Experimental Investigation of the Traditional Method of Muga Silkworm (*Antheraea assamensis* Helfer) Rearing in Chawrekia, Majuli, Assam (India)

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Abstract

The rearing of the muga silkworm (*Antheraea assamensis*), which is endemic to the Brahmaputra Valley, is an ancient, agro-based cottage industry. Responsible for producing the highly coveted, golden-yellow muga silk—which boasts a Geographical Indication (GI) tag—the practice is a vital livelihood source for indigenous communities in Assam. The silk is renowned for its durability, shimmering texture, and natural golden tint. The entire muga culture cycle is managed through a specialized, seasonal, and outdoor-based sequence. Muga silkworms are semi-domesticated and arboreal. They feed primarily on the leaves of two aromatic host plants. Som (*Persea bombycina*) is predominantly found in Upper Assam and is used for yielding high-quality reeling cocoons. Sualu (*Litsea polyantha*) is more common in Lower Assam and is primarily used for producing seed cocoons. Because the caterpillars cannot be reared indoors full-time, farmers manage them through 5 to 6 continuous generations every year, which align with both commercial and seed-producing cropping seasons. Commercial Crops: Jethua (May-June) and Katia (October-November). Seed and Pre-seed Crops: Jarua (Dec-Jan), Aherua (June-July), Chotua (Feb-March), and Bhodia (July-August). These are raised specifically to carry the genetic line to the next season. In traditional rearing practices, farmers apply generations of local ecological knowledge to nurture the caterpillars. Muga silkworm (*Antheraea assamensis*) rearing is actively practiced in Chawrekia Village in the district of Majuli. This paper highlights the traditional method of rearing Muga Silkworm (*Antheraea assamensis*) in the Chawrekia village of the Majuli river island.

Keywords: Muga Silkworm, Traditional Method, Chawrekia, Majuli.

Introduction

As one of the oldest industries in India, sericulture plays a pivotal role in the rural economy, particularly in the North-eastern States. Silkworm rearing is the process of rearing silkworms to produce raw silk. It holds great importance in the socio-economic landscape of Northeast India, especially in states like Assam, Nagaland, Meghalaya and Arunachal Pradesh. This

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practice provides livelihoods to people in rural regions and also conserves the rich indigenous knowledge system and traditional methods. Northeast India has great biodiversity in terms of different types of silkworm varieties. There are three commonly found silk varieties: Mulberry Silkworm (*Bombyx mori*), Muga Silkworm (*Antheraea assamensis*) and Eri Silkworm (*Samia ricini*) *(Narzary & Boro, 2025*). Sericulture is an agro-based industry, playing an important role in the rural economy of the country. The uniquely golden-coloured muga silk has restricted distribution and is found only in the NE part of India. Sericulture and silk weaving are part and parcel of the cultural heritage of the people of NE India. The climate of North-East India is suitable for the growth of non-mulberry silkworms, i.e., muga and eri. The number of sericulture villages in the NE region is about 38,000 and approximately 1.9 lakh families are engaged in this industry in Assam. Muga rearers of Assam have been practicing this culture using traditional methods (*Unni et al., 2009*). Sericulture is a traditional economic activity and provides a considerable share of the livelihood earned by the rural masses of Assam. Sericulture is an important source of employment for rural people, which can create 151-200 days of employment. Sericulture also provides several very useful by-products like unused leaves, dead, unhealthy, diseased larvae, larval litter and excreta, pupae, defective cocoons, silk waste and parts of host plants like mulberry fruit, stem, castor seed, tapioca, etc. Lots of value-added products like spun silk, ghicha yarn, pupae, compost, craft items, medicines, cosmetics, etc. can be prepared from these wastes. Effective utilization of these waste products makes the sericulture sector more attractive and remunerative and will help in doubling farmers' income (*Gogoi et al., 2023*). Sericulture is a labour-based and export-oriented cottage industry of the country. India produces four different types of silk such as mulberry, eri, muga and tasar silk. The muga (*Antheraea assama*) is a semidomesticated silkworm belonging to the family Saturniidae and the order Lepidoptera. It primarily feeds on host plants, Som (*Persea bombycina*) and Soalu (*Litsaea monopetela*), and secondary host plants, Digloti (*Litsea salicifolia*), Mejankori (*Litsea cubeba*), etc. More than 85% of the muga silk is produced by Assam. Assam produced 136 MT of muga silk during 2014-15 (*Singha & Sonowal, 2016*). *Antheraea assamensis* Helfer is an endemic polyphagous insect and feeds on a wide range of different food plant species, mainly Som (*Persea bombycina*), Soalu (*Litsea monopetela*) and a few other food plants. Som is one of the major consumed species throughout North Eastern India for muga silkworm rearing that produces natural muga, or golden silk, found nowhere else in the world. The muga silkworm is multivoltine. Successive broods in a year in which the worms are bred and spin cocoons are designated in the Assamese calendar as Jethua, Aherua, Bhodia, Kotia, Jarua and Chotua. The commercial crops during autumn and spring, namely Kotia and Jethua, produce quality silk, and the other seed crops are Jarua, Chotua, Aherua and Bhodia (*Kumar et al., 2024*). Muga is such a kind of insect that produces golden-coloured threads that are highly distinctive and valuable. The Brahmaputra valley of Assam is the only place in the world where muga rearers have been rearing muga silkworms traditionally since time immemorial. In other states of the North-East, except Tripura, it is found in the wild and people rear it after collecting from the jungles. Nowadays, people of the bordering areas such as Meghalaya, Nagaland, Arunachal Pradesh and the Cooch Bihar district of West Bengal rear muga silkworms, considering its economic importance (*Bonia, 2020*). The characteristic climate, ecological conditions and soil quality have been congenial

in Assam for the silkworm food plantation. As a result, sericulture is considered as one of the promising rural industries in Assam because of its unique characteristics of being eco-friendly, labour-intensive, having a short gestation period, the capacity to develop into a family enterprise, limited capital investment and its interlinkages with other enterprises (*Dutta & Saikia, 2013*). The North-Eastern states of India, Sikkim, Assam, Nagaland, Tripura, Arunachal Pradesh, Meghalaya, Mizoram and Manipur, are the main centres of wild silk culture, using silk collected from muga (*A. assamensis*), eri (*S. ricini*), oak tasar (*A. proylei*), mulberry (*B. mori*) and tasar moths (*A. mylitta*) (*Tikader et al., 2013*). The north-eastern region of India is the natural abode of a large number of sericogenous insects. The habitat biodiversity of all these sericogenous insects is the wealth of the ecosystems of this region. The sericogenous Saturniid (*Antheraea assamensis*) is a monospecies and is exclusively confined to the Brahmaputra valley of Assam, India, due to its unique ecological niche. It produces golden coloured silk of high economic value (*Nath et al., 2008*). Assam is well known for the production of golden-coloured silk from muga (Antheraea assama=assamensis) silkworm. Muga culture has a long tradition amongst the rural community of North-East India and the people of the district of Dhemaji in Assam are an exception in this regard (*Chakravorty et al., 2015*). This paper highlights the traditional rearing method of Muga Silkworm (*Antheraea assama*) in Chawrekia, Majuli, Assam.

Materials and Methods:

Study Area: Chawrekia is an inhabited rural village located in the Ujani Majuli Circle of Majuli, the world's largest river island, situated in Ratanpur Miri Gram Panchayat, Assam, India, which is nestled in the mighty Brahmaputra River. It is located between 27º10'6027" N and 94º42'6670" E. As per the 2011 Census, it is a medium-sized village with a population of 621 people across 125 households. Chawrekia spans a geographical footprint of about 197.96 hectares.

Occupation: Agriculture is the dominant sector in Chawrekia, employing the vast majority of its working population. Weaving is a core non-commercial and semi-commercial economic activity managed almost entirely by the village women. They produce intricate, traditional cotton and silk fabrics such as Muga and Eri silk, etc.

Survey: A comprehensive survey was conducted in Chawrekia Village, located in the Ujoni Majuli Block, Majuli District, Assam, to evaluate the traditional practices and adoption levels of Sericulture farmers. Household data reveal that Muga rearing is deeply tied to indigenous communities such as Ahoms, Mishings, Deori, Sonowal Kachari and other indigenous communities. The traditional rearing methods of the Muga Silkworm (*Antheraea assamensis*) in Chawrekia, Majuli, Assam, reveal that this indigenous practice relies heavily on centuries-old agro-ecological knowledge, spiritual practices, and semi-domesticated outdoor handling.

Results and Discussion:

1. Traditional rearing Practices of Muga silkworm in Chawrekia, Majuli, Assam:

I. Selection of Host Plant: The rearers know that the success of rearing muga silkworms is mainly based on the quality of the primary host plant, Som (*Persea bombycina*). The

rearers categorized host plants into two categories. Primary host plants: Som (*Persea bombycina*) and Soalu (*Litsea polyantha*). Secondary food plants include: Mezankari (*Litsea cubeba*), Digloti (*Litsea salicifolia*), Tejpat (*Cinnamomum tamala*), Bogori (*Ziziphus jujube*), Gomari (*Gamelina arboraeai*), Tita chapa (*Michelia champaca*), Bor sopa (*Michelia oblonga*), Bhomloti (*Symplocos grandiflora*), Bajjramani (*Xanthoxylum limonella*), etc.

II. Selection of Seed Cocoons: The rearers select the seeds according to the sizes of the larvae and the cocoons. Larvae and cocoons of larger sizes are believed to indicate a greater propensity for adaptiveness than smaller ones do. The cocoons formed by male larvae are smaller and smoother than those made by female larvae. One of the precautions that traditional rearers usually follow in order to prevent the cocoons from being exposed to sunlight is to carry the seed cocoons at night. Selection of cocoons also depends on the physical examination of the silkworms.

III. Traditional Rearing Method:

1. Rearing Techniques: Successful rearing involves many phases, starting with the selection of the breeds and giving them optimal conditions for metamorphosis, pairing and oviposition.

1.1: Selection of breeds for rearing: The muga silkworm species is multivoltine, breeding 5-6 times per year. Farmers raise five to six crops a year. Jethua (May-June) and Katia (October-November) are the primary commercial crops, yielding the best golden cocoons. Jarua (Dec.-Jan.), Aherua (Jun.-Jul.), Chotua (Feb.-Mar.), and Bhodia (Jul.-Aug.) are chosen carefully to supply resilient stock despite extreme weather. Pick compact, hard, medium to large cocoons with a distinct golden-yellow colour. Reject deformed, flimsy, or stained cocoons. Ensure active internal movement of the pupa inside the cocoon upon gentle handling. Isolate cocoons in clean grainage structures to screen out pebrine and other microbial infections before allowing moth emergence.

1.2: Host Plant Selection: In Upper Assam, Som (*Persea bombycina*) trees are the most preferred host plants, predominantly abundant in districts like Dibrugarh, Sibsagar, Lakhimpur, Jorhat, Golaghat, Dhemaji and Majuli. Rearing on Som leaves yields high-quality, commercial reeling cocoons. Soalu (*Litsea polyantha*) is most common in Lower Assam districts like Kamrup, Goalpara and Darrang. It is primarily selected to produce healthy seed cocoons or utilized when Som leaves are unavailable. Dighloti (*Litsea salicifolia*), Mejankori (*Litsea cubeba*), Bogori (*Ziziphus jujube*), Champa (*Michelia champaca*), Patihonda (*Actinodaphne obovata*), etc. are secondary and tertiary host plants utilized primarily as alternative food sources during seasonal scarcities or to support specific pre-seed crop generations.

1.3: Seed cocoons in Bamboo box or chokori pera: After collecting cocoons from different places, the rearers generally keep the cocoons in a box made of bamboo or chokori pera. The box with the seed cocoons is kept in the kitchen close to the wood fire at a certain height so that the cocoons receive optimal heat for metamorphosis.

Traditional rearers usually spread tulsi or holy basil (*Oscimum sanctum*) and kochu (*Alocasia indica*) twigs over the cocoons to prevent infections.

1.4: Hatching and copulation of the moths: After hatching, the female moth is tied with cotton threads onto a kharika. The kharikas are made of thatch grass of about 30 cm in length and 1 cm in diameter, bent into the shape of a hook at the end. The rearers hang the kharikas on a jori (rope) made of bamboo inside a separate room of the house for mating with the male moths. The mating continues for one day, after which the moths decouple. A healthy female lays about 100-200 eggs over a period of 4-5 days.

1.5: Hatching of eggs: After one hour of copulation, the female moth starts laying eggs. The rearers will take only eggs which are laid between one and two days after copulation for rearing. The Kharikas bearing the eggs are very carefully hung on the Chaloni made of bamboo.

1.6: Transfer of newly hatched larvae into host plants: The traditional method of transferring newly hatched muga silkworm larvae into host plants uses a Chaoni (a specialized bamboo sieve to safely move the worms without physical handling). Because newborn muga larvae (Som or Soalu caterpillars) are extremely delicate, touching them directly can cause fatal injuries or infections. Freshly hatched larvae are kept on a chaloni. Tender, young leaves from the host plant are plucked and placed directly over the newly hatched larvae on the tray. Attracted by the scent and moisture, the tiny larvae naturally crawl upward onto these fresh leaves within a few hours. Once the larvae have securely attached themselves to the plucked leaves, the entire bamboo sieve or specific twigs with the crawling larvae is carried to the outdoor host tree. As the plucked leaves begin to dry up over the next 24 to 48 hours, the larvae instinctively migrate onto the fresh, living leaves of the host tree to continue feeding. The empty bamboo tray or old twigs are then removed.

1.7: Larval Stages: The larval phase is the only feeding stage in the life cycle of the Muga silkworm (*Antheraea assamensis*), lasting roughly 21 to 25 days in summer and extending up to 40 to 55 days during winter. During traditional outdoor rearing on host plants like Som (*Persea bombycina*), the larvae progress through five distinct growth stages (instars) separated by structural moults. First instar (Chimuga or Ek ulua): Tiny, blackish, ash-covered larvae hatch from eggs tied to grass sticks called karakas. They are brushed onto tender host leaves, where they feed for 3 to 4 days before their first moult. Second instar (Dui Ulua): After shedding their skin, the larvae turn slightly lighter green. They feed aggressively on tender leaves for 5 to 6 days before entering the second moult. Third instar (Tini ulua): The caterpillars grow rapidly and take on a distinct translucent green colour. This stage lasts for about 6 to 7 days. Fourth instar (Chari Ulua): The larvae become highly robust, feeding continuously on mature leaves for 8 to 9 days. This is the final stage before they consume the most significant volume of biomass. Fifth instar (Mature Chon): The final larval stage lasts 9 to 10 days. Fully grown larvae develop a golden-yellow hue, prominent tubercles, and lateral brown stripes. At the end of this instar, they crawl down the tree trunk at night to be collected for cocoon spinning.

1.8: Collection of ripe larvae: The traditional method of collecting ripe muga silkworm larvae (*Antheraea assamensis*) relies heavily on the natural instinct of the worms to crawl down the host trees (Som or Sualu) when they are ready to spin cocoons. Before the larvae begin their descent, farmers prepare the tree trunks to stop the worms from reaching the ground, where they get lost or attacked by predators. Farmers tie a bundle of dry straw, banana leaves or thatch grass around the tree trunk about 3 to 4 feet above the ground. As the ripe larvae crawl down from the canopy at dusk, they hit this barrier and gather there in large numbers.

1.9: Manual harvesting using the Chaloni: Muga silkworms traditionally ripen and descend during the night and early morning hours. Rearers use a traditional, wide, flat bamboo sieve called a Chaloni. Farmers gently pick the gathered larvae off the straw barrier by hand or brush them directly into the chaloni. Any larvae that are still green and active (not fully ripe) are placed back onto the branches to continue feeding.

1.10: Transfer to the spinning Basket (Jali): Once the Chaloni is filled with translucent, ripe larvae, they are immediately taken indoors for cocooning. The larvae are placed into a Jali, which is a large, conical bamboo basket. The filled Jalis are hung from the ceiling of a dark, well-ventilated room.

IV: Traditional reeling and spinning of Muga Silkworm Cocoons: Traditional reeling and spinning of golden Muga silk in Assam involves boiling cocoons to loosen their filaments and unwinding them using an indigenous hand-operated device called Bhir. First, healthy, compact Muga cocoons are dried or stifled to kill the pupa inside, then sorted to remove damaged or flimsy shells. Secondly, the cocoons are boiled in hot water mixed with soda or ash to soften the hard outer sericin protein and locate the filament ends. Thirdly, traditional reeling requires two people working together at a wooden frame called a Bhir. One person manages and draws the continuous filaments, while the other twists and winds the resulting golden yarn. Traditionally, simple hand spindles like the Takli or indigenous spinning setups were used to draw and twist staple fibers into durable spun yarn, though modern decentralized centres now also utilize motorized or pedal-driven spinning frames for higher efficiency. Lastly, defective, cut or pierced cocoons that cannot be clearly reeled are set aside for spinning. These waste cocoons are boiled in a mild alkaline solution (sodium carbonate) to remove impurities and degum the silk.

V: Traditional boiling of the Cocoons for reeling: During boiling, various traditional degumming and other facilitatory reeling reagents are used. These include kolakhar, dhankhar, and, for easy reeling of the thread, slippery substances like owtenga, simalu, joba pat, and kukurhuta leaves, depending upon their availability.

VI: Traditional rearing tools and equipment for Muga Silkworm:

a. Chaloni (Bamboo Sieve): Flat, circular woven bamboo sieves used for gently transferring, sorting and transporting young or crawling silkworms between host plants.

b. Khora/Khurung (Bamboo Basket): Specialized conical or cylindrical bamboo baskets used to collect and hold mature, ripe muga larvae by hand when they descend from trees to spin cocoons.

c. Jali (Leaf Mesh/Bundles): Bundles of dried leaves (Singori, Mango or Nahor leaves) tied together where mature, ready-to-spin larvae are placed for cocoon formation.

d. Kharika: Small dried straw or twig clusters used traditionally for brushing and early-stage management of newly hatched larvae.

e. Chakaripera (Moth Cage): A traditional bamboo or cane cage structure used for keeping and handling adult moths during egg-laying.

f. Dhanu (Bow-shaped tool): A lightweight bow-like instrument used in specific handling processes of larvae or fiber sorting.

g. Bhir: A primitive, traditional wooden/bamboo reeling device operated manually by two people to extract and twist the continuous muga silk filaments from boiled cocoons into raw yarn.

h. Ushnakuti: A traditional earthen or clay oven setup used for stifling (killing the pupa with heat) harvested cocoons so the filaments remain unbroken for reeling.

Current Challenges: Muga silk production is a traditional agro-based cottage industry in Assam, India, famous for its unique natural golden-yellow shine. Assam produces the vast majority of the world's Muga silk. The sector functions as a rural cottage industry supporting hundreds of thousands of families, with women leading post-cocoon tasks like reeling and handloom weaving. Rising temperatures and humidity linked to climate change negatively impact the delicate outdoor silkworms. Deforestation and industrial expansion have reduced the natural host plant acreage required for feeding the worms.

Summary:

India is the world's second-largest producer of silk, and the scale of employment it generates is staggering. The sericulture industry employs around 9.76 million people across 52,500 villages in rural and semi-urban areas. Between 2013-14 and 2024-25 alone, the sericulture workforce expanded by nearly 24%, growing from about 78 lakh to around 98 lakh workers—a clear sign of the industry's expanding role in rural livelihoods. One of the most significant social contributions of the silk industry is the economic employment of women.

References:

1. Bonia, B. (2020): Muga Silk Rearers: A field Study of Lakhimpur District of Assam. International Journal of Scientific & Technology Research. Vol. 9(4).

2. Chakravorty, J., Gogoi, M. & Meyer-Rochow, V.B. (2015): Cultural Attributes & Traditional Knowledge in Connection with the Rearing of Muga (*Antheraea assam=assamensis*) in the Dhemaji District of Assam, North-East India. Journal of Insect Biotechnology & Sericology. 84(1): 17-28.

3. Dutta, Dr. B.M. & Saikia Mr. B. (2013): Economics of Muga Rearing. GJRIM Vol. 3, No. 1.

4. Gogoi, R., Gogoi, G., Saud, R.K., Bhuyan, N., Barthakur, A.K., Neog, M. & Pathak, P.K. (2023): A Study on Constraints of Ericulture in Dhemaji District, Assam. India Journal of Extension Education. Vol. 59. No. 1(166-169).

5. Kumar, V., Majumdar, M., Singh, A., Indirakumar, K., Kumar, N. & Neog, K. (2024): Rearing Performance of Muga Silkworm as Influenced by Abiotic Factors during Commercial Crops at Garo Hills Region. Biological Forum-An International Journal. 16(2), 98-101.

6. Narzary, D. & Boro, I. (2025): Silkworm rearing Practices in North east India: A review of traditional & Scientific methods. Journal of Entomology & Zoology Studies. 13(4), 190-192.

7. Nath, R., Nath, S.K. & Devi, D. (2008): Study and Conservation of Host Food Plants of Muga Silkworm, *Antheraea assamensis* (Helfer), of Assam. Nature Environment & Pollution Technology. Vol. 7. No. 1, pp. 83-92.

8. Singh, Th.A. & Sonowal, P. (2016): An Importance of Muga Silkworm (*Antheraea assama* Ww.) seed crops. J.Exp.Zool.India. Vol. 19. Supplement 1, pp. 1215-1217.

9. Tikader, A., Vijayan, K. & Saratchndra, B. (2013): Muga Silkworm, *Antheraea assamensis* (Lepidoptera: Saturniidae)- an overview of distribution, biology & breeding. Eur.J.Entomol. 110(20, 293-300.

10. Unni, B.G., Goswami, M., Kakoty, V., Bhattacharjee, M., Wann, S.B., Rajkhowa, G., Das, S., Devi, B.R. & Chutia A.D. (2009): Indigenous Knowledge of Silkworm Cultivation and its Utilization in North Eastern Region of India. Indian Journal of Traditional Knowledge. Vol. 8(1), January 2109, pp. 70-74.