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Socio-Economic Status of Muga Silk Weavers In Assam: Livelihoods, Structural Constraints and Policy

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Abstract

Muga silk, produced by the semi-domesticated silkworm Antheraea assamensis, is a distinctive natural fibre associated with Assam's cultural heritage and rural economy. Its production links host-plant cultivation, silkworm rearing, cocoon harvesting, reeling and weaving, creating livelihood opportunities across a largely traditional value chain.This study explores the socio-economic conditions of Muga silk weavers and the various factors influencing the long-term sustainability of their livelihoods. The analysis is based on secondary data and follows a descriptive research approach, drawing information from historical records, published studies on Muga silkworm biology and rearing practices, research on the adoption of improved technologies, and official reports of the Assam Directorate of Sericulture. The literature indicates that Muga production is constrained by low or uneven adoption of scientific practices, exposure to weather and biological risks, limitations in seed and host-plant management, cocoon-storage and market infrastructure gaps, and difficulties in translating the cultural value of Muga into stable returns for producers. These production-side constraints can affect household income and the bargaining position of rearers, reelers and weavers. The paper argues that livelihood improvement requires a value-chain approach combining accessible extension services, quality seed systems, climate-risk adaptation, improved reeling and market infrastructure, collective marketing, and social protection for informal workers. Because the present study relies on secondary sources, it does not claim to estimate current household income or represent all Muga weavers in Assam. Further field research disaggregated by gender, occupation and district is required.

Keywords: Muga silk; Antheraea assamensis; socio-economic status; handloom; sericulture; rural livelihoods; Assam

1. Introduction

Sericulture is an agro-based livelihood system connecting host-plant management, silkworm rearing, cocoon production, reeling and textile manufacture. In Assam, Muga silk has particular cultural and economic significance because it is produced by Antheraea assamensis, a silkworm native to north-eastern India, and is valued for its naturally golden appearance and durability (Tikader et al., 2013; Devi et al., 2021). The Assam Directorate of Sericulture identifies Muga as a distinctive silk tradition of the region and describes its production as concentrated in several districts of the state (Directorate of Sericulture, Government of Assam,n.d.).

The value chain depends on both biological conditions and the skills of rural producers. Rearers manage host plants and outdoor silkworm crops; other workers participate in cocoon handling, reeling, yarn preparation, weaving and marketing. Consequently, the socio-economic status of weavers cannot be understood solely through the price of finished cloth. It is connected to access to raw material, production risks, equipment, credit, training, market information and the distribution of value between different actors.

Published research has documented persistent barriers to scientific practice adoption and the effects of weather and biological risks on Muga rearing. A study of 120 rearers in Sonitpur identified constraints including adverse climatic conditions, limited technical knowledge, inadequate cocoon storage, weak regulated-market access and delays in obtaining loans (Saikia et al., 2024). Research on Muga silkworm biology similarly highlights disease, predators and climatic variation as significant production risks (Tikader et al., 2013). These constraints matter to weavers because instability in cocoon availability and quality can influence input costs, production continuity and earnings.

2. Statement of the Problem

Muga silk has strong cultural recognition, yet cultural prestige does not automatically ensure secure livelihoods for the people who produce it. The value chain includes separate activities and occupations, and workers may experience different constraints depending on whether they rear silkworms, process cocoons, reel yarn, weave textiles or sell finished products. Production uncertainty, limited access to improved technology, uneven market infrastructure and weak collective bargaining can restrict the income and resilience of households engaged in the sector. A clear, evidence-based account of these issues is needed to guide policy support while distinguishing documented findings from assumptions that require field verification.

3. Methodology

This paper adopts a descriptive and analytical review design based on secondary sources. The source material includes historical accounts cited in the original manuscript, peer-reviewed research on Muga silkworm biology and host plants, studies of technology adoption and production constraints, and information published by the Directorate of Sericulture, Government of Assam. The review organises the material into four themes: (i) historical and cultural significance; (ii) production technology and biological risk; (iii) livelihood and market constraints; and (iv) policy and institutional support.

No new household survey, interview or original statistical analysis was conducted. Accordingly, numerical results from individual studies are attributed to those studies rather than presented as estimates for all of Assam. The paper does not infer current income, education, health or gender- disaggregated conditions where the reviewed sources do not provide directly comparable evidence. A systematic review protocol, search dates, inclusion criteria and quality appraisal should be added if the target journal requires a formal systematic review.

4. Review of Literature

4.1 Historical and cultural importance

Historical accounts describe silk as an established part of Assam's material culture and trade. The original manuscript cites Helfer (1837), Watt (1893), Gait (1905), Robinson (1941) and Barua (1969) on indigenous silkworms, silk production and the historical value of Assamese silk. These older sources are useful for tracing historical descriptions, but their statements should be interpreted in their historical context and not treated as evidence of present-day income or working conditions. Contemporary research also records the transmission of traditional knowledge and practices in Muga rearing in rural Assam (Chakravorty et al., 2015).

4.2 Biology, host plants and production performance

Muga production depends on Antheraea assamensis and its host plants, particularly Persea bombycina (commonly known as som) and Litsea monopetala (soalu). Devi et al. (2021) review the diversity and use of host plants and note that the two principal species are the most commercially utilised. Tikader et al. (2013) review the silkworm's distribution, biology and breeding, including production challenges associated with disease, natural enemies and environmental variability. This literature shows that the quality and availability of host plants, crop timing and rearing conditions are central to production outcomes.

4.3 Technology adoption and extension

Technology adoption is uneven across practices. The original manuscript summarises Mech et al. (2016) and Mech (2018) as finding low or moderate adoption of several improved practices among Muga farmers in Golaghat, with particularly limited use of selected disease-management and seed-quality practices. More recently, Saikia et al. (2024), in a study of 120 Muga rearers in Sonitpur, identified inadequate knowledge of host-plant cultivation and rearing practices, limited interest or capacity to adopt technology, lack of land and delayed credit as reported constraints. These findings support the need for practical, repeated extension rather than assuming that information alone will produce adoption.

4.4 Climate, pests and production uncertainty

Outdoor rearing exposes Muga silkworms to changing temperature, rainfall, humidity and biological threats. Tikader et al. (2013) describe the importance of disease resistance, host-plant knowledge and improved rearing practices. Das et al. (2023) examine climate-change implications for Eri and Muga cultivation and rural income and employment in Assam. Such evidence indicates that production risk is not only a biological issue: crop loss can also affect household cash flow, labour use and the availability of cocoons for downstream processing.

4.5 Reeling, markets and livelihood security

The transition from cocoon to yarn is another important part of the value chain. The original manuscript cites Munshi et al. (2015) on quality characteristics and reeling performance, and reports concerns about filament breakage and reeling speed. Saikia et al. (2024) also identify the lack of cocoon-storage facilities and regulated markets among the constraints reported by rearers. These issues can weaken product consistency and make producers more dependent on intermediaries. However, the available sources do not provide a consistent, state-wide estimate of weaver earnings, profit margins or the share of final retail value received by each occupation; these questions require dedicated fieldwork.

4.6 Geographical indication, authenticity and value capture

Muga Silk of Assam received geographical-indication registration in 2007, and the official registry records the product as registered with Assam as its geographical area (Office of the Controller General of Patents, Designs and Trade Marks, n.d.). This recognition can support product differentiation and help protect the geographical name, but registration alone does not establish that additional value reaches rearers, reelers or weavers. The livelihood effect depends on awareness of the GI, producer participation in authorised-user arrangements, consumer ability to distinguish authentic products, and effective monitoring of misleading claims. The policy question is therefore not simply whether Muga has GI status, but whether the protection is linked to traceability, market information and fairer returns for producers. The available evidence in this review does not quantify the income effect of GI protection; that relationship requires direct investigation.

4.7 Gendered labour, skills and continuity of traditional knowledge

Muga production combines specialised ecological knowledge with skilled textile work. Research on traditional Muga rearing in Dhemaji documents the relationship between cultural practices and knowledge transmission (Chakravorty et al., 2015), while a recent case study of Sualkuchi examines livelihood challenges among Muga silk saree weavers and notes the importance of women's weaving work (Jamal et al., 2025). These sources support treating skills, household labour and intergenerational learning as part of livelihood security rather than as cultural context alone. However, the evidence reviewed here is not sufficient to calculate women's share of employment or compare earnings by gender across Assam. Future district-level research should record who performs each stage of production, how skills are acquired, how work is paid, and whether producers have access to training, credit, collective marketing and social protection.

5. Analysis and Discussion

5.1 Socio-economic implications across the value chain

The literature suggests that the livelihood conditions of Muga workers are shaped by the interaction of production risk, access to technology and the organisation of markets. When crop output is uncertain, rearers may have less predictable cash income and may struggle to meet household or production expenses. If cocoon storage, grading and market access are weak, the ability to delay sales or negotiate prices may also be limited.

For reelers and weavers, irregular supply or variable cocoon and yarn quality can complicate production planning and increase costs. These are plausible value-chain mechanisms supported by the documented production and market constraints, but their magnitude must be measured through current field data.

Women's contribution should be examined explicitly rather than treated as a general assumption. The Muga value chain contains activities that may be distributed by gender, household role, skill and access to assets. A publishable empirical study should report the gender composition of its sample and distinguish the work and earnings of rearers, reelers and weavers. The current secondary-source material does not support a precise estimate of women's share of the workforce or a state-wide claim about their earnings, so such figures have not been asserted here.

5.2 Structural barriers

Four linked barriers recur in the literature. First, technical and extension gaps may limit adoption of improved rearing, host-plant and disease-management practices. Second, outdoor rearing and biological threats expose production to weather variability, pests and disease. Third, weak storage, reeling and market infrastructure can reduce efficiency and bargaining power. Fourth, limited access to timely credit and risk protection can make it difficult for producers to invest in improved methods or recover from crop failure (Mech et al., 2016; Tikader et al., 2013; Saikia et al., 2024). These constraints are interdependent and should therefore be addressed as a connected system rather than as isolated problems.

5.3 Limitations of existing evidence

The studies reviewed differ in location, sample, methods and date. Findings from a district-level sample cannot automatically be generalised to all Muga-producing districts or to weavers specifically. Some of the original manuscript's numerical statements lack a sufficiently complete citation or a clearly stated reference year; those figures have not been carried forward as statewide facts. A stronger empirical paper should collect primary data from a defined sample of weavers and other value-chain participants, report sampling procedures and field dates, and distinguish household income from earnings attributable to Muga work.

6. Findings from the Literature

1. The literature identifies Muga as a culturally distinctive livelihood system whose outcomes depend on connected stages of host-plant management, silkworm rearing, cocoon handling, reeling, weaving and marketing (Tikader et al., 2013; Directorate of Sericulture, Government of Assam, n.d.).
2. Technology adoption and extension remain important concerns. A study of 120 rearers in Sonitpur reported constraints involving technical knowledge, host-plant cultivation, credit and market infrastructure (Saikia et al., 2024). This district-level evidence should not be treated as a statewide estimate.
3. Weather variability, disease and natural enemies create production uncertainty, which can affect cocoon availability and the continuity of downstream work (Tikader et al., 2013; Das et al., 2023).
4. Weak storage, reeling and market arrangements may limit quality consistency and bargaining capacity. The reviewed literature does not provide a comparable statewide estimate of weaver earnings or the distribution of final product value.

5. GI registration provides a formal mechanism for recognising Muga Silk of Assam, but the livelihood benefits for producers cannot be assumed without evidence about authorised-user participation, enforcement and value distribution (Office of the Controller General of Patents, Designs and Trade Marks, n.d.).
6. Traditional knowledge and weaving skills are central to continuity of the sector. Existing studies provide a basis for investigating gendered labour and intergenerational skills, but further fieldwork is needed to establish gender-disaggregated employment and income patterns (Chakravorty et al., 2015; Jamal et al., 2025).
7. The evidence base is heterogeneous in geography, methods and period. Current claims about income, welfare and working conditions should therefore be tested through transparent district-level research that distinguishes rearers, reelers and weavers.

7. Policy Recommendations

Strengthen field extension: provide regular, locally accessible demonstrations on host-plant management, scientific rearing, disease surveillance and safe pest management; evaluate adoption after training rather than counting training sessions alone.
Improve seed quality and crop planning: strengthen disease-free seed production, testing and distribution, and clarify operational arrangements between seed-crop and commercial-crop rearing where supported by local technical assessment.
Build climate resilience: disseminate locally appropriate advisories on crop timing and weather risks; test affordable protective measures and document their cost effectiveness before scaling them.
Upgrade post-cocoon infrastructure: improve cocoon handling, storage, grading, reeling equipment maintenance and access to technical services so that producers can reduce avoidable quality loss and improve consistency.
Improve market access: support producer groups and cooperatives, transparent price information, collective marketing and reliable buyer linkages. Evaluate digital platforms only where producers have access, training and sufficient market demand.
Expand financial protection: improve timely access to suitable credit and explore insurance or contingency support designed around the production cycle and the risks faced by rearers and small-scale workers.
Recognise informal workers: assess feasible routes to occupational safety, health coverage, social security and skills certification for rearers, reelers and weavers, with particular attention to workers who lack formal employment relationships.
Protect authenticity and cultural value: strengthen awareness of geographical indication and authenticity mechanisms while ensuring that benefits reach producers and artisans, not only downstream sellers.
Generate better evidence: commission district-level studies that record income sources, production costs, education, asset ownership, credit access, gendered division of labour, market channels and welfare-scheme access using transparent methods.

8. Conclusion

Muga silk is both a distinctive cultural product and a livelihood system that depends on the work of rural producers across several stages of production. The literature reviewed for this paper identifies constraints involving technology adoption, host-plant and seed management, climatic and biological risk, post-cocoon handling, market access and credit. These constraints may undermine income stability and the long-term sustainability of Muga-based livelihoods even where the product has strong cultural recognition and market value. Policy responses should therefore connect extension, production resilience, post-cocoon infrastructure, collective marketing and social protection.

This paper is a secondary-source review and should not be read as a new survey of the socio-economic status of all Muga weavers in Assam. The next research step is a transparent, district-based field study that distinguishes weavers from rearers and other workers, documents gender and household conditions, and measures income and costs using clearly described methods. Such evidence would enable more precise recommendations and provide a stronger empirical foundation for publication.

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