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Sericulture in North-East India: Diversity, Production Systems, and Future Prospects

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Abstract— *Sericulture in the north-eastern region of India is unique in its socio-economic and cultural importance. Since all four varieties of silk—Mulberry, Tasar, and most importantly, Eri and Muga—are produced here, the region offers many opportunities for the rural economy, primarily empowering women. While possessing many potentials, sericulture in the north-eastern part of India is fraught with several problems, such as poor productivity, poor adoption of improved technologies, incidences of diseases and pests, poor quality of planting materials, poor infrastructural facilities, and poor marketing systems. The sector has seen improvement to an extent owing to advances in breeding, improvement in host plants, improved rearing practices, and supportive schemes. This review focuses on the importance, diversity, constraints, and future prospects of sericulture in the region. Taking advantage of the untapped potential of the region, proper alignment and intervention through technology can ensure success.*

Keywords— Sericulture, Mulberry, Eri, Muga, Oak Tasar, Rural livelihood.

I. INTRODUCTION

Sericulture is one of the sectors of agriculture that deals with the rearing of silk worms and harvesting their cocoons, which can help boost the growth of the concept of sustainable development that integrates agriculture, forestry, and rural industry[1]. It is a labour intensive, agroforestry-oriented industry supporting rural livelihood that expands across the globe. India is the second largest producer of raw silk of 41,121 MT next to China leading the production supporting around 97.3 Lakh people uplifting the livelihood mainly in the rural and semi urban sectors[2] . Characterized with abundant types of silk producing fauna makes the country capable of producing all the major types of natural silks- mulberry silk, Tasar, Oak Tasar, Eri, and Muga silk, made by *Bombyx mori*, *Antheraea mylitta*, *Antheraea proylei*, *Samia cynthia ricini*, and *Antheraea assamensis* respectively. Apart from these types of silkworms which have been commercially used to manufacture silks, the forests of northeast regions have many other types of silkmoths that have not yet been used but have great potential[3].

India being major biodiversity hotspot with strong connection to socio cultural practices, harbour nearly 10% of the world species and supporting additional income to the weaker communities. The north-eastern and sub-Himalayan regions are particularly rich in wild sericigenous insects and their host plants, though only five silkworm types are commercially utilized, including mulberry and vanya silks. Besides that, silkworm cocoon and pupae serve as valuable resources with their host plant having multiple medicinal uses[4].

North-Eastern part of India, which includes Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura, which is crucial for non-mulberry silk production. Various sericulture systems are supported by the region's varied topography, rainfall patterns, vegetation, and traditional textile traditions. Mulberry and oak Tasar offer further chances for livelihood diversification, while Eri and Muga silk are particularly important because to their historical connection to the area[5].

The North East part of India is identified as one of the 34 biodiversity hotspots in the world due to its abundance of flora and fauna which supports the ideal ecological base for diverse sericulture practices[6]. Holding the unique ability of producing all varieties of silk, northeast sericulture is embedded in the cultural traditions and involves both genders, especially in the production of Eri silk and geographical indicator (GI) tag Muga silk. According to socio-economic studies, the economic benefits of sericulture have a better ratio compared to several crops produced in agriculture. Eri and Muga silk production is mainly centred on the states of Assam, Arunachal Pradesh, Meghalaya, Mizoram, Nagaland, and Tripura with marginal involvement of mulberry silks. Even though the income level from this activity is fairly stable compared to other cash crops, there are still limitations to its development due to several constraints[7]. Moreover, Eri silk has less need for investment in capital resources but provides a large employment opportunity, which is quite beneficial for rural development in India[8]. This review is to integrates current state of sericultural knowledge and existing literature of the North East India with regard to their exclusive silk resources, sericulture methods, constraints faced, and development prospects, which can facilitate sustainable development leading to economic improvement and stability promoting rural areas where sericultural activities are growing.

II. GEOGRAPHICAL DISTRIBUTION AND MAJOR SILK-PRODUCING SYSTEMS

2.1 North East India Sericulture

The North Eastern Region of India inhabited around 2.6 million sq. km which is abundant with natural resources, diverse flora and fauna, and suitable climatic conditions with domination by agriculture[9]. Traditionally, sericulture in the Northeast region has always been associated with agriculture-based livelihoods, female empowerment, and agroforestry practices, enabling eri and muga to become highly valued industries due to their cultural significance. In NER, the four varieties of silk viz. mulberry, eri, muga, and oak tasar are produced accounting for 19.3% of the raw silk production in India. The sericulture activity is undertaken in 81 out of 84 districts of 8 states of NER. With low capital investment, labour-intensive in nature, particularly for women, conducive to silkworms, and highly profitable, the rearing of silkworms has become an appealing business for the rural population. The industry has immense capacity for expansion and presents opportunities for productive investments[10] (Viswanathan et al., 2015). India supports about 40 different species of wild silkmoths other than the species of domestic silkmoths like *Theophila religiosa*, *Bombyx mandarina*, and *Antheraea compta* that are native to the eastern part of India, making India the best place for them[11,12].

2.2 Cultivated silk varieties

Because of the favourable agro-climatic conditions of North Eastern India, high biodiversity and indigenous knowledge related to silk production, sericulture hold a significant area with specialization in eri and muga silks, as well as mulberry and tasar in smaller amount[13]. The Eri silk spun by *Samia cynthia ricini*, and *Antheraea assamensis*, are popular due to its soft texture, insulation ability, and environmentally friendly method of production. On the other hand, the muga silk has global recognition due to its unique golden shine and high durability especially in Assam. *Bombyx mori* silks, referred to as mulberry silk, are also grown in several North Eastern states[14].

The types of commercially available silk in India can be categorized under two groups mulberry silk and non-mulberry silk (Vanya) which includes tropical tasar silk, oak tasar silk, eri silk, and muga silk. The seri biodiversity of the northeastern states with their production systems differ in domestication, host range, rearing environment and post-cocoon technology with differs in requirements of labour and intervention to succeed (Table 1).

TABLE 1
SILK PRODUCTIONS SYSTEMS OF NORTH EASTERN INDIA

Silk	Principal silkworm	Host plants	Rearing system	Regional concentration	Silk Properties
Eri	*Samia ricini* (Donovan)	Castor, *Ricinus communis*; kesseru, *Heteropanax fragrans*; tapioca, *Manihot esculenta*; borpat, *Ailanthus* spp.	Indoor, multivoltine, household based	Assam, Bodoland, Meghalaya, Nagaland, Manipur and Arunachal Pradesh	Open or discontinuous cocoon; normally spun rather than reeled; warm, soft yarn
Muga	*Antheraea assamensis* Helfer	Som, *Persea bombycina*; soalu, *Litsea monopetala*; secondary *Litsea* spp.	Outdoor, semi-domesticated, multivoltine	Assam and Bodoland; also Meghalaya and smaller pockets in other states	Naturally golden, lustrous filament; premium cultural textile
Mulberry	*Bombyx mori* L.	Mulberry, *Morus* spp.	Indoor; plantation-based leaf production; crossbred and bivoltine races	Manipur, Tripura, Mizoram, Meghalaya and parts of Assam	Reelable continuous filament; established national processing market
Oak tasar	*Antheraea proylei* Jolly	*Quercus serrata*, *Q. griffithii*, *Q. acutissima* and related oak flora	Outdoor, seasonal, forest or plantation linked	Manipur and smaller hill belts of Nagaland, Mizoram, Meghalaya and Arunachal Pradesh	Coarser wild-silk filament with distinctive texture

Source: Keisa et al., 2022 [15]

2.3 Mulberry Silk

The mulberry silkworm (*Bombyx mori*) is the most important insect used in sericulture for silk production which are fully domesticated. They fed entirely on species belonging to the Morus family and constitutes nearly 77% of India's total raw silk output. They are commonly grouped into univoltine, bivoltine, and polyvoltine races, with bivoltine races generally preferred for producing better-quality silk. The quality and grades are only largely depending on the silkworm hybrid used and the technology adopted also. Compared to other classes of silkworms, the mulberry silkworm has been the subject of extensive experimental research and novel observations. Varying the duration of UV exposure on eggs drastically changes the economic parameters of the resulting cocoons; however, the tolerant bivoltine breed WB1HH demonstrated superior performance compared to others[2]. Although, multi × bi crossbreeds can be preserved for up to 75 days using double-step refrigeration without compromising the hatching percentage[40]. Among different mulberry species, *Morus alba* is widely cultivated and preferred due to its high nutritional quality, soft and succulent leaves, better moisture content, and balanced composition of proteins, carbohydrates, vitamins, and amino acids that support healthy larval growth and superior cocoon production[16]. The art of mulberry sericulture is adopted across different regions of the north east region ranging from the high altitude to the plain. Tripura being the highest producers with a production of 117MT and Sikkim with 0.4MT accordingly to the seri state report of 2024-2025.

2.4 Tasar Silk

Still with the undergoing development of the country, tribals reside in the forest where naturally important host plants of Tasar silkworm is easily available. Tasar sericulture is carried out the tribal people due to its sustainability and less inputs giving them a promising return generating income to the family involved in the production of the cocoons. It also plays a vital role in uplifting the socio-economic status of tribals with the employments engaged in the culture activities[17]. The wild silk Tasar is generally categorized in two which includes tropical Tasar and temperate (Oak) Tasar. The former is secreted by *Antheraea mylitta* that feeds on Asan (Terminalia tomentosa) and Arjun (Terminalia arjuna) as the primary host plants, while the latter is

a product of *Antheraea proylei* that fed on the oak plant of the genus Quercus. Some important oak varieties that serve as the host for this insect are *Quercus serrata, Quercus incana, Quercus semicarpifolia, and Quercus griffithii*. These varieties of oak trees are prevalent in the sub-Himalayan and North-Eastern hill areas of India. The cultivation of tropical Tasar takes place majorly in the forest areas of the central and eastern parts of India, including Jharkhand, Chhattisgarh, Orissa, Maharashtra, and North Eastern region of India and the temperate Tasar is geographically to the sub-Himalayan regions from Kashmir to Manipur[18]. It is interbred between the male Indian species of A. proylei with the female of Chinese species of A. pernyii G[19]. The oak Tasar is a semi-domesticated, bivoltine species that are fully domesticated domesticated in the north-western part of India and bred in the open field in the north-eastern part of India. The fibre released by them is quite valuable due to its similarity to Muga silk fiber[20]. The production is limited to states like Himachal Pradesh, Manipur, Mizoram, Nagaland, and Uttarakhand. According to the available data of Central silk Board, Manipur remains the leading producer of oak Tasar silk. But in the recent years, a decline in the production was from 5 MT in 2019–20 to 2 MT in 2023–24 [21,22,23,24,25,26]. Others state which took part in the production contribute marginally and show irregular trends. During 2023–24, Uttarakhand recorded a production of 0.1 MT, up from 0.03 MT in 2019–20, while Nagaland produced 0.08 MT compared to 0.023 MT in 2019–20. Conversely, Mizoram experienced a significant reduction, with production falling sharply from 0.15 MT in 2019–20 to just 0.01 MT in 2023–24.

2.5 Eri Silk

Ericulture is among the most significant and fastest growing non-mulberry sericulture that is closely linked to the agricultural practices of the people in Northeast India along with encouragement towards women's participation as well. It integrates agriculture with textiles and generates income through a number of processes within the value chain that require relatively less dependence on external resources and can also be practiced by combining small scale farms with household labour. The Eri silkworm is both polyvoltine and polyphagous in nature thus capable of feeding on different types of host plants like castor (*Ricinus communis*), Kesseru, Tapioca, Payam, Borpat, and Borkesseru etc. The domestic Eri silkworm, *Samia ricini*, is the most commonly used variety in commercial production while the wild Eri silkworm, *Samia canningi*, provides its genetic resource base for breeding Programme[27]. With the unique character of open-ended cocoons, the Eri silk is known as Ahimsa Silk defining the non-violent completion of metamorphosis. Different races of the Eri silkworm like the yellow plain, yellow spotted, and greenish-blue zebra which possess diverse genetic bases are making them capable of producing better quality cocoons and adapting to adverse climatic conditions[38,39]. Believe to be originated in the Nort-East India with native place of Brahmaputra valley of Assam and its adjoining foothills of Sub-Himalaya belt, rearing of Eri has always been a traditional practice and heritage for the tribal communities since time immemorial with time traces back as far as 1600 BC[28]. According to the annual report (2024-2025) of the Central silk Board, the North-East region dominates the production with a total of 7,799 Metric Tonnes (MT) contributing nearly 99% of India's total Eri silk production. Among the states Assam hold the leading producer followed by Meghalaya, Nagaland, Manipur, Arunachal Pradesh and Mizoram. Apart from the traditional states, its production has successfully expanded to different parts of the country like Uttar Pradesh, Andhra Pradesh, Telangana, Maharashtra, and Bihar also. With the recent launch of the "Eri Sericulture Promotional Project" in Gujarat, Eri cultivation is introduced in the entirely new region. Ericulture, the cultivation of the *Philosamia ricini* (or *Samia ricini*) silkworm primarily on castor and kesseru leaves, generates several valuable materials alongside its silk. Because the Eri silkworm leaves a hole in its cocoon when the moth emerges, the silk filament is non-continuous and cannot be reeled like traditional mulberry silk; instead, all Eri silk must be spun into yarn. Another product of Eri-culture besides their silk which generates substantial income is the pupa which are rich in proteins. The pupa is the delicacy of the north eastern region among the tribal communities.

2.6 Muga Silk

The history of Muga culture that are closely associated with the Assamese dates back more than a millennium, with records of Muga silk tracing back to as early as the 4th century AD. Muga silk was regarded as a symbol of wealth and prestige during the ancient time for royalty and was traditionally used in their attire. With the advancing generations, it has now become an integral part of Assamese cultural heritage and identity. Apart from Assam, other northeastern states also contribute significantly to Muga production, particularly through the endemic silkworm *Antheraea assamensis* Helfer, which is renowned for its naturally lustrous golden silk[29]. As they are reared outdoor on the host plant, constraints like fluctuation environment, pest and disease pressure on both the host plant and silkworm creates production risks. Improved rearing practices, quality seed, management of the host plant should balance the improvement and conservation of the silkworm[30]. According to the DOS, Assam, the species is confined to the north east with 95-99%of the raw silk production highlighting its regional

specificity. The Muga silkworm fed primarily and commercially on Som (*Persea bombycina*). They are also reared on several species of host plant Soalu (*Litsea monopetala*), Dighloti (*L. salicifolia*) and Mejankari (*L. citrata*) if Som is not available[31].

III. PRESENT STATUS OF SERICULTURE IN NORTH-EASTERN INDIA

The northeastern region occupies a distinctive position in India's silk economy due to the importance of eri and muga production. Latest raw silk production of the North-East region states according to the available sources from the official website of the Central Silk Board sharing the raw silk production of India (Table 2) and major raw silk varieties producing area (Production in MT) in the year 2024-2025 (Table 3)

TABLE 2

NORTH-EAST RAW SILK PRODUCTION: 3-YEAR COMPARISON FROM 2022-23, 2023-24, AND 2024-25

State / Region	2022-23 (MT)	2023-24 (MT)	2024-25 (MT)	Growth (23-24 to 24-25)	Share of NE Total (2024-25)
Arunachal Pradesh	61.0	69.0	69.0	0.0%	0.8%
Assam (State)	4,218.0	4,240.0	4,794.0	+13.1%	57.3%
Bodoland (BTC)	1,503.0	1,505.0	1,511.0	+0.4%	18.1%
Manipur	454.0	83.0	180.0	+116.9%	2.2%
Meghalaya	1,168.0	1,176.0	1,199.0	+2.0%	14.3%
Mizoram	84.0	84.0	86.0	+2.4%	1.0%
Nagaland	350.0	399.0	408.0	+2.3%	4.9%
Sikkim	0.4	0.5	0.4	-20.0%	0.0%
Tripura	115.0	116.0	117.0	+0.9%	1.4%
Total North-East	**7,953.4**	**7,672.5**	**8,364.4**	**+9.0%**	**100.0%**

Sources: CSB Annual Reports (2022–2025). Note: Values are approximate for intermediate years based on available data.[21,22,22]

TABLE 3

NATIONAL & NORTH-EAST SILK VARIETY BREAKDOWN (2024-25)

Silk Variety	India Total (MT)	North-East Total (MT)	NE Share of National Output (%)	Primary NE Producing States
Mulberry Silk	31,119.0	329.4	1.1%	Tripura (117 MT), Mizoram (67 MT), Meghalaya (66 MT)
Tasar Silk (Oak Tasar in NE)	1,884.0	2.0	0.1%	Manipur (2 MT)
Eri Silk	7,886.0	7,799.0	98.9%	Assam incl. BTC (6,108 MT), Meghalaya (1,091 MT), Nagaland (403 MT)
Muga Silk	232.0	231.9	99.9%	Assam incl. BTC (181 MT), Meghalaya (42 MT), Mizoram (5 MT)
Grand Total	**41,121.0**	**8,362.3**	**20.3%**	**North-East produces ~20.3% of India's total raw silk**

Sources: CSB Annual Reports (2024-2025)[21]. Note: Values are approximate for intermediate years based on available data.

IV. MAJOR CONSTRAINTS

Although sericulture is one of the livelihood activities in North-East India, the potential is limited by the several factors. Constraints like biological, environmental, technological and socioeconomic factors affect the production of the silks besides diverse climatic conditions. The challenges also differ from silkworm species also. The variability in the climatic condition is a significant challenge although with the humid climate favourable for the Muga silkworm, the substantial rainfall that favours the growth of the several host plant. The rearing operation is interfered by high humidity, temperature fluctuation, flooding, excessive rainfall affecting feeding, larval growth, pupation and survivability leading to the shortage of the seeds[32]. The heavy rainfall can damage host plant disrupting the availability of the suitable leaves of Eri and Mulberry silkworm leading to underperformance of rearing and cocoon production. The shortage of DFLs at the required time affects the commercial production is a major limiting factor. The seed depends on the preceding crops of the unfavourable conditions which calls for breeds that are climate resilient to overcome the problem of less fecundity, hatchability, male sterility, reduce cocoon yield etc.[33]

Pest and disease are one of a major challenge facing in the industry that causes substantial loss extending to non-availability of the seed crop. Different factors lead to the outbreaks, in case of the Muga culture they are vulnerable to the predators, environment conditions besides the pest and disease. In the indoor Eri culture, they are mainly due to poor hygiene, inadequate ventilation, poor management of the room influencing the pest and disease to occur. The cleanliness and maintenance of the rearing site, host plant, grainge facilities also risk the occurrence of the disease[7]. The traditional practices followed by the farmers does not cope the changing environmental stress. Stickiness to the traditional ideas without adoption of the improve practices restricted in uplifting the industry and poor-quality silk. The limited access to the improved spinning and reeling equipment's constraints the productivity, standardization and buyers' requirements.

Lack of a proper market and instability of the price is also an important factor where farmers face difficulties in obtaining their remunerative prices. The weak market linkages and fragmented chains between the buyer and sellers create a serious challenge in North-East Sericulture. The concern arises when producers have little information about prevailing prices or few alternative buyers. Under these conditions, farmers may have limited bargaining power and may receive a small share of the final product's value. In addition, consumers may recognise traditional silk products without necessarily understanding differences in silk type, authenticity, origin or production method.

Sericulture is a women empowered industry where they make major contributions in several sectors from rearing, spinning, weaving and of cultural significance. However, younger generation shifted toward other industry and no longer engage in sericulture creating lack of labours and intergeneration continuity. Others factors are gaps in extension services and institutional coordination with the existing farmer, conservation of indigenous silkworm resources and traditional production systems for long-term sustainability of regional silk systems, weak value addition and limited product diversification besides the yarns and unable to identify the causes of the crop failure at the earliest.

V. STRATEGIES FOR SUSTAINABLE DEVELOPMENT

A coordinated and science-based development strategy is essential for strengthening the entire oak tasar sericulture value chain in Manipur. Sericulture can contribute to rural employment, income generation, and livelihood diversification when production, processing, and marketing activities are supported through appropriate institutional mechanisms (Food and Agriculture Organization of the United Nations [FAO], 2025[34]. The Central Muga Eri Research and Training Institute (CMER&TI) has identified productivity increase and the creation of sustainable and profitable oak Tasar firms as key research targets[35].

First, the state should establish an updated baseline database covering district-wise includes information on rearer populations, host-plant resources, silkworm seed availability, cocoon production, silk recovery, production costs, and household income. Accurate baseline data would help in evidence-based planning, identify regional limitations, and support the evaluation of development programmes. Given the historical evolution of oak Tasar sericulture in Manipur and the necessity of evaluating its current state, this is especially crucial[36].

Second, plantation development, regeneration, and sustainable management of existing oak vegetation should all be done in a way that strengthens host-plant resources. A consistent food supply for oak Tasar silkworms depends on the selection of appropriate Quercus species, preservation of regional biodiversity, and evaluation of seasonal leaf availability. Ecological restoration and host-plant development have also been recognised as crucial elements of sustainable Tasar value-chain initiatives in India[37].

Third, there should be easier availability to high-quality silkworm seed and regionally approved rearing methods. To increase silkworm breed development, seed production, quality control, and disease management techniques, research institutions and sericulture departments should work together. An essential part of CMER&TI's research mandate is the creation of affordable technology to increase oak Tasar productivity (CMER&TI).

Fourth, regular training programmes, field demonstrations, and extension services should be provided to improve the technical knowledge and skills of silkworm rearers. Training should cover host-plant management, silkworm rearing, pest and disease prevention, cocoon harvesting, and post-cocoon processing. Effective extension support is particularly important because inadequate technical assistance and irregular access to silkworm seed have been identified as constraints in Tasar-based livelihood programmes[37].

Fifth, post-harvest infrastructure and producer organizations should be strengthened to improve cocoon processing, reeling, spinning, weaving, product quality, and market access. Collective procurement and marketing, the promotion of local entrepreneurship, and the development of value-added silk products can help improve producer participation in the value chain and reduce dependence on intermediaries[36]. Such initiatives should be adapted to the specific ecological, technical, and market conditions of oak Tasar sericulture in Manipur.

Sixth, stronger collaboration among research institutions, government departments, cooperatives, and local communities is necessary to address emerging challenges. Collaborative research should focus on pest and disease surveillance, climate resilience, host-plant productivity, silkworm survival, and improved rearing practices. CMER&TI's research and development activities provide an institutional basis for strengthening research-led improvements in oak Tasar production and post-cocoon processing[35].

Finally, the effectiveness of development programmes should be assessed through measurable performance indicators, including rearer participation, host-plant survival, larval survival rate, cocoon yield, silk recovery, household net income, women's participation, and the proportion of produce marketed as higher-value yarn or finished products. Periodic monitoring of these indicators would help identify successful interventions, improve resource allocation, and support the long-term sustainability of the sector. Overall, integrating scientific research, ecological conservation, capacity building, institutional coordination, and market development could strengthen oak Tasar sericulture as a viable livelihood activity in Manipur.

VI. FUTURE PROSPECTS

The region of North-Eastern India with its favourable agroclimatic condition, rich heritage and biodiversity has vast scope for development of all the types of commercial sericulture particularly in Eri and Muga along with mulberry and oak Tasar. However, the development depends on improving existing constraints faces at production and adoption of the new technology. Following scientific way of rearing, host plant maintenance, timely prevention steps of pest and disease, disease free laying, climate resilience breeds etc can reduce crop loss and improve production with the changing environmental conditions. Technologies suited with the diversity of the region would facilitate the development and adoptions by the farmers. Conserving the genetic resource of the silkworm at their habitat is important at preserving the unique heritage. Regular farmer interaction with practical demonstrations, encourage adoption of new technologies, promoting value added products besides the tradition's textiles will increase return income through sericulture. Development of market creating direct links between the producers and reelers with transparent price, supported by the consumers demands will promote regional silk of the north eastern states with authencity. Strengthening community level interaction between the farmers and research institute will ensure practical benefits as well as skill development. Post cocoon activities of reeling and spinning, cocoon storage and training for cocoon processing with services to repairment will reduce the unavoidable loss giving more opportunities to young entrepreneur of the regions also. Ultimately, the objective should extend beyond increasing silk production to building a resilient and economically viable sericulture sector that preserves traditional knowledge, creates rural employment and ensures better returns for silk producers.

VII. CONCLUSION

Sericulture in Northeast India stands out because it is both an economic and cultural activity. The region has a rich variety of silks, including both mulberry and wild types. Many rural households, especially women in tribal and farming communities, rely on sericulture for their livelihoods. In recent years, the production of Eri and Muga silk has grown steadily, thanks to government and research efforts. However, challenges like poor seed quality, pests, diseases, and climate risks still limit productivity. Addressing these issues calls for a systems approach that improves seed and host plant quality, uses integrated

pest management, and strengthens market connections. There is a lack of social research on how technology is adopted and on the economics of sericulture. For the sector to develop sustainably, policy and research must work together. Policies should support small-scale rearers with extension services and credit, help women's sericulture businesses, and encourage planting more silk host trees. Researchers should also collaborate with local communities to make sure new technologies, such as improved silkworm hybrids and digital tools, are suitable and can be used effectively. With its natural advantages and the right focus on social and technical challenges, sericulture in Northeast India could do much more to improve rural livelihoods and protect its unique silk heritage.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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