International Journal of Advance and Applied Research
www.ijaar.co.in
ISSN – 2347-7075 Impact Factor – 8.141
Peer Reviewed Bi-Monthly
Vol.12 No.2 November – December 2024

A Case Study on The Economy and Conservation of Samia Ricini – A Bio Resource of Assam, NE India

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DOI - 10.5281/zenodo.18950785

Abstract:

Assam is a state situated in northeast India, where sericulture is practiced traditionally. Culture of Eri silkworm Samia ricini is a sustainable form of agro-based cottage industry of Assam. Sericulture can fulfil the demand for the production of cloth for the winter season and Eri pupa is treated as a delicious food item. The species Samia ricini is a more recent taxonomic designation for the same species Philosamia ricini. Eri silkworms primarily feed on the leaves of the Ricinus communis (castor) as host plant followed by Heteropanase fragrance (kesseru). Since castor is available in a very limited amount due to environmental stresses like flood and drought, habitat loss due to human activities like construction of road and buildings Heteropanase fragrance preferred over Ricinus communis as alternative host plant for rearing the silkworm.

The present study was carried out at Mirza Kamrup district Assam India during 16/04/2022 to 20/07/2022. Geographically Mirza is situated at 26°5'35"N latitude, 91°31'55"E longitude and 55.00m/180.45 ft. altitude. We have found that the highest length in the mature Larvae is 9 cm and weight is 9-10 g on the highest temperature of 32°. The autumn season is best for the growth of Eri silkworm and the production of Eri silk. By sustainable management practice, agroforestry, improve breeding techniques, improving disease-resistant breeds, promoting sericulture as a heritage of Assam can conserve Samia ricini -a bio resource of Assam NE India.

Keywords: Sericulture, Bio Resource, Eri Silkworm, Assam, NE India.

Introduction:

Assam is a state, situated in the North-East India of great eastern Himalayan range, which is very rich in bio resources. The caterpillar of Eri silk insect is polyphagous, multivoltine and lives on different food plants belonging to Euphorbiaceae, Araliaceae, Apocynaceae and Simaroubaceae family (Chowdhury, 1982). At present, more than 24 plant species are known to host Eri silkworms (Singh and Suryanarayana, 2003; Singh and Chakravorty, 2005). *Samia ricini*, commonly known as the eri silkworm, is a valuable bio resource in Assam and other part of North-East India. India is the largest producer of Eri silk in the world, producing 96% of the total production (Kumar & Gangwar, 2010). It plays a significant role in the rural economy due to its contribution to the silk industry. More than 90% of the total Eri silk produced in India are produced by the north eastern states (Sarmah and Chakravorty, 2008). From ancient time, sericulture is practiced traditionally,

which is a major source of livelihood and agro-based, eco-friendly, economic activity of the people of north east India (Saha et.al. 2012 and Peigler and Naumann, 2003). Eri silk is also known as "ahimsa silk" or "peace silk" is a unique type of silk, as harvesting would be done without killing the pupa. The eri silk is used for the production of cloth for fulfil the demand of winter clothes as well as eri pupa is treated as a delicious food along with high rich of protein. The *Samia ricini* is a more recent taxonomic designation for the same species *Philosamia ricini*. They primarily used to feed on the leaves of *Ricinus communis* (castor) as host plant followed by *Heteropanax fragrans* (kesseru). The cultivation of *Samia ricini* is intertwined with traditional livelihood, environmental conservation and sustainable economic development. Various factors have shown to affect the success of silk worm cocooning including the environment (Deka, 2013). Insects are poikilothermic in nature and their body temperature tends to fluctuate with the ambient temperature. This influences their physiological conditions ultimately affecting their growth, development, reproduction, voltinism, etc. and ultimately quality and quantity of the produced silk (Reddy et al, 2001 and Palit *et al*., 2003).

Review of Literature:

Sericulture is a traditional practice of rearing silk worms which not only deals with the production of silk, but also other by-products of the industry. The word "sericulture" is derived from the word su meaning silk. This traditional practice was originated in China during 2500 BC and eventually spread to the rest of the world in a period of 3000 years (Roogta and Parker, 2005). The north- eastern part of India falls under tropical temperate climatic zone and is one of the important biological hot spot areas of the world (Chaudhuri and Sarkar, 2003; Myers et al., 2000) and harbours large number of flora and fauna (Suryanarayana *et al*., 2003).

According to the latest report published by the International Sericultural Commission, worldwide 60 countries are related to silk production, of which China and India produce 82% and 16% of the total production respectively. India produced a total of 30348 MT of silk in 2016- 17 which included all the five varieties of silk, viz. Mulberry, Eri, Muga, Tasar Oak Tasar (Source: CSB Annual Report 2017-18). Eri culture is practiced in North- East India traditionally to meet the domestic demand of warm clothing and for pupa (shetty and Samson, 1998). Rearers depend mostly on leaves of stray *Ricinus communis* plants for the rearing of the silk worm which hardly fulfils economical purpose because of the annual nature of the *Ricinus communis* plants (Saikia, 1999).

The development of any industry needs increased productivity at a reduced production cost (Mishra, 1986). But cultivation of *Ricinus communis* needs utmost care and it is also not cost effective (Krishnaswami, 1978). So large scale *Ricinus communis* plantation invites whorls of caterpillars to feed upon its leaves. Recently, the Central Silk Board (CSB) has introduced the concept of host plant cultivation amongst the Eri silk worm farmers. *Heteropanax fragrans* Seem,

locally known as "Kesseru", belonging to the family Euphorbeaceae is an ever-green plant and is established as the second major food plant of Eri silk worms. *Heteropanax fragrans* as well as *Evodia flaxinifolia* leaves are used for commercial rearing of Eri silk larvae in north east India (Naik, 2008). The rate of larval growth and development has direct impact on egg fertility (Hazarika *et al.* 2007; Govindan *et al.* 1990; Singh and Prasad, 1987; Kotikal *et al.* 1989). Cocoon weight has high positive correlation with cocoon shell weight, larval weight and cocoon yield (Kumaresan *et al*., 2003 and 2000). Reddy *et al*., reported significant correlation between pupal weight, pupal duration and moth longevity (Reddy *et al.,* 2000).

Objectives:

The primary objectives of this study on the economy and conservation of *Samia ricini* – a bio resource of Assam, NE India are:

1. To explore the economic significance of *Samia ricini* in the silk industry of Assam and its contribution to the rural economy.
2. To assess the role of eri silk production in providing employment and livelihood opportunities, especially for women.
3. To identify the challenges faced in the conservation and sustainable management of *Samia ricini*, including habitat loss, drastic climatic changes and declining of castor (*Ricinus communis*) plant cultivation.
4. To analyse government policies and initiatives for supporting the eri silk industry and their effectiveness in promoting sustainable sericulture practices.
5. To propose conservation strategies and promote the integration of traditional knowledge with modern scientific methods for enhancing the productivity and conservation of *Samia ricini*.

Methodology:

Study Area: Mirza is a major town in Kamrup (R) district of Assam, India. It is situated on south bank of River Brahmaputra and 18 km from Guwahati. Mirza is located at geographical location of 26° 5′ 35″ N Latitude, 91° 31′ 55″ E Longitude and 55.00m/180.45 ft. Altitude. The Mirza town is near national highway 17. The maximum temperature is between 32-37°C and minimum temperature range from 7-10°C. The average annual rainfall range from 300-400 nm. The town is near National highway 17 and had a good transportation system connected to nearby towns and cities with regular buses and other mode of transportation, such as Mirza railway station and Guwahati airport. The site is surrounded by beautiful forests and diverse ecological systems like rivers, wetlands and cultivated land.

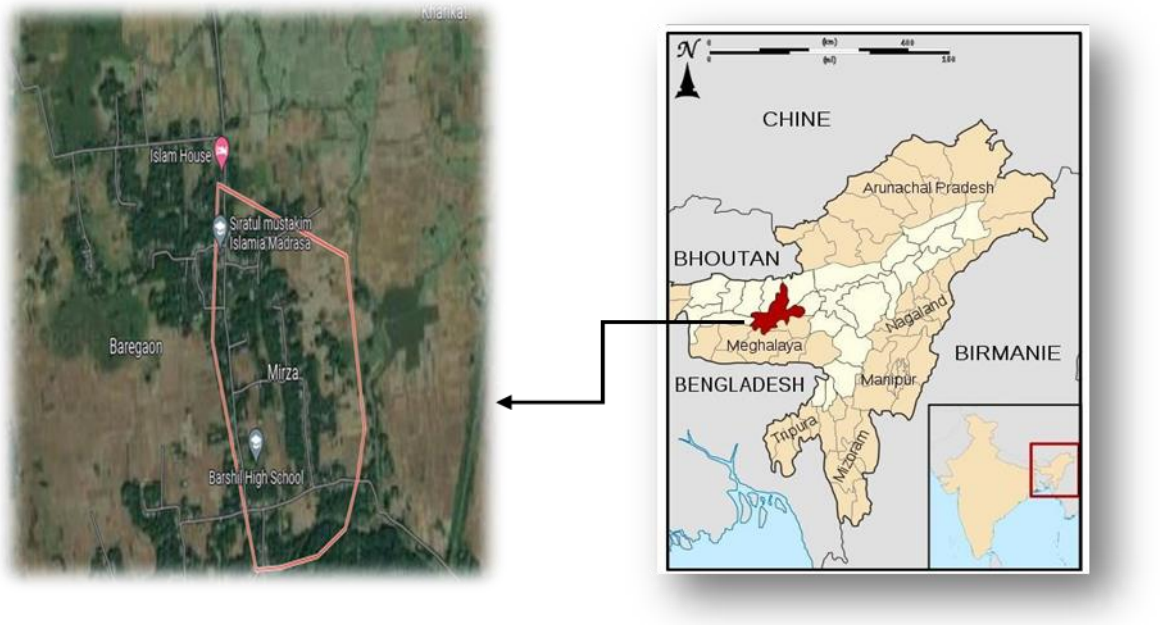

Fig: Study area at Mirza, Kamrup (R), Assam, India

Data Collection:

We personally rearing two batch of *Samia ricini* for observing the growth and productivity rate on the study area i.e. Mirza. We conducting surveys in eri silk producing regions of Assam to gather information from farmer, silk producers and weavers. Studding eri silkworm rearing techniques, feeding behaviour, and environmental factors affecting on the productivity. We analysing various research papers, government reports and publications related to eri silk production and conservation. Collecting various information on governmental policies, modern techniques and equipment's from the sericulture department of Mirza, Assam. Several data are also collected from the SERI-FED CENTER and sericulture department.

Rearing of Eri silkworm:

The rearing of eri silkworm (*Samia ricini*) was carried out during 16/04/2022 to 20/07/2022. Approx. 150 eggs are rearing for the first batch of cultivation. The larvae are feeding castor leaves. They do not eat food 15 - 10 hour before moulting. Some larvae are died during moulting period. To avoid contamination, injured and sick larvae were gathered and buried. At the highest temperature about 34^0 - 32^0 the larvae are start ripening on 17^{th} – 20^{th} days of hatching. Cocoons are collected or harvested after 6^{th} days of formation. Then after 20 days of ripening new adult moth will emerges from the cocoon and start laying eggs within 2-3 days after mating. These eggs are used for the rearing of second batch of cultivation. At the highest temperature about 31^0 – 28^0 the larvae are start ripening on 21^{th}-24^{th} days of hatching. Cocoons are collected or harvested successfully after 6^{th} days of formation. Then after 20 days of ripening new adult moth will emerges from the cocoon.

Results:

This study the data recorded on morphological features of eri insect (*Samia ricini*) found in Mirza are given in Table 1.

In this study, we found creamy white in coloured egg, body colour of larva yellow /cream/ blue/green with thorny skin, white cocoon with no peduncle, having a reddish-brown pupa inside it & adult moth have black brown-coloured wings with some white coloured lines on it, are in agreement with the data found by (G & G 2014). These characteristics of egg, larva, pupa, cocoon & adult moth are with closely conformity with (Kalita & Dutta 2014). Adult male moths are smaller than the adult female moth. Ricinus communis L (castor) is of two types-red & green. Castor is the primary & *Heteropanase fragrans* R (kesseru) is the alternative host plant which is also reported by Sarkar et al., 2015.

The highest length in the mature larvae is 9cm and weight is 9-10 g on the average temperature of 24^0-32° C. Total life cycle duration in 1st batch is almost 45 days and in 2nd batch is 50 days. The rearers get the eggs from the sericulture department of nearby district. Women play significant role in weeding, host plant leaves collection, rearing etc. The families involved in eri culture generally belong to the weaker section of the society in terms of income and education. These results are in agreement with the results of (Mech & Ahmed 2012). The decline in rearing of many broods is due to scarcity of castor leaves which is also supported by (De & Das 2010).

Table: Morphological features of *Samia ricini*

Egg	Colour	Creamy white
	Shape	Oval
Larvae	Colour	Yellow, creamy, blue, green
	Highest length	9 cm
Pupa	Colour	Dark reddish brown
	Shape	Oval
Cocoon	Colour	White
	Shape	Oval with no penduncle
Adult (moth)	Colour	Black brown

Fig: Castor plant

Fig: Eri yarn spinning machine

Fig: Handloom textile weaving machine

Fig: Seri-Fed Center

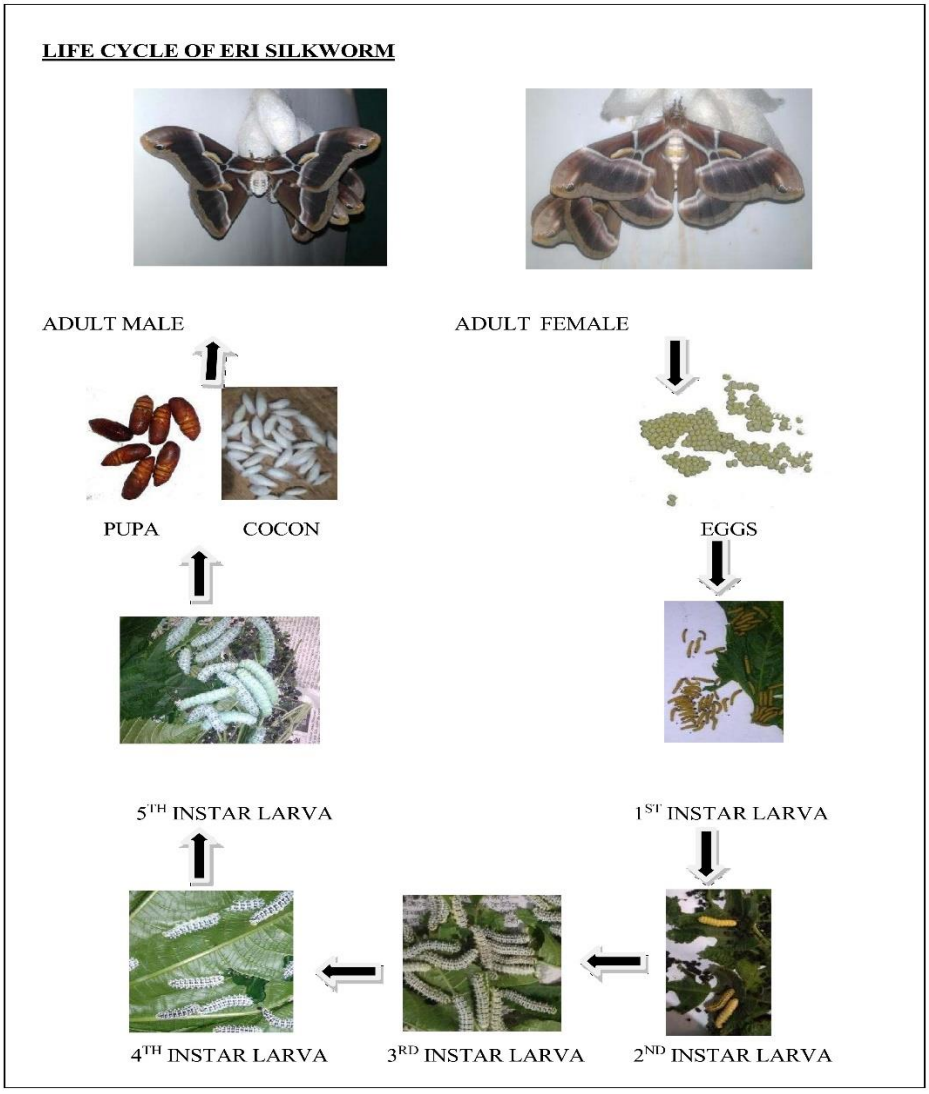

Fig: Life cycle of *Samia ricini* (eri silk worm) cultured in D.K.C. Mirza, Assam. During 16/04/2022 to 20/07/2022.

Discussion And Conclusion:

The Assam is a major producer of eri silk, contributing to India's position as the second largest silk producer in the world. The demand for eri silk has increased in national and international markets, providing employment to so many rural families. It has high economic potential in eco-fashion and sustainable textile markets. The government promotes eri silk under various schemes like the north east region textile promotion scheme (NERTPS). The SERI-FED CENTER play a significant role in the production, economic development and conservation of Samia ricini along with other silk worm species under various schemes and projects. They provide modern instruments which make easier to processing of various eri products. They provide a wide range of market to the product of eri textile. They create employment and most of the women from rural area included in it. Along with the textile market of eri yarn the pupa of eri silkworm are also used as a protein rich food source and fish feed. But due to the deforestation, agricultural expansion, climatic changes, population exploitation, construction of roads and fill up of wetlands, the habited of castor plant i.e. the primary food of eri silkworm (Samia ricini) will declining day by day. So that the production of eri silk was affected by lack of their primary food. The conservation and economic development of Samia ricini are interlinked. By practicing some conservation strategies like agroforestry, castor cultivation, community-based rearing, developing disease resistant breed and conducting some awareness programs, we can conserve our most valuable bio resource for Assam and N.E. India.

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