



E-ISSN: 2320-7078

P-ISSN: 2349-6800

www.entomoljournal.com

JEZS 2020; 8(5): 975-978

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Received: 05-07-2020

Accepted: 11-08-2020

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Biology of til hawk moth, *Acherontia styx* at Raipur, C.G.

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Abstract

Present study was carried out in the laboratory at Department of Entomology IGKV, Raipur (C.G.) during 2018. The eggs of til hawk moth, *Acherontia styx* are spherical in shape and yellowish green in colour. The eggs were laid singly on upper surface of leaves. It turns into orange before hatching. Egg period lasts for 3 - 5 days with an average of 4.66 days. The total larval period completed in 17-22 days with an average of 19.50 days. Posterior portion of the pupa was narrow in the male and broad in the female. The genital opening in female pupa was present on the 8th abdominal segment while it was present on the 9th segment in case of male pupa. The total pupal duration ranged between 17-26 days with an average of 21.66 days. The adult female period was 2-3 days and male period was 3-5 days, respectively with an average of 2.50 days and 4.50 days.

Keywords: *Acherontia styx*, fecundity, pupation, biology, sesame

1. Introduction

Sesame (*Sesamum indicum* L.) is an important oilseed crop and has been under cultivation since classical times. It is also known as Til, Gingely, Ajonjoli, Simsim, and Benniseed. Sesame belongs to family Pedaliaceae and commonly grown in the tropical and warm subtropical region [1]. The crop is highly tolerant to drought, grows well in most of the well-drained soils and is well adapted to different rotations. The plant genus consists of thirty seven species, of which *Sesamum indicum* L. is the predominant cultivated species. Sesame seeds are small and flattened and can vary in many colours.

Sesame is the "Queen of oil seeds" due to its high oil content (38-54%), protein (18-25%), calcium, phosphorous, oxalic acid and excellent qualities of the seed oil and meal [3]. The leaves of sesame are rich in a gummy substance and when mixed with water they form a rich bland mucilage which is used for the treatment of infant, cholera, diarrhoea, dysentery and bladder problems. Sesame cake is an excellent fodder for cattle and laying hens [4]. Sesame seed oil has a longer life due to the presence of lignin, which has remarkable antioxidant functions, which oppose oxidation [5].

One of the major problems in sesame production is the heavy damage caused by various insect pests. Til hawk moth, *Acherontia styx* is a sporadic pest but voracious feeder of sesame crop at larval stage. The larvae feed voraciously on leaves and defoliate the plants; and is capable of inflicting heavy damage at times. Only one larva is enough to denude the whole plant. The host plants of *A. styx* include sesame, lablab, Niger, brinjal and jasmine [6] and *Clerodendrum inerme* [7].

Different insects have different forms of life cycles. The knowledge of life cycle of is important for the management of *Acherontia styx* because the habitat, habits and appearance of the insect can change dramatically throughout the life cycle.

2. Materials and Methods

The study was carried out in the laboratory at Department of Entomology IGKV, Raipur (C.G.) during 2018.

2.1 Insect culture: The insect larvae were collected from the sesame plants from the experimental field and kept in transparent glass jars covered with a fine muslin cloth secured with rubber band. The larvae were transferred to another clean jar containing fresh food for every 2-3 days till all the larvae pupated.

The pupae thus collected from each jar were kept separately in jars for the emergence of moth. The moths after emergence were kept in ovipositional glass jars.

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The inner surface of jars was lined with a black paper sheet, which provided clear visibility of eggs on the surface. 10% honey solution on a cotton swab was placed in each jar for moth feeding.

Eggs laid on the bottom were collected for further multiplication and study. These eggs were used as nucleus culture for mass rearing of *A. styx*. The egg diameter was measured by means of an ocular micrometer after calibration.

2.2 Biology of *A. styx*

The biology of til hawk moth, *A. styx* was studied under 26°C ± 2°C temperature and 70 ± 5 per cent RH. Twenty five eggs were collected from stock and kept in petri dishes for hatching. The newly emerged larvae were fed on newly emerged leaves of sesame and later on food was changed daily. Observations regarding the moulting, duration, size and number of each larval instar, pupal period, adult longevity and fecundity were recorded.

3. Results and Discussion

The following biological parameters were observed:-

Eggs: The freshly laid eggs by the female are spherical and shape and yellowish green in colour. The eggs were laid singly on upper surface of leaves. It turns into orange before hatching. Egg measures about 0.94 to 1.15 mm in length and 0.94 to 1.06 mm in breadth. Egg period lasts for 3- 5 days with an average of 4.66 days. (Table no.1)

Larva: The larvae after hatching fed on epidermal layer of the leaf tissue. Neonate larva was pale green with black colour horn at the eighth abdominal segment. Larva measured about 4.0 mm on first day and it grew up to 90 mm with a tail horn length of 10 mm before pupation. Each spiracle consisted of a black central slit, encircled with white. The total larval period completed in 17-22 days with an average of 19.50 days. (Table no.1)

Pupa: Initially, the pupa was green in colour but later turned to brown. Pupation occurs in earthen cells. The sex of the larvae can easily be distinguished during this stage. Posterior portion of the pupa was narrow in the male and broad in the female. The genital opening in female pupa was present on the 8th abdominal segment while it was present on the 9th segment in case of male pupa. The total pupal duration ranged between 17-26 days with an average of 21.66 days in the laboratory. Pupa brownish in colour. It measured about 42-50 mm in length. (Table no.1)

Adult: Skull like marking on thorax is the characteristic feature of the genus *Acherontia*. Forewing large and blackish brown in colour with two medial bands present on the underside and on upper side with yellowish brown streaks. The discal spot (stigma) present on upper side of forewing with orange colour. Hind wing yellow with two black bands on upper side. The adult female period was 2-3 days and male

period was 3-5 days, respectively with an average of 2.50 days and 4.50 days. (Table no.1)

The present findings are in agreement with the results of Viswanath and Agarwal (1982) ^[8] who reported that the incubation period of *A. styx* ranging from 4 to 6 days and larval period for 11 to 21 days. Pre pupal period occupied 3 to 4 days respectively with pupal period of 4 to 20 days. Similarly, Vora *et al.* (1985) ^[9] studied that incubation period of 2 days, larval period of 11-21 days and pupal period of 17 to 18 days on *S. indicum*. Similarly, Paul and Ghosh, (1987) ^[10] studied that incubation period occupied two days and duration of first, second, third, fourth and fifth instars larvae was 2-3, 1-4, 3-4, 3-4 and 4-8 days. Pupal period occupied 17 to 18 days.

Table 1: Duration of different life stages of til hawk moth, *Acherontia styx* on sesame crop under laboratory conditions.

Biological stages	Range (days)	Mean
Fecundity (number)	90-200	141.33
Incubation period	3-5	4.66
Larval period	17-22	19.50
Pre Pupa	2-3	2.16
Pupal period	17-26	21.66
Total life cycle (Egg to Adult emergence)	39-56	47.50
Adult longevity		
Female	2-3	2.50
Male	3-5	4.50

Similarly present findings are in agreement with the results Devi and Ramaraju (2016) ^[11] who studied that Moth stout and dark brown in colour. Thorax with characteristic skull mark. Abdominal segments with alternate black and yellow bands. The eggs were laid singly on upper surface of leaves, spherical and shape and yellowish green in colour. The present findings are also in agreement with the results of Kanaburgi (2011) ^[12] who reported that the sex was easily discernible at pupal stage, based on the genital opening. Posterior portion of the pupa was narrow in the male and broad in the female. In both the sexes the abdominal segment had an anal opening or slit. In case of male the genital slit was situated on the 9th abdominal segment ventrally, which was smaller and closer to the anal opening. While in female, genital and anal openings were separated as the former was situated on the 8th abdominal segment.

4. Conclusion

It may be concluded from the present study that the biology study of til hawk moth, *Acherontia styx* were recorded on sesame and it was seen that the egg period from 3 - 5 days with an average of 4.66 days. The total larval period completed in 17-22 days with an average of 19.50 days. The total pupal duration ranged between 17-26 days with an average of 21.66 days. The adult female period was 2-3 days and male period was 3-5 days, respectively with an average of 2.50 days and 4.50 days.



Egg of *A. styx*



First instar



Second instar



Third instar



Fourth instar



Fifth instar



Larva goes into pupation

Fig 1: Different life stages of *Acherontia styx*



Male Pupa

Female pupa

Fig 2: Male and female pupae of til hawk moth *Acherontia styx*.



Male adult

Female adult

Fig 3: Male and Female adult of til hawk moth *Acherontia styx*.

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