

Biodiversity and Life Cycle Study of Tasar Silk moth *Antheraea Mylitta*

Bhosale Y.M.¹ Kale R. S.² Phulwade Durgesh. N.³

^{1,3}Nanasaheb Y.N. Chavan Arts, Science and Commerce College, Chalisgaon.

²M.S.G. Arts Science and Commerce College, Malegaon Camp, Malegaon.

Corresponding Author- Phulwade Durgesh. N.

Email: durgeshphulwade@gmail.com

Abstract:

Antheraea mylitta drury is mostly found in the tropical areas of our country, the polyphagous tasar silkworm feeds on food plants like *Terminalia arjuna* and *T. tomentosa* a variety of food plants. e.g. *Zizyphus jujube* *T. Catappa* *L Bombax malabaricum* *Semecarpus anacardium* *Ricinus communism* etc. Tasar culture is a traditional livelihood for tribal in the Maharashtra.

Present study based on quantitative traits such as cocoon weight, shell weight, larval weights etc. were made. Study shows that the variation in the cocoon weight 19.95 mg, 8.17 mg, 6.49 mg respectively coloration and different stages of tasar silkworm *Antheraea mylitta* Drury due to the changes in ecological parameters like fluctuation in temperature and humidity. *Antheraea mylitta* is distributed in the form of ecorace in varied geographical areas of Maharashtra. From the studies it is observed that rich biological diversity of *Antheraea mylitta* mainly is due to its wide range of distribution, climatic factors, rainfall and food plants etc., which have led to made variations in their life cycle and commercial traits.

Key words: *Antheraea mylitta*, Polyphagous, Cocoon weight, Climatic factor.

Introduction:

Sericulture is a cottage and agro-forestry and forestry based industry that provides sustainable livelihoods to rural communities and earning foreign exchange. According to the annual report of Ministry of textile India (2006) the profit worth about Rs.1600 crores per annum. The global production of raw silk is approximately 70,000 tons per year of which 16,500 tons per year is produced by India Sohn, Kee-Wook (2003). The ecological conditions of this selected study area are favorable to adopt agriculture and sericulture simultaneously In India, over three million people are employed in various fields of sericulture. Though India is the second largest silk producer in the World after China, it accounts for just 5% of the global silk market, since the bulk of Indian silk thread and silk cloth are consumed domestically.

Tasar silk is produced from the tasar silkworms (Insecta: Lepidoptera: Saturniidae) which has many ecoraces principally controlled by prevailing environmental conditions. The tasar silkworms are cultivated in natural forests; however, some attempts have been made for its semi-domestication. The present study depicts the variation in the different stages of tasar silkworm *Antheraea mylitta* which is distributed in the form of ecoraces in varied geographical areas. From the studies it is observed that rich biological diversity of *Antheraea mylitta* mainly is due to its wide range of distribution, climatic factors, and food plants etc., which have led to variations in their ethology and physiology. *Antheraea mylitta* is a wild sericigenous insect, widely distributed. In Maharashtra it is a polyphagous insect feeding on a number of food plants primarily on *Terminalia arjuna* and *T. tomentosa*, *Shorearobusta* and secondarily on *Zizyphus*, *Tectona*, *Bauhinia*, *Lagerstroemia*, etc.

Systematic studies were made to generate substantial information on the diversity of these populations so as to develop appropriate strategy for its conservation at the natural habitat. The present study is focused on the life cycle study of these wild species for commercial populations of *Antheraea mylitta* in selected parts of agricultural field based on physical features, climatic conditions and cocoon characteristics.

Material and Methods:

For the present study, the natural habitats of the agricultural field of Chalisgaon Thasil and some towns were selected. Study of Tasar Silkworm, *Antheraea mylitta* wild species were explored in their natural habitats and the geographical parameters were recorded. The ecological aspects of the of tasar silkworm, *Antheraea mylitta* were observed in their natural habitats and recorded Suryanarayana *at. el.*, (2005).

The various colored cocoon of wild species were collected. In 45 days observation adult were emerged out were grown under an optimum temperature of 29-30°C and a relative humidity of 70-80% in the agriculture field at Chalisgaon, The optimum temperature and relative humidity for the tasar silkworm rearing are 25-30 °C and 60-70% respectively. In the present study, the temperature and relative humidity were recorded with the help of lab thermometer and hygrometer respectively. The average of lowest and highest values taken and noted them. To study the ethological aspects of trivoltine and bivoltine, of wild species. Different stages of life history till cocoon formation were observed daily in the natural habitats. Such observations were made during project work for four months

Rearing Method:

The rearing of Tasar ecoraces was done by taking proper measures of disinfection to prevent outbreak of diseases and any attack by predators in fields. The quality of cocoons depends upon the selection of rearing site and food plants, optimum temperature and relative humidity, in agricultural field on *Zyzipus Jujuba*, Almond tree, and other plants.

Rearing of Tasar Silkworm:

The rearing of the tasar silkworm, *Antheraea mylitta* TV/BV were reared in laboratory on the *Zyzipus jujuba* leaves the larval span, moth colour, etc., were observed. During rearing, environmental fluctuations were seen, Temperature and relative humidity were measured regularly.

Results and Discussion:

The average larval span of tasar silkworm, *Antheraea mylitta* in study area were 38.7 and Pupal span 65.7 respectively. The average of total adult emergence period were 115.7 as well as the average maximum temperature 29.9 and minimum average temperature were 22.6 respectively, than total average of adult emergence were 115.7 days as shown in above table all these things were concerned with climatic changes and its impact on metamorphosis.

Tropical tasar silkworm, *Antheraea mylitta* is a commercial variety, which exists in various forms in different geographical niches of our country depend on food plants and environmental conditions. Agriculture and forest areas of loamy and black clayey regions within maximum temperature range of 30-38 °C and a minimum of 25-30°C, The voltinism (uni/bi/tri) in *Antheraea mylitta* is regulated by environmental factors like temperature, relative humidity, day length and rainfall. Humidity also plays an important role in growth of the larvae, triggering the moth emergence and preventing pupal desiccation.

The present study depicts the variation in the different stages of tasar silkworm *Antheraea mylitta* is mainly due to its wide range of distribution, climatic factors, and food plants etc. Variation were observed in the color, size and weight of cocoon due to foraging because tasar

silkworm feeds on variety of food plants, plant succession and factors like latitude, longitude, the altitude of different areas lead to expression of wide variations in phenotypic, physiological and behavioral traits resulted in formation of eco-races. Leather *et al.*, (1993) described that several species shows a large variation in the color which are present in the population which contribute the morphological and physiological characters.

Tasar silkworm growth and subsequent cocoon are normally influenced by availability of numbers of plants vegations and favorable environment. The Tasar silkworm rearing being an outdoor practice mostly on nature grown food plants David owitz *et al.*, (2004). Vishaka G. V. *et al.*, (2021) has stated that tasar sericulture is a magnificent gift of nature apart from silk production proper utilization of secondary and waste products of tasar sericulture industry can generate extra income in addition to the silk. Value addition also helps in avoidance of post losses, industrialization, employment generation, export, extended availability of produce, foreign exchange earnings and product diversification, easy marketing etc. Therefore this wild silk-producing insect has high commercial value and is an important economic source for the indigenous tribe residents in the forest. The tasar silkworm-based sericulture is a forest-based industry run by the tribal communities as a key cash crop in the central and southern plateau of India.

Conclusion:

The present study infers to the need of conserving the distinct and unique tasar ecoraces, by several measures because most of the tasar silkworms are polyphagous, the availability of a range of secondary and tertiary food plants in large numbers in the natural habitat of selected area should be conserved by an innovative methods of food plantation. In the case of *Antheraea mylitta*, rearing the natural habitats should be conserved because this area is potational for semi-domestic practices of sericulture production. Studies on adaptability of ecoraces in different ecological conditions and synchronization of emergence pattern need to be focused.

Observation Table:

Table 1: Natural habitat and ecology parameters of the collection site of Tasar Silkworm *Antheraea mylitta*

Site of Collection.	Area of habitat	Host plants	Soil type	Avg. Max. Temp. (°C)	Avg. Min. Temp. (°C)	Number of cocoon.	Colour of cocoon.
Saygaon	Forest	Ber	Black	30.38	25.90	11	White
Chalisgaon	Agriculture	Jambul	Black loamy	27.40	17.40	3	Yellow/Creamish
Patna	Forest	Arjun	Rocky gray	28.40	21.80	11	Blackish brown
Bilkhed	Agriculture	Sal	Black	30.25	25.30	4	Blackish gray

Table 2: Life cycle, ecological parameters at the collection site of Tasar Silkworm *Antheraea mylitta*

Site of collection	Cocoon Colour	No. of Eggs	Avg. max. Temp (°C)	Avg. min. Temp. (°C)	Larval span in days	Pupal span In days	Total span Adult of moth
Saygaon	Creamish /yellow	135	30. 38	25. 90	45	90	122
Chalisgaon	Grey	122	27. 40	17. 40	35	85	96
Patna	Blackish grey	120	28. 40	21. 80	45	76	110
Bilakhed	Yellow	116	30. 25	25. 30	30	120	135
Mean	-	123.2	29.1	22.6	38.7	65.7	115.7

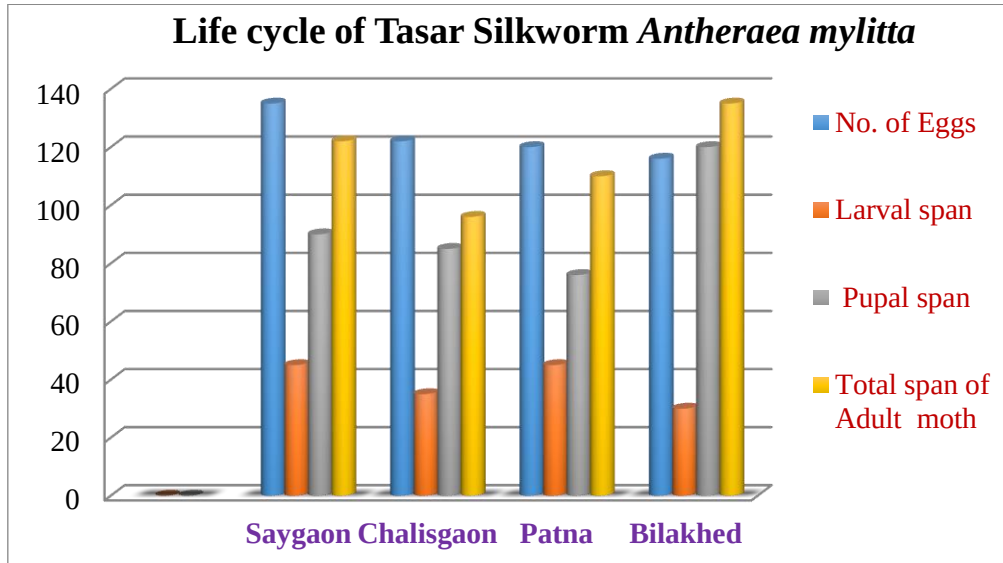
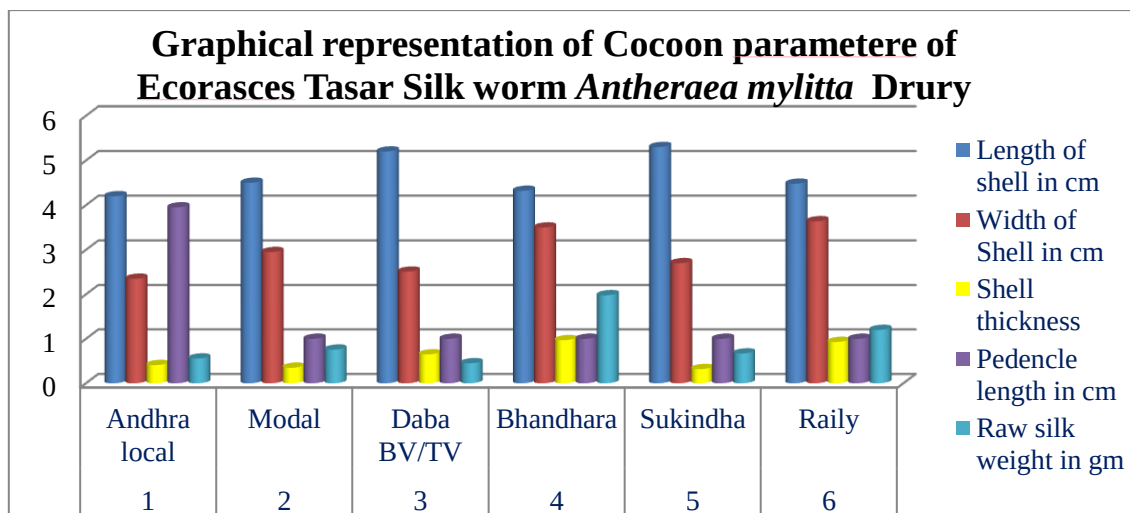


Table 3: Cocoon parameters of Ecorasces of Tasar silk worm *Antheraea mylitta* Drury.

Sr. No.	Ecorasces	Length of shell in cm	Width of Shell in cm	Shell thickness	Pedence length in cm	Raw silk weight in gm
01	Andhra local	4.2	2.35	0.41	3.95	0.557
02	Modal	4.50	2.95	0.35	1	0.757
03	Daba BV/TV	5.20	2.51	0.65	1	0.451
04	Bhandhara	4.32	3.50	0.97	1	1.98
05	Sukindha	5.30	2.70	0.32	1	0.67
06	Raily	4.48	3.64	0.93	1	1.20





Andhra local



Sukindha



Bhandhara



Modal (TV)



Raily Moth on Zizyphus jujube tree



Eggs of *Antheraea mylitta* Ecorasces.

References:

1. **Ministry of Textile (2006).** Annual Report.
2. **Sohn, Kee-Wook (2003).** Conservation Status of Sericulture Germplasm Resources in the World - II. Conservation Status of Silkworm (*Bombyx Mori*) Genetic Resources in the World, Food and Agriculture Organization of the United Nations, Rome.
3. **Suryanarayana N, Srivastava A.K. (2005).** Monograph on Tropical Tasar Silkworm, First Edition, published by Ministry of Textiles, Central Tasar Research and Training Institute, Nagri, Ranchi, India, 1-87.
4. **Leather, S.R., Walters, K.F.A. and Bale, J.S. (1993).** The ecology of insect overwintering. Cambridge University press, Cambridge.
5. **Davidowitz, G., Amico, L. J. D. and Nijhout, H. F. (2004).** The effects of environmental variation on a mechanism that controls insect body size. *Evol. Ecol. Res.* 6: 49-62.
6. **Vishaka GV, Hasansab Nadaf, Chandrashekharaiyah M, Rathore MS and K Sathyanarayana (2021).** New vistas of value addition in tasar sericulture through utilization The Pharma Innovation Journal 2021; SP-10(12): 388-392.
7. **Kar PK, Srivastava A.K., Sinha M.K., Sinha A.K., Prasad B.C. (2010).** Conservation genetics, combination of molecular biology and ecology: tropical tasar silkworm as an example. *The Bioscan*, 3:627-634.
8. **Singh B.M.K., Srivastava A.K. (1997).** Ecoraces of *Antheraea mylitta* Drury and exploitation strategy through hybridization. CTR&TI, Current Technology Seminar in Non-mulberry Sericulture. Base Paper 6:1-39.
9. **Sinha S.S, Sinha A. K. (1994).** Conservation strategies for important wild silk moth populations of *Antheraea mylitta* D. *Int. J Wild Silkworm and Silk.* 1(2):159-162.
10. **Srivastava A.K., Sinha A.K. (2002).** Present status of tropical silkworm germplasm management. Workshop on Germplasm Management and Utilisation at CSGRC, Hosur. Base Paper, 1-12.
11. **Mohanty P.K. (2003).** Tropical wild silk cocoons of India, book, Daya Publishing house, New Delhi, 197.
12. **Sinha A.K., Prasad B.C. (2011).** Variability in the Ecoraces of Tropical Tasar Silkworm *Antheraea mylitta* Drury, *Nature proceedings* doi: 10.1038/npre.6161-1.
13. **Mahendran B, Padhi B.K., Ghosh S.K., Kundu S.C. (2006).** Genetic variation in ecoraces of tropical tasar silkworm, *Antheraea mylitta* D. using RFLF technique. *Current science* 90(1):100-103.
14. **Ojha N.G., Reddy R.M., Hansda G, Sinha M.K., Suryanarayana N, Prakash N.B.V. (2009).** Status and potential of Jata, a new race of Indian tropical tasar silkworm (*Antheraea mylitta* Drury). *Acad. J Entomol.* 2:80-84.
15. **Nayak B.K., Dash A.K., Patro K.B.G. (2000):** Biodiversity conservation of wild tasar silk moth *Antheraea paphia* Linn. Of Simlipal Biosphere Reserve and strategy for its economic

- utilization, International Journal of Wild Silkmoth and Silk. 5:367-370.
16. **Rao P.A. (2000).** some salient features of Andhra local ecorace *Antheraea mylitta* Drury in relation to its conservation and multiplication. International Journal of Wild Silkmoth and Silk 5:356-358.
17. **Srivastava A.K., Naqvi A.H., Roy G.C., Sinha B.R.R.P. (2000).** Temporal variation in quantitative and qualitative characters of *A. mylitta* Drury. International Journal of Wild Silk moth and Silk. 5:54-56.
18. **Suryanarayana N, Srivastava A.K. (2005).** Monograph on Tropical Tasar Silkworm, First Edition, published by Ministry of Textiles, Central Tasar Research and Training Institute, Nagri, Ranchi, India,; 1-8