSSION

In all, four moults were observed during the larval development. Total larval period ranged for 27 to 36 days. The duration of fifth instar ranged for 8 to 9 days with an average of 8.2 days. The length of the fifth instar ranged for 12 to 16 mm with a mean of 15.4 mm while the width ranged from 5 to 7 mm with a mean of 6.6 mm. Caterpillars stout and flattened, fleshy extension of thorax covers head. Head brown and retractile, Ground colour dark brown; a lateral yellow patch extending back from the 9<sup>th</sup> somite. A series of small subdorsal tubercles, those on the second somite red and single; on the 7<sup>th</sup> and 8<sup>th</sup> black and on the 9<sup>th</sup> to 11<sup>th</sup> yellow. Spiracles black. Ventral surface and claspers orange red.

Previous reserach on *E. aedea aedea* Clerck reports that it is a polyphagous species of moths. Its larvae were recorded feeding on the foliage of *Q. leucotrichophora*, *Bischofia javanica* Blume, *Aporosa lindleyana* (Wright) Baill., *A. villosa* (Lindl.) Baill., *Cornus florida* L., *Lagerstroemia* sp., *Melastoma candidum* D. Don, *Myrica rubra* Siebold & Zucc., *Sloanea formosana* Li., *Rhododendron* sp., *Symplocos glauca* (Thunb) Koidz, *Camellia* spp. (including *C. japonica* L., *C. sasanqua* Thunb., *C. sinensis* (L.) Kuntze, *C.abel*, and *C. oleifera*), *Eurya japonica* Thunb., *E. septata* Wu, Hsu & Tsou, *Cleyera japonica* Thunb. and *Buddleja* sp. (Sevatopulao, 1939; Robinson et al. 2009; Singh et al., 2019).

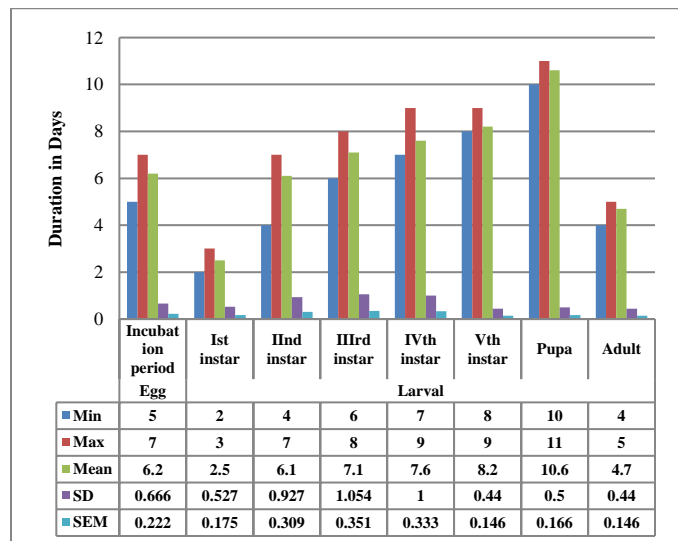


Fig. I. Life cycle of *E. aedea* Linn. on *C. arborea* Roxb. Figures are mean of 10 samples. SD: Standard Deviation; SEM: Standard Error of Mea

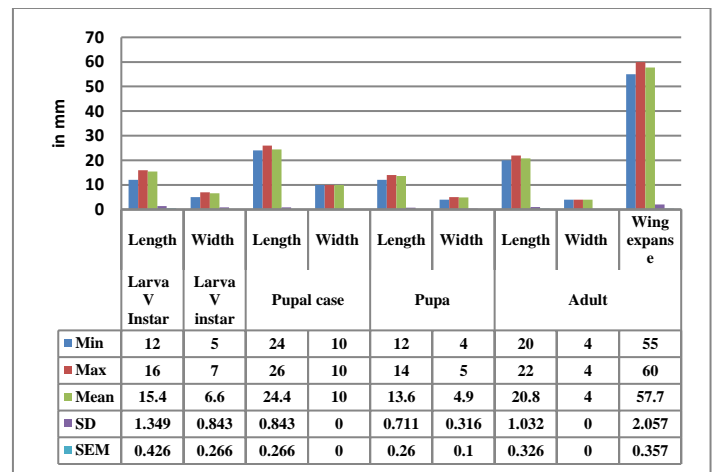


Fig. II Morphometric data of *E. aedia* Linn. (in mm) Figures are mean of 10 samples. SD: Standard Deviation; SEM: Standard Error of Mean

Figure 1. Fifth instar larva on leaf of *Careya arborea* Roxb.

Figure 2. Larvae encloses itself between leaf fold and pupates within

Figure 3. Pupa enclosed in a thin cocoon of papery white silk

Fig. 4. Pupa of *E. aedea* Linn.

Figure 4. Adult, Male

Plate 1. Life Cycle of *Eterusia aedea* Linn. in *Careya arborea* Roxb. From Amba reserve forest, Kolhapur, Western Ghats, Maharashtra

Pupa yellow with a thorax little darker; enclosed in a thin cocoon of papery white silk. The length of pupal case ranged from 24 to 26 mm with an average of 24.4 mm while the breadth was measured 10 mm. The pupal duration ranged from 10 to 11 days with a mean of 10.6 days. The length of pupa ranged from

12 to 14 mm with a mean of 13.6 mm while the breadth ranged from 4 to 5 mm with a mean of 4.9 mm. Eye flanges are lateral in position. Pupal head bears 4 pairs of appendages viz. the antennae, mandibles, maxillary galeae and labial palpi. Antennae reach on to abdominal segment A6 and A7 in female and male respectively. Maxillary palpi developed, mandibles posterior to clypeolabrum, labial palpi three segmented. Thoracic legs of pupa folded twice and hind wing largely concealed by the forewing except for small dorsolateral lobe. Abdomen 10 segmented, last three immovable, spiracles oval, present on A1 – A7. Spiracle A1 and Spiracles A4- A8 fully exposed, while spiracle A2 is completely and spiracle A3 mostly concealed by the hind wing. Similar observations were reported by Fanger et al. (2002) on pupal morphology of *E.aedia*. Eye flanges are lateral in position. First Abdominal spiracle is largely exposed as compared with the other spiracles on the abdomen. Setal pattern is reduced type.

Adults are moderate sized, brightly coloured moths. Moths are day flying with a conspicuous fluttering flight and with rather clubbed antennae. Hindwing vein 8 connected to cell by a bar approximated to it; Vein 1c present. Proboscis present. The body length ranged from 20 to 22 mm with an average of 20.8 mm while the width was measured 4 mm. The wing expanse measured from 55 to 60 mm with a mean of 57.7 mm.

The Adult longevity ranged from 4 to 5 days with a mean of 4.7 days. *E.aedea* Linn is largely studied species with respect to its morphological variations, geographic distribution and occurrence as pest on plantation crops (Hampson, 1893; Felder & Felder, 1862; Hering, 1922; Fletcher, 1925; Bryk, 1936; Gardner, 1942; Tremewan, 1960, 1973; Fletcher & Nye, 1982; Owada, 1989; Endo & Kishida, 1999 and Yen, 2004). *E. aedea* Linn. is serious pest of Tea in China, India, Sri Lanka, Japan and Taiwan. Larvae completely defoliate the host plants. In severe infestation damage to the bark was also reported. Under laboratory conditions 2 to 4 generations are completed in a year. (Fletcher, 1914; Roy et al., 2018). In our observations, larvae were found the foliage of the host plants. Damage to the bark was not recorded during the observations. In the study region, the preferred larval food plant of *E.aedea* was *Careya arborea* Roxb. as compared with the *Sapium insigne* (Royle) Benth. It is due to scanty distribution of *Sapium insigne* (Royle) Benth in the study region.

#### IV. CONCLUSION

This work reports *Careya arborea* Roxb. (Lecythidaceae) and *Sapium insigne* (Royle) Benth (Euphorbiaceae) as new host plants of *E. aedia* Linn. from study area. This species breeds in rainy season and two generations are possible in a year. *E. aedea* Linn. requires 42 to 54 days for completion of life cycle. In all observations during the study period, maximum larval incidences were recorded on the foliage of *Careya arborea* as compared with the foliage of *Sapium insigne*. *Careya arborea* is

the most preferred larval food plant than the *Sapium insigne*. This is due to the patchy distribution and low number of *Sapium insigne* plants in the Amba reserve forest, Kolhapur. It is a fragmented forest area of around 300 hectares. It has semi evergreen type of vegetation cover. The species is found active only in rainy season. *Growing Careya arborea* plants are more susceptible to the attack of *E.aedia* as compared with the full grown trees of same species in the study region.

#### CONFLICT OF INTEREST

The authors declare no conflict of interest.

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