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Tapioca reservoirs in Meghalaya: Unlocking potential to revitalise Eri silk production and strengthen rural livelihoods

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Abstract

The convergence of Meghalaya indigenous Eri silk tradition with its underutilised tapioca resources—both wild and cultivated—presents a unique opportunity for inclusive rural development. Harnessing these ecological resources can help the state sustainably expand its economy, uplift rural livelihoods and position itself as a leader in ethical and regenerative textile production. This is a crucial moment for Meghalaya to shape a new economic narrative by promoting its silk industry anchored in cultural heritage, driven by environmental stewardship and sustained by the richness of its forests and farmlands.

Keywords

agro-forestry; eri silkworm; genetic resources; host plant; rural livelihood; sericulture; tapioca

Introduction

Eri silk, also known as Ahimsa silk, stands apart from other silk varieties due to its ethical production process that does not involve killing of the silkworm. The silk is spun from open-ended cocoons and is known for its durability and thermal properties. Eri culture, indigenous to Northeast India, is deeply rooted into the culture and traditions in states like Meghalaya, Assam, Nagaland and Arunachal Pradesh. In 2024–25, India produced a total of 41121 metric tonnes of raw silk, with Eri silk accounting for 7886 metric tonnes alone (1). India remains the only country producing all four major silk types, viz. Mulberry, Eri, Tasar and Muga with over 7.6 million people employed in sericulture across approximately 51000 villages (2).

In Meghalaya, Eri silk, known as Ryndia contributes nearly 22.6 % of India's total Eri silk production. More than 50000 families are engaged in Eri silk farming, with around 80 % of them being women, playing a crucial role in spinning and weaving (3). Eri silkworm (*Samia ricini*) farming relies on host plants such as castor (*Ricinus communis* L.), kesseru (*Heteropanax fragrans* (Roxb.) Seem.), tapioca (*Manihot esculenta* Crantz.) and a few others, which serve as their food sources (4–5). Increasing awareness, sustainable practices and support for women artisans have made Eri culture not just a livelihood activity but a culturally and environmentally significant tradition in the region.

1.1. Eri silk in Meghalaya: A sector in transformation

The Eri silk industry in Meghalaya is centered on the domesticated, multi-voltine Eri silkworm which primarily feeds on castor leaves, though kesseru and tapioca are increasingly recognised as viable alternatives (6). Eri silk production is not merely an income-generating activity; it is embedded in Khasi, Jaintia and Garo tribal traditions in the state. The hand-woven fabric, locally known as Ryndia, symbolises ecological harmony and cultural heritage. Women are the main custodians of this traditional knowledge, using indigenous looms and natural dyeing methods to create garments often worn during festivals and ceremonial events (7).

In 2024–25, the state produced approximately 1069 metric tonnes of Eri raw silk supported by a network of 37303 Eri farmers (8). The current area under Eri host plantation spans up to about 9336 ha. As of 2025, the industry holds an economic valuation of ₹35.595 billion, with ambitious projections to scale up to ₹100 billion by 2030 contributing nearly 20 % of Meghalaya's Gross State Domestic Product (GSDP) in the coming years (3). However, one underutilised but highly promising resource that could catalyse this growth is tapioca, both in its cultivated and wild forms. Meghalaya's rich tapioca plantations and wild forest varieties provide a low-cost, locally sourced and ecologically sustainable alternative to the traditional castor leaves used as feed for Eri silkworms.

Tapioca: A natural ally for Eri culture

Using tapioca as feed for Eri silkworms offers several key advantages. It is locally available, widely distributed across Meghalaya and primarily cultivated by women and smallholder farmers. Compared to castor, tapioca requires lower input costs and reduces dependence on limited castor plantations for Eri silkworm rearing (5). Its integration aligns well with forest-based and eco-friendly agricultural practices. Known for its resilience and adaptability, tapioca is grown across 5463 ha in Meghalaya, producing 35979 t of tubers annually (9). It is cultivated through diverse systems like Jhum (shifting cultivation), small-holdings, homesteads and mixed cropping mainly by tribal women.

Tapioca serves a dual role in food security and livestock feed management. Its leaves are valuable feed for Eri silkworms, making it an ideal crop to integrate into the Eri culture system (10). Although, Eri silkworms are reared on castor leaves traditionally (11), however, tapioca leaves have potential to serve as viable and locally available

alternative, especially in forested and rural areas. Currently, only 73 ha of land in Meghalaya are covered by castor plantations (12). In contrast, widespread growth of tapioca especially in open forest regions offers a vast, untapped reservoir for silkworm feed. Meghalaya's forest cover spans approximately 16966.8 km² (1.697 million ha), with open forest zones particularly rich in wild and cultivated tapioca (12). These regions can potentially become key hubs for expanding Eri silk production without requiring major agricultural shifts.

Tapioca in Meghalaya: A largely untapped resource

It is an important food and fodder crop in rural diets and is now being recognised for its value in Eri silkworm rearing (13). Tapioca cultivation during the kharif season in Meghalaya covers a large area with an average yield of 6.59 t ha⁻¹ of tubers. Meghalaya holds the 5th position in tapioca production in India, with Tamil Nadu leading the nation at the top of the chart. Beyond cultivated areas, wild tapioca is abundantly available in foothills of the state and traditional jhum zones, offering additional untapped feed resources for Eri silkworm rearing (14).

Further, tapioca flourishes naturally mostly in the open forest areas of Meghalaya (15). These forest-based “tapioca reservoirs” remain unexplored for industrial use particularly for silkworm feed, which presents a huge opportunity (Fig. 1). Castor cultivation in Meghalaya is limited while tapioca is grown in about 5463 ha across the state besides naturally grown tapioca reservoirs (12). This means, tapioca is over 74 times more abundant than castor, highlighting its vast potential as an alternative and more scalable feed source for Eri silk production.



Fig. 1. Naturally grown tapioca in Meghalaya (East Garo Hills, West Garo Hills and Ri-Bhoi district).

Wild tapioca: A genetic and ecological resource

Tapioca commonly grows in a semi-wild and wild habitat or feral forms exhibit greater genetic diversity, stronger resistance to pests and diseases and better adaptability to marginal, low-input agro-ecological conditions than commercial cultivars. Their inherent tolerance to abiotic stresses such as drought, nutrient-poor soils and irregular rainfall positions them as valuable genetic resources for crop improvement, especially under projected climate variability (5). From an ecological standpoint, wild and semi-wild tapioca contribute to nutrient cycling, soil stabilisation and overall agro-ecosystem resilience. The species' perennial root system helps mitigate erosion on sloped terrains, a critical issue in Meghalaya's hilly landscapes (16). Furthermore, their frequent integration in traditional polyculture systems supports landscape-level biodiversity and can potentially function as a subsistence food reserve during periods of agricultural shortfall (17).

These wild tapioca genotypes reinforce the status of Meghalaya as a genetic reservoir for tuber crops, offering long-term agronomic and ecological benefits. Their integration into sustainable systems such as Eri culture particularly within remote or jhum-based communities could enhance feed security for silkworm rearing, increase silk productivity and stabilise local livelihoods. Such applications align with indigenous ecological knowledge, advancing food and fibre security through low-input, climate-resilient practices.

Future prospects

Strategic and integrated approach is essential to fully harness the synergy between tapioca cultivation and Eri silk production in Meghalaya. GIS-based mapping and zoning may be done to identify tapioca-rich areas, including those with wild-growing varieties and align these zones with Eri silk expansion plans. Simultaneously, systematic research-based approach may be carried out through controlled feeding trials to evaluate the impact of tapioca leaves on Eri silkworm nutrition, cocoon yield and overall silkworm health. The results will guide varietal selection and cultivation methods. Promoting tapioca within agro-forestry models, either as an intercrop or a secondary crop, can further enhance land use efficiency, diversify farmer income and contribute to ecological restoration in shifting cultivation areas.

Moreover, empowering rural women through targeted training in tapioca cultivation, Eri silkworm rearing and traditional Ryndia weaving can create inclusive value chains and support women-led enterprises. Integrating traditional textile practices with modern weaving technologies and connecting producers to slow fashion and GI-certified markets will add significant value to local silk production. In conclusion, the convergence of Meghalaya's indigenous silk heritage with its underutilised tapioca resources—both cultivated and wild—offers a unique opportunity for rural transformation. By leveraging these assets, the state can sustainably strengthen its silk economy, enhance tribal livelihoods and establish itself as a leader in ecological and ethical textiles. This is the time for Meghalaya to weave a new economic fabric rooted in tradition, nourished by its forests and farmlands and guided by sustainability.

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Authors' contributions

MC was responsible for conceptualisation, critical review and preparation of the original draft. NB contributed to conceptualisation and was involved in reviewing and editing the draft. Both authors read and approved the final version of the manuscript.

Compliance with ethical standards

Conflict of interest: The authors have no conflict of Interest.

Ethical issues: None

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