

***Attacus atlas* L. (Lepidoptera: Saturniidae): A New Record on *Ailanthus excelsa* Roxb. From Assam, India**

S.A. Ahmed

Central Muga Eri Research and Training Institute,
Central Silk Board, Lahdoigarh, Jorhat-785700, Assam, India

Abstract: The natural incidence of the saturniid wild silk moth, *Attacus atlas* L. recorded feeding on “Tree of Heaven”, *Ailanthus excelsa* Roxb. plantations at Jorhat, Assam, India. The incidence of the wild silk moth recorded throughout the year with peak incidence during May-October. The average cocoon weight was 14.11g and 10.29g for male and female, respectively. The average shell weight of single cocoon recorded 2.04g and 1.84g for female and male, respectively which is five times more than shell weight of domesticated eri silkworm, *Samia ricini*. The scope and prospects for commercial exploitation of this wild moth has been highlighted in this study.

Key words: *Attacus atlas* % *Ailanthus excelsa* % Host range % Distribution

INTRODUCTION

Attacus atlas L. (Lepidoptera: Saturniidae), a wild silk moth which is known as *fagara* silk [1] was first described by Linnaeus in 1758 is the world largest lepidopteran moth in terms of its wings surface area (400 cm²) [2] and behind only Ghost moth, *Thysania agrippin* in terms of its wingspan, which is 32 cm in case of *T. agrippin* and 25-30 cm in case of *A. atlas* [3]. Both the male and female moths are large in size with chestnut brown to maroon in colour with roughly triangular, diaphanous eyes on both forewings and hind wings, bordered in black [4], with intricate patterns on its wings and is thought to be the origin of its name, with their wing patterns resembling maps. There are various ways to differentiate between the sexes. Males are smaller than the female and have more tapered wings. As a result the males are stronger fliers than females and although still unsteady fliers they are capable of traveling several kilometers to seek out a mate. The females in comparison are much weaker fliers and do not travel far from their chrysalis, only leaving after mating in order to find a suitable location to lay her eggs, usually the underside of a leaf [5]. The moth belongs to the family Saturniidae like muga (*Antheraea assama*) and eri (*Samia ricini*) silkworm, widely distributed in the tropical and sub-tropical forests of South East Asia and

India [6-8]. In India this species was also reported from Western Ghat, Deradhun, Konkan region, Assam, Sikkim, Nagaland and Tripura [4, 9-15].

The adult male and female do not have fully formed mouth parts and so cannot eat during adult stage of their life as in case of other moths; they survive on whatever fat reserves they built up in their larval stage. Consequently, in their adult form they can only survive up to two weeks. The caterpillar of *Attacus atlas* is quite polyphagous and reports suggested that it feeds on a variety of leaves including *Muntingia calabura*, *Annona muricata*, *Cinnamomum verum*, *Nephelium lappaceum*, *Psidium guajava*, *Sandoricum indicum*, *Citrus sp*, *Cinchona officinalis* (Cinchona tree), *Cinnamomum camphora* (camphor laurel), *Coffea arabica* (arabica coffee), *Curcuma longa* (turmeric), *Elettaria cardamomum*, *Persea americana* (avocado), *Litsea polyantha* (Soalu plant) and other evergreen trees. Although the caterpillar is polyphagous it is only a noted pest species for farmers trying to grow avocado and cacao. The *Attacus atlas* has been explored during the study conducted to collect, conserve and explore the different silkworm host plants and recording the insect associated with the host plants throughout the year in the germplasm Conservation Centre, Central Muga Eri Research and Training Institute, Chenijan, Jorhat (India).

MATERIALS AND METHODS

The different perennial host plant germplasm of eri silkworm, *Samia ricini* Donovan were collected from different parts of North Eastern Region in the form of seedlings and seeds and raised in the nursery and field plantings were carried out during 2010-2012. The different insect pests infest the plants were recorded periodically and their bio-ecological studies were carried out to enrich the database for developing suitable pest management strategies and to develop agro-technology of the host plant germplasm. The different perennial food plants such as *Ailanthus excelsa* Roxb., *Ailanthus grandis* Prain., *Heteropanax fragrans* and *Evodia flaxifolia* were planted systemically and maintained in the germplasm for the study.

RESULTS AND DISCUSSION

The record natural infestation of *A. atlas* caterpillars on *Ailanthus excelsa* Roxb., also known as “Tree of Heaven” was observed for the first time in the germplasm bank of Central Muga Eri Research and Training Institute, Chenijan, Assam (India) and their bio-ecological studies were conducted. *Ailanthus excelsa* has been used in Indian system of medicine in the treatment of asthma, bronchitis, cold, colic pain, etc. Stem bark of *A. excelsa* has been used as a decoction in traditional claims [16]. *Ailanthus* is a genus of tall, leafy trees, widely distributed in Indo-Malay, Japan, China and Australia. The genus is noted for its antidysentric and antidiarrhial properties [17]. The tree is being explored for rearing of eri silkworm, *Samia ricini* Donovan [7, 18].



Fig. 1: Distribution of *Attacus atlas* (Source: wikipedia.org/wiki/File:Attacus_atlas_distribution.png)

The natural incidence of *Attacus atlas* caterpillar on *Ailanthus excelsa* was recorded throughout the year with peak incidence during May-October. The caterpillars voraciously feed on the leaves and in certain cases, the trees are completely defoliated. The average larval duration recorded 23 days during May-June period. After reaching 10-11 cm in length, the caterpillar starts pupation in the plant covering with mature leaves. The brown colored cocoons are formed by spinning a silky covering (taking around 20-24 hours) that is interwoven with desiccated leaves. The adult *Attacus atlas* emerges from the pupa in the early morning hours and the total pupal period was recorded 22 days. The average cocoon weight was 14.11g and 10.29g for male and female, respectively. The average shell weight of single cocoon recorded 2.04g and 1.84g for female

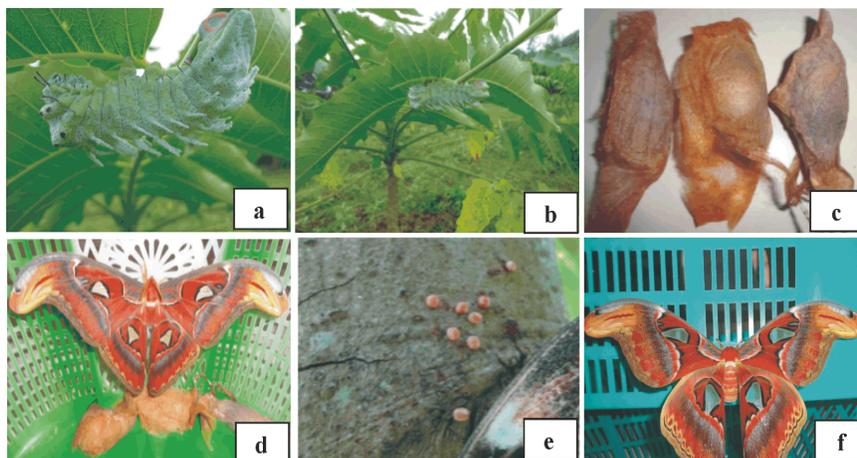


Fig. 2: (a-b) *Attacus atlas* caterpillar feeding on *Ailanthus excelsa* plant (c) Cocoons of *A. atlas* (d) Male moth of *A. atlas* (e) Female moth of *A. atlas* (f) Eggs laid on bark of tree.

and male, respectively which are five times more than shell weight of *Samia ricini*. The adult longevity was 10-12 days. Apart from the differences in size and flying ability, males also differ from the female in that their antennae are much larger and feathery. This may have caused or be a result of behavioural differences with regards to coupling strategy. The females are sexually passive, only releasing pheromones to attract a male for mating. The wings have complex patterns; most notably what appears to be a snake head on the tip of each of the forewings helps in escaping the attack of predators. After emergence of moths, the coupling of male and female moth continued for 4-6 hours and started egg laying on the underside of leaves or the bark of the trees. Eggs are around 2.1-2.6mm in diameter and the caterpillar hatched from the eggs after 17-22 days during summer season.

CONCLUSIONS

The present record of this species from Jorhat, Assam confirmed its new host range as well as geographical distribution. This wild silk worm has got higher shell weight compared to other commercially exploited silkworms such as eri, muga and tasar silkworm. The *Attacus* silkworm is not commercially cultivated because of its broken strands of silk i.e. discontinuous filament. However, there is a greater scope of spinning of cocoon to get the yarn like eri silk. This brown, wool like silk is thought to have greater durability [1]. It is high time to conserve and standardize the rearing techniques of this wild silkworm. Conservation and exploration of wild silk moths available in North East India not only has an economic bearing on inhabitants of the region but also indirectly helps to save forest ecosystem [7, 19]. The conservation of forest food plants like *Ailanthus*, *Evodia* sp., *Litsea polyantha* along with commercial exploitation of wild silk moths like *Attacus atlas* may provide livelihood security to the forest dwellers to a greater extent.

ACKNOWLEDGEMENTS

Thanks to the Director, Central Muga Eri Research and Training Institute, Central Silk Board, Lahdoigarh, Assam (India) for providing support under the CSB funded project PIE 5853.

REFERENCES

1. Jolly, M.S., S.K. Sen, T.N. Sonwalkar and G.S. Prasad, 1979. Non-mulberry silks. Food and Agriculture Organisation. United Nations, Services Bulletin, Rome, 29: 178.
2. Watson, A. and P.E.S. Whalley, 1983. The Dictionary of Butterflies and Moths in colour. Peerage Books, London, England.
3. Moucha, J., 1966. Beautiful moths. Drury House, London.
4. Majumder, J., R. Lodh and B.K. Agarwala, 2011. *Attacus atlas* L. (Saturniidae): A new distribution recorded from Tripura, Northeast India. NeBio, 2(2): 27-28.
5. Sterry, P., 1995. Butterflies and Moths: A Portrait of the Animal World, Todtri, p. 60-61: about the Saturniid family.
6. Holloway, J.D., 1987. The Moths of Borneo: part 3; Lasiocampidae, Eupterotidae, Bombycidae, Brahmaeidae, Saturniidae, Sphingidae. Southdene Sdn. Bhd., Kuala Lumpur, Malaysia.
7. Ahmed, S.A. and R.K. Rajan, 2011. Exploration of *vanya* silk biodiversity in North Eastern Region of India: Sustainable livelihood and poverty alleviation. Proceedings of International Conference on Management, Economics and Social Sciences (ICMESS'2011), December 23-24, 2011 at Bangkok, Thailand, pp: 485-489.
8. Veenakumari, K., P. Mohanraj and R.S. Peigler, 1994. Life History of *Attacus mcmulleni* (Saturniidae) from the Andaman Islands, India. J. Res. Lepidoptera, 31(3-4): 169-179.
9. Methew, G., 1999. Butterflies and Moths of Silent Valley National Park. Silent Valley-Whisper of Reason, Kerala Forest Department, Kerala, India, pp: 291-296.
10. Sondhi, S., 2009. The Atlas Moth. Doon Watch Nature Series for Dehradun Live, Hindustan Times (8 May).
11. Seitz, A., 1933. The Macrolepidoptera of the World Indo-Australian Bombyces and Sphinges. Stuttgart.
12. Bhattacharya, A., B.K. Singh and P.K. Das, 2004. Biodiversity of wild silkmths in Assam (North East India). Ann. Fores., 12: 208-216.

13. Singh, K.C. and R. Chakrovorty, 2006. Seri-biodiversity of North Eastern India-an update. In: J.P. Handique and M.C. Kalita (eds.) Biodiversity Conservation and Future Concern. Gauhati University, Guwahati, pp: 8-19.
14. Thangavelu, K., K.V.S. Rao and V.K. Pandey, 2002. Wild silkmths diversity and conservation. *Int. J. Wild Silk Moths Silk*, 7: 87-93.
15. Palkar, S.B., 2008. A New Record of Host Plant *Embelia Acutipetalum* of Atlas Moth *Attacus atlas* Linnaeus from Konkan. *J. Bombay Nat. Hist. Soc.*, 105(3).
16. Kumar, D., S.S. Bhujbal, R.S. Deoda and S.C. Mudgade, 2010. Bronchodilator activity of aqueous extract of stem bark of *Ailanthus excelsa* Roxb. *Phcog Res.*, pp: 102-106.
17. Chopra, R.N., I.C. Chopra, K.L. Handa and L.D. Kapur, 1958. *Chopra's Indigenous Drugs of India*. 2nd Edn., UN. Dhar and Sons Private Ltd., Calcutta, pp: 408.
18. Saritha Kumari, S., K.C. Narayanswamy and Manjunath Gowda, 2009. Amylase Activity in Eri Silkworm, *Samia Cynthia ricini* Boisduval as influenced by Host Plants. *Indian J. Ecol.*, 36(1): 71-74.
19. Bhattacharya, A. and R.S. Teotia, 2000. Conservation strategies of wild silk moths in the North-Eastern Region of India. *Int. J. Wild Silk Moths Silk* (Special issue).