International Journal of Entomology Research
www.entomologyjournals.com
ISSN: 2455-4758
Received: 26-04-2022, Accepted: 11-05-2022, Published: 27-05-2022
Volume 7, Issue 5, 2022, Page No. 133-137

Comparative biology of *Olene mendosa* hübner, 1823 (Eebidae: Lymantriinae) in okra (*Abelmoschus esculentus*) and brinjal (*Solanum melongena*)

Swafvan Kananchery, Sureshan P M
Western Ghats Regional Centre, Zoological Survey of India, Kozhikode, Kerala, India

Abstract
Studies related to the Biology of the brown tussock moth, *Olene mendosa* Hübner in Kerala, especially in Northern Kerala is scanty. There were no comparative biology studies of *Olene mendosa* on different crops in Kerala. The present studies were undertaken during 2018-19, under room temperature (28-34^{0}C). The data on comparative biology of *Olene mendosa* on different hosts inferred that Female lays around 212-214 eggs in *Solanum melongena*. While minimum numbers of eggs were recorded from *Abelmoschus esculentus* (210-215). Larvae develop through five instars in 57 to 60 days with an average of 58.5 days at 28-32 °C. The present studies, the comparative biology of *Olene mendosa is* important for to know the best host that support the development of *Olene mendosa* and can be used for mass rearing. Similarly, the information of life history parameters of *Olene mendosa* on different host plant species will help to make efficient strategies to control this economic pest.

Keywords: comparative biology, *Olene mendosa, Abelmoschus esculentus, Solanum melongena,* Northern Kerala

Introduction
Okra (*Abelmoschus esculentus*) and brinjal (*Solanum melongena*) are the major vegetable crops in northern Kerala. There are many insect pests that attack these crops. *Acherontia styx* (Westwood), *Autoba olivacea* (Walker), *Chrysodeixis chalcites* (Esper), *Herpetogramma bipunctalis* (Fabricius), *Leucinodes orbonalis* (Guenee), *Olepa ricini* (Fabricius), *Spodoptera litura* (Fabricius), *Xanthodes transversa* Guenee are the major moth pest that feeds on brinjal. *Anomis flava* (Fabricius), *Anomis sabulifera* (Guenée), *Earias vittella* (Fabricius), *Helicoverpa armigera* (Hübner), *Pectinophora gossypiella* (Saunders), *Spodoptera exigua* (Huebner), *Syllepte derogata* (Fabricius), *Xanthodes albago* (Fabricius), *Xanthodes transversa* Guenee are the major moth pest that feed on the okra. *Olene mendosa* (brown tussock moth or hairy tussock moth), is a moth of the family Erebidae, is one of the moth pest of okra and brinjal in Kerala. It is found in India, Bangladesh, Sri Lanka, Indonesia, Taiwan, Thailand and Australia. The caterpillar of this species is a polyphagous pest on diverse range of plant species. Young larvae feed on the surface of leaves, causing skeletonization. As they mature, they chew holes in leaves and eventually consume all but the major veins (Drooz 1985, Johnson and Lyon 1988) [3, 12]. In India, the caterpillar has been recorded on crops such as *Solanum tuberosum*, *Tamarindus indica*, *Citrus*, *Cedrus deodara*, *Acacia nilotica*, *Mangifera indica*, *Camellia sinensis*, *Ricinus communis,* and *Salmalia malabarica*. In Bangladesh, caterpillars were recorded on *Sesbania aculeata* and *Bauhinia purpurea*. Other common food plants of larva include, *Ceiba*, *Durio*, *Terminalia*, *Raphanus*, *Shorea*, *Dipterocarpus*, *Aleurites*, *Excoecaria*, *Pelargonium*, *Saccharum*, *Sorghum*, *Zea*, *Cinnamomum*, *Careya*, *Arachis*, *Butea*, *Cajanus*, *Cassia*, *Dalbergia*, *Pithecellobium*, *Sesbania*, *Vigna*, *Lagerstroemia*, *Hibiscus*, *Zizyphus*, *Rosa*, *Populus*, *Santalum*, *Dimocarpus*, *Litchi*, *Nephelium*, *Schleichera*, *Achras*, *Palaquium*, *Melongena*, *Tectona*, *Macadamia integrifolia*, *Persea americana*, *Terminalia carolinensis*. Comparative biology of *Olene mendosa is* important for to know the best host that support the development of *Olene mendosa* and can be used for mass rearing. Similarly, the information of life history parameters of *Olene mendosa* on different host plant species will help to make efficient strategies to control this economic pest.

Materials and method
The larvae were collected along with their host plants and were brought to laboratory for further rearing to adults at the entomology laboratory of ZSI, WGRC-Kozhikode, during 2018-19. The larval cultures were transferred to rearing cages of size 20×20×20 cm along with its host and were maintained in the laboratory conditions on *Olene mendosa* in *Abelmoschus esculentus*, *Solanum melongena* at room temperature (28 ± 4°C) and relative humidity (70 ± 5%). Full-grown larvae were allowed to pupate and uneaten leaves and faces were cleaned from the bottles daily. Proper hygienic conditions were maintained. Open end of bottle was covered with muslin cloth held tightly with the help of a rubber band. The emerged adults were later killed by using ethyl acetate, pinned through thorax using stainless anticorrosive insect pins (No. 3, 4). The insects were mounted on mounting

boards, or on a thermacol, the antenna and wings were stretched properly in order to facilitate identification. Eggs obtained from these moths were placed in glass bottle .Newly hatched larvae were further used for different aspects of the study. The identification of the specimens were done by the keys developed by Hampson in the Moths volumes of the Fauna of India (1891, 1892, 1893, 1894, 1895 and 1896), Holloway (1988, 1999) [10, 11]. T R Bell, L F B Scott (1937) [2], Barlow (1982) [1], Pinratana and Lampe (1990) [17], Robinson (1994) [18], Kendrick (2002) [13], Mathew *et al*, (2018) [16], Sivasankaran *et al*. (2014) [20] Singh and Singh (2014) [14, 19]. Kirti & Singh (2015, 2016) [14, 15].

Result and discussion

Comparative biology of *Olene mendosa* on different host plants.

1. Egg

The maximum numbers of eggs were recorded from *Solanum melongena* (212-214 eggs) and minimum from *Abelmoschus esculentus* (210-215). Incubation period ranged from 7 – 8 days with an average of 7.50 days in all hosts, at 28 to 32^{0}C.

2. Larvae

Larvae often are seen wandering on understory vegetation, on the walls of structures, and on the ground prior to pupation. Early instars differ from later ones in having only the first two of the four dorsal brushes well developed; the third is shorter, pale, and the fourth remains dark as the rest of the body. The final instar has them all pale dull orange, though Gardner and Sevastopulo described them as grayish white. The head, legs and prolegs are crimson. The body is black with paler tracery and a dorsal row of segmental white streaks posterior to the brushes. The setae are generally white except in the more dense pencils flanking the head and dorsally at the rear, where they are black. Larvae develop through five instars in 58 to 60 days with an average of 59 days at 28-32 °C.

A. First instar larvae

Newly emerged larvae often disperse by ballooning. They are minor leaf feeders. The larval lengths were noticed from 15 mm to 18 mm from *Abelmoschus esculentus* and *Solanum melongena* (18mm-22mm). The widths were noticed maximum from *Solanum melongena* (0.57 mm to 0.75 mm) and minimum were from *Abelmoschus esculentus* (0.55-0.72 mm). The width of head capusule recorded maximum from *Solanum melongena* (0.02 mm-0.05 mm), while minimum from *Abelmoschus esculentus* (0.02 mm-0.04 mm). The larval stage last for 5- 7 days in both hosts.

B. Second instar larvae

Like the first instar, these are also feeds on leaves.The larval lengths were noticed maximum from *Solanum melongena* (20 mm to 22 mm) and minimum from *Abelmoschus esculentus* (18mm-22mm). The widths were noticed maximum from *Solanum melongena* (1.00 mm to 1.12 mm) and minimum were from *Abelmoschus esculentus* (0.85-1.10 mm). The width of head capusule recorded maximum from *Solanum melongena* (0.06 mm-0.08 mm), while minimum from *Abelmoschus esculentus* (0.05 mm-0.07 mm). The larval stage last for 7-8 days in both hosts.

C. Third instar larvae

They are also minor leaf feeders. The larval lengths were noticed maximum from *Solanum melongena* (25 mm to 34 mm), while minimum from *Abelmoschus esculentus* (24 mm to 32 mm) mm and widths were noticed from 1.45 mm to 1.58 mm in *Solanum melongena*, while it is minimum from *Abelmoschus esculentus* (1.4 mm to 1.5 mm). The larval stage last for 9-10 days in *Solanum melongena* with an average of 9.5 days and minimum in *Abelmoschus esculentus* (8-9 days).The width of head capsule recorded maximum from *Solanum melongena* (0.15 mm-0.18 mm), while minimum from *Abelmoschus esculentus* (0.14 mm-0.17 mm).

D. Fourth instar larvae

They are voracious feeders. It is hairy with four white or brown dorsal tussocks. It is greyish brown with a crimson-reddish head, legs and prolegs. The larval lengths were noticed maximum from *Solanum melongena* (37 mm to 42 mm), while minimum from *Abelmoschus esculentus* (35 mm to 41 mm) mm and widths were noticed from 1.75 mm to 1.81 mm in *Solanum melongena*, while it is minimum from *Abelmoschus esculentus* (1.7 mm to 1.8 mm). The larval stage last for 9-10 days in *Solanum melongena* with an average of 9.5 days and minimum in *Abelmoschus esculentus* (8-10 days). The width of head capsule recorded maximum from *Solanum melongena* (0.20 mm-0.28 mm), while minimum from *Abelmoschus esculentus* (0.18 mm-0.28 mm).

E. Fifth instar larvae

Mature larvae are conspicuously colored, with distinctive red heads, white or yellow mid-dorsal tufts of hairs, and a black mid-dorsal stripe flanked by yellow subdorsal stripes .They also have paired hair pencils of black setae that extend forward from the prothorax and another hair pencil extending backward from the eighth abdominal segment and red dorsal glandular structures on segments six and seven. They are also voracious feeders, like the 4th instar. The larval lengths were noticed maximum from *Solanum melongena* (44 mm to 48 mm), while minimum from *Abelmoschus esculentus* (42 mm to 47 mm) mm and widths were noticed from 2.1 mm to 2.3 mm in *Solanum melongena*, while it is minimum from *Abelmoschus esculentus* (2 mm to 2.2 mm). The larval stage last for 10-12 days in *Solanum melongena* with an average of 11 days and minimum in *Abelmoschus esculentus* (10-11 days).The width of head capsule recorded maximum from *Solanum melongena* (0.30 mm-0.35 mm), while minimum from *Abelmoschus esculentus* (0.30 mm-0.37 mm).

3. Pre-pupal period
The pre-pupal period was recorded 1-2 days in *Abelmoschus esculentus* and *Solanum melongena*.

4. Pupae
Pupation occurs inside a Cream- or tan-colored silk cocoon spun in protected areas like, in bark crevices, tree cavities, and under siding between the leaves of the food plant or soffits of buildings. The pupation is recorded maximum from *Solanum melongena* (7-8.2 days), while it is 7.5-8 days in *Abelmoschus esculentus*. Pula color was observed in white or pale white in color. The pupal lengths were noticed from 2 mm to 2.2 mm and widths were noticed from 1.00 mm to 1.2 mm.

5. Adult
Sexes show dimorphism with variable color morphs. Males are smaller than females. The common form is smoke brown with uniformly brown forewings and pale grayish hind wings. In the forewing, black specks and a pale patch outside the sub basal line can be seen. The adult female also has two forms with an areole on each forewing and they lack the white colored portions on forewings which are found on male. The common form has an irregular longitudinal dark brown zone in the center of forewing. The more rare form has pale colors. The undersides of the wings are similar in both sexes with less pronounced markings. The wing span of female was noticed from 46 mm to 54 mm and wing span of male was recorded from 30 mm to 40 mm in *Abelmoschus esculentus*. In *Solanum melongena* wing span of female was noticed from 45 mm to 55 mm and wing span of male was recorded from 31 mm to 41 mm.

6. Adult longevity
The maximum longevity of male is recorded from *Solanum melongena*. (7.6-8.4 days), while minimum was from 7.5-8.2 days in *Abelmoschus esculentus*.

7. The preoviposition period
The preoviposition period is noticed from 4.68-4.8 days in *Solanum melongena*. While it is 4.7 to 4.85 days in *Abelmoschus esculentus*.

8. Oviposition period
Oviposiotion last for 3 to 3.7 days in *Abelmoschus esculentus* and 3-3.46 days in *Solanum melongena*.

9. Fecundity
The fecundity is observed maximum from *Solanum melongena* (212 to 214 eggs), while minimum from *Abelmoschus esculentus* (210-215 eggs) at 28- 32 ^{0}C.

10. Percentage of hatching
Percentage of hatching was recorded maximum from *Abelmoschus esculentus* (18 to 20) and minimum from *Solanum melongena* (17-18).

11. Total life span
Total life span of male and female ranged from 57 to 60 days with an average 58.5 days at 28- 32 ^{0}C.


1st Larval Instar


2nd Larval Instar


3rd Larval Instar


4th larval instars


5th larval instars


Pupa


Larva feeding on brinjal leaf


Larva feeding on okra leaf


Adult

Plates

Table 1: Comparative biology of *Olene mendosa* on different hosts.

Host	Incubation period	Larval period	Minimum and maximum days	Mean days	Length (mm)	Width (mm)	Head capsule width (mm)	Pre pupal period	Pupal period	Adult longevity	Wing span (mm)	Pre oviposition period	Oviposition period	Post oviposition period	Fecundity	Percentage of hatching
Abelmoschus esculentus	7-8 days	Ist Instar	5-7	6	15-18	0.55-0.72	0.02-0.04	1-2 days	7.5-8 days	7.5-8.2 days	Female: 46-54 Male: 30-40	4.7-4.85 days	3-3.7 days	2 days	210-215 eggs	18-20
		IInd Instar	7-8	7.5	18-22	0.85-1.10	0.05-0.07									
		IIIrd Instar	8-9	8.5	24-32	1.4-1.5	0.14-0.17									
		IVth Instar	8-10	9	35-41	1.7-1.8	0.18-0.28									
		Vth Instar	10-11	10.5	42-47	2-2.2	0.30-0.35									
		Total larval period	38-45	42.5												
***Solanum melonge**na*	7-8 days	Ist Instar	5-7	6	15-18	0.57-0.75	0.02-0.05	1-2 says	7.82-8 days	7.6-8.4 days	Female: 45-55 Male : 31-41	4.68 -4.8 days	3-3.46 days	2 days	212-214 eggs	17-18
		IInd Instar	7-8	7.5	20-22	1.00-1.12	0.06-0.08									
		IIIrd Instar	9-10	9.5	25-34	1.45-1.58	0.15-0.18									
		IVth Instar	9-10	9.5	37-42	1.75-1.81	0.20-0.28									
		Vth Instar	10-12	11	44-48	2.1-2.3	0.30-0.37									
		Total larval period	40-47	44												

Acknowledgments
The authors thankful to the Director, Zoological survey of India- Kolkata, for providing necessary facilities; also extends hearty thanks to Dr. P. Girish Kumar, Zoological Survey of India Kozhikode, for constructive feedback on the manuscript.

References
1. Barlow H S. An Introduction to the Moths of South East Asia, Kuala Lumpur.Malayan Nature Society. 1982, 20-29.
2. Bell TR, Scott LFB. The Fauna of British India including Ceylon and Burma, Moths. Vol. V. Sphingidae, Taylor and Francis Ltd., London,1937:6:1-533.
3. Drooz AT. Insects of eastern forests. USDA Forest Service Misc. Publ. 1426. USDA Forest Service, Washington, DC, 1985.
4. Hampson GF. Illustrations of typical specimens of Lepidoptera: Heterocera in the collection of the British museum part VIII. The Lepidoptera Heterocera of the Nilgiri district. Taylor and FrancisLtd.,London,1891:144(IV):18 plates.
5. Hampson G F. The fauna of British India indicating Ceylon and Burma, Moths volume 1. Taylor and Francis Ltd, London, 1892, 1-527.
6. Hampson GF. The fauna of British India indicating Ceylon and Burma, Moths volume 2. Taylor and FrancisLtd, London, 1893, 1- 609.
7. Hampson GF. The fauna of British India indicating Ceylon and Burma, Moths volume 3. Taylor and FrancisLtd, London, 1894, 1-546.
8. Hampson GF. A Description of new Heterocera from India. Transaction of the Entomology Society of London, 1895, 277-315.
9. Hampson GF. The fauna of British India indicating Ceylon and Burma, Moths volume 4. Taylor and Francis Ltd., London, 1896, 1-595.
10. Holloway JD. The Moths of Borneo (part 6); Family Arctiidae: Subfamilies Arctiinae, Syntominae, Aganainae (to Noctuidae).Kuala Lumpur, SouthdeneSdn. Bhd, 1988, 101. + 168 figs., 6 pls.
11. Holloway J D. The moths of Borneo (part 5); Family Lymantriidae. Malayan Nature Journal. 1999. 53: 1–188.
12. Johnson WT, Lyon HH. Insects that feed on trees and shrubs. Cornell University Press, Ithaca, NY, 1988.
13. Kendrick RC. Moths (Insecta: Lepidoptera) of Hong Kong. Ph.D. Thesis. Hong Kong: University of Hong Kong, 2002.
14. Kirti JS, Singh N. Arctiid Moths of India. Nature Books India,2015:I:1-205.
15. Kirti JS, Singh N. Arctiid Moths of India,2016:II:1-214.
16. Mathew P, Anand S, Sivasankaran K, Ignacimuthu S. The moths (Lepidoptera: Heterocera) of Vagamon hills (Western Ghats), Idukki district, Kerala, India. International Journal of Entomology Research,2018:3(2):114-120.
17. Pinratana A, Lampe REJ. Moths of Thailand. Volume 1, Saturniidae (Vol. 1). Bangkok, Brothers of St Gabriel in Thailand, 1990, 47+44 pls.
18. Robinson GS, Tuck KR, Shaffer M. A field guide to smaller moths of South East Asia. Malaysian Nature Society, Malaysia, 1994, 309.
19. Singh J, Singh N, Joshi R. A Checklist of Subfamily Arctiinae (Erebidae: Noctuoidea: Lepidoptera) from India. Rec. zool. Surv. India,2014:367:1-76.
20. Sivasankaran K, Ignaimuthu S. A report of Erebidae (Lepidoptera: Noctuoidea) from the Tamil Nadu part of the Western Ghats, India.Journal of the Bombay natural history society,2014:-113.