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Overview of Indian Sericulture: Types, Production and Economic Significance

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Abstract

Silk, known as the "Queen of Textiles," is a natural fiber produced in over 60 countries, with India as the biggest consumer and second-largest producer. The five commercial silks, Muga, Eri, Oak Tasar, Tropical Tasar and Mulberry are exclusively produced in India, each from different silkworm species. The sericulture industry in India employs 8.8 million people and generated Rs. 1,848.96 crores (US$ 248.56 million) in export earnings in 2021-22. Mulberry silk, from *Bombyx mori*, constitutes the majority of production, with Karnataka, Andhra Pradesh, Tamil Nadu, West Bengal, Maharashtra, Telangana, Uttar Pradesh and Jammu & Kashmir producing 92% of it. In 2022-23, India produced 36,582 MT of silk, with mulberry silk at 27,654 MT. Jharkhand, Orissa and Chhattisgarh make tasar silk, while Oak Tasar comes from sub-Himalayan regions. Eri silk, from *Philosamia ricini*, is prominent in the Northeastern states and Muga silk, from *Antheraea assamensis*, is unique to Assam. India's cultural and traditional market strengthens its global silk industry presence.

Keywords: Mulberry, Silk, Textile, Vanya

Introduction

Silk, often referred to as the 'Queen of Textiles', is a natural fiber composed of protein fibroin, secreted by caterpillars known as silkworms. These caterpillars consume specific plants and create cocoons as protective coverings to sustain their lifecycle. The global silk production base is dispersed throughout 60 nations. India is the world's second-largest silk producer, surpassed only by China and it is also the world's largest consumer of silk. India uniquely produces all five commercially recognized types of silk: Mulberry, Tropical Tasar, Oak Tasar, Eri and Muga. These are synthesized by different species: *Bombyx mori* for Mulberry, *Antheraea mylitta* for Tropical Tasar, *Antheraea proylei* for Oak Tasar, *Philosamia ricini* for Eri and *Antheraea assamensis* for Muga. The seri-enterprise with its rurally oriented activities, both on and off the farm clubbed with huge employment generation (8.8 million people in India are directly and indirectly engaged) and income generation potentials accounting for Rs. 1,848.96 crores (US$ 248.56 million) export earnings during 2021-22 (CSB, 2024), makes it among the most suitable tools for the socioeconomic advancement of a predominantly agrarian economy such as India.

Silk used to be deeply woven into the fabric of Indian life and culture. India produces a wide array of silk products, including scarves, dress materials, stoles and ready-made garments. However, silk sarees stand out as particularly unique. The saree has long been the traditional attire of Indian women, almost becoming synonymous with the term silk itself. Humans have long held a deep fascination with silk goods. The developmental stages of a silkworm encompass egg, larva, pupa and adult moth. Humans intervene in these developmental stages during the cocoon phase to extract silk, a prized incessant filament utilized in weaving luxurious fabrics. Silk, while being a valuable commodity, constitutes a small fraction, just 0.2%, of the global textile output. Nonetheless, silk production holds

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significant economic importance for countries, due to the labor-intensive nature of it and generates high income. This industry produces value-added products crucial for economic growth. Developing nations particularly depend on silk for job creation, particularly in rural areas and as a source of foreign exchange earnings (ISC, 2024).

Silkworm Types

Five main types of commercially valuable silk are derived from various species of silkworms, each feeding on different plants: Mulberry, Oak Tasar & Tropical Tasar, Muga & Eri (Figure 1; Table 1). World's majority of the commercial silk production is derived from mulberry silk, which is typically what people refer to when they mention silk. The silkworm *B. mori* L. (Figure 1) feeds only on mulberry leaves and produces mulberry silk. These silkworms are fully domesticated and raised indoors. In India, Karnataka, Andhra Pradesh, Tamil Nadu, West Bengal and Jammu & Kashmir are the main states producing mulberry silk, collectively accounting for 92% of the nation's total raw mulberry silk production (CSB, 2024).

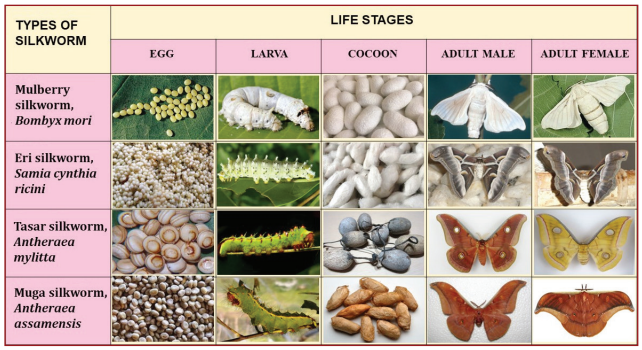

Figure 1: Types of silkworms

Apart from mulberry silk, other kinds of silk are commonly called as wild silks. India holds special honor of cultivating all these commercially significant silk varieties. Tasar, also known as Tussah, is a copper-colored, coarse silk primarily used for furnishings and interior decor. Although it lacks the mulberry silk's sheen, it possesses its peculiar distinct texture and charm. The silkworm *A. mylitta* (Figure 1), which mostly feeds on Asan and Arjun trees, produces tasar silk. These silkworms are raised outdoors, on trees in their natural habitat. In India, the primary producers of tasar silk are Jharkhand, Chhattisgarh and Orissa, with additional production in Maharashtra, Andhra Pradesh and West Bengal. Tasar silk cultivation is a crucial livelihood for several tribal communities in India. The silkworm *A. proylei* J., which feeds on oak trees plentiful in the sub-Himalayan regions of Manipur, Himachal Pradesh, Uttar Pradesh, Assam, Meghalaya and Jammu & Kashmir, produces a finer kind of tasar silk. China holds the position of the world's largest producer of oak tasar silk; it is derived from a different silkworm species, *A. pernyi*.

Eri silk is produced from open-ended cocoons and is known for its multivoltine nature. It is sometimes referred to as Endi or Errandi, distinguishing it from other silk varieties. The tamed silkworm *P. ricini* (Figure 1), which mostly consumes castor leaves, is the source of this silk. Ericulture is a household activity, particularly among tribal communities, who value the protein-rich pupae as a delicacy. As a result, eri cocoons have open ends from which silk is spun. Traditionally, this silk is used by tribal communities in India to make chaddars (wraps) for personal use. Eri silk farming is mainly concentrated in the Northeastern states and Assam, with additional cultivation in Bihar, West Bengal and Orissa.

The Assam state's pride and India's privilege is its golden yellow silk. The semi-domesticated multivoltine silkworm *A. assamensis* is the source of it (Figure 1). Like tasar silkworms, these silkworms are grown on trees and feed on the fragrant leaves of Som and Soalu plants. Muga rearing is unique to Assam, playing a vital role in the state's traditions and culture. Muga silk, a luxurious product, is utilized in the creation of sarees, mekhalas, chaddars and other items.

Table 1: Commercial silk production by the sericigenous insects in India and the host plants they feed on (CSB, 2024; Goel, 2017)

Common Name	Scientific Name	Origin	Host Plant	Silk production during 2022-23 (MT)
Mulberry Silkworm	*Bombyx mori*	China	Mulberry (*Morus* spp.)	27,654
Tropical tasar silkworm	*Antheraea mylitta*	India	Asan (*Terminalia tomentosa*)	1,318
			Arjun (*T. arjuna*)	
			Saal (*Shorea robusta*)	
			Ber (*Zizyphus jujube*)	
Temperate tasar silkworm	*Antheraea proylei*	India	Oak (*Quercus* spp.)	08
	Antheraea pernyi	China		
	Antheraea yamamai	Japan		
Eri Silkworm	*Philosamia ricini*	India	Castor (*Ricinus communis*)	7,349
			Kasseru (*Heteropanas fragrans*)	
			Tapioca (*Manihot utilisma*)	
Muga Silkworm	*Antheraea assamensis*	India	Som (*Persea bombycina*)	261
			Soalu (*Litsea polyantha*)	

Production

Asia holds the top position globally as the leading producer of silk, contributing over 95% of the total global production. While more than 40 countries produce silk worldwide, the majority of it comes from China and India, followed by other nations *viz.*, Uzbekistan, Vietnam, Thailand, Brazil, North Korea and Iran. India produced total of 36,582 MT of silk with mulberry silk contributing 27,654 MT as a lion's share followed by Eri - 7349 MT, Tasar - 1318 MT and Muga - 261 MT in year 2022-23 (Table 1) (CSB, 2024).

India is the world's second-largest producer of silk and also the largest consumer of silk globally, boasting a strong domestic market deeply rooted in tradition and culture. The states of Karnataka, Andhra Pradesh, Tamil Nadu, Assam, Jammu & Kashmir and West Bengal are the main producers of mulberry silk in India. Non-mulberry silks, on the other hand, are primarily produced in Jharkhand, Chhattisgarh, Odisha and the Northeastern states (Table 2; Figure 2) (CSB, 2024).

Economic Significance of Sericulture in India

Sericulture is an agricultural industry centred on the cultivation of silkworms to obtain the yarn that certain insect species take from their cocoons is called raw silk. Key sericulture tasks include cultivating food plants to nourish the silkworms, allowing them to spin silk cocoons and then unwinding these cocoons to extract the silk filament for further processing and weaving, leading to added value (Yokoyama, 1963).

Table 2: State wise silk production (Metric Tonnes) in India during 2022-23 (CSB, 2024)

Sl. No.	State	Silk Type				Total
		Mulberry	Eri	Tasar	Muga	
1	Karnataka	11,823	-	-	-	11,823
2	Andhra Pradesh	9,311	-	01	-	9,312
3	Assam	22	5,487	0.009	211	5,721
4	Tamil Nadu	2,589	-	-	-	2,589
5	West Bengal	1,947	03	16	0.03	1,966
6	Jharkhand	01	-	873	-	874
7	Maharashtra	609	-	11	-	620
8	Telangana	455	-	07	-	462
9	Manipur	132	317	04	01	454
10	Uttar Pradesh	293	54	26	-	373
11	Nagaland	05	345	0.04	0.43	350

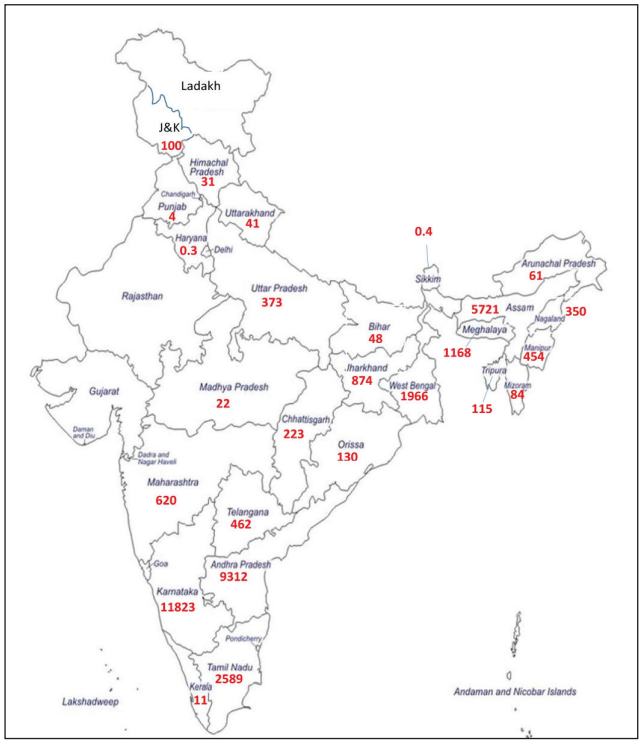

Figure 2: State wise raw silk production (MT) in India during 2022-23 (CSB, 2024)

1. High Employment Potential

Around 6 million individuals are involved in diverse sericulture tasks across the nation. It is projected that sericulture has the capacity to create employment at a rate of 11 man-days kg^{-1} of raw silk production, covering both on-farm and off-farm activities throughout the year without variation. This remarkable potential for generating employment, particularly in rural areas, is unparalleled by any other industry, highlighting sericulture's role as a tool for rural development (Bhattarcharjya *et al.*, 2020).

2. Enhances Village Economies' Vibrancy

Roughly 57% of the total value generated from silk fabrics goes back to the cocoon rearers, distributing income among various groups as follows: 56.8% to cocoon growers, 16.6% to traders, 10.7% to weavers, 9.1% to twisters and 6.8% to reelers. This signifies a significant portion of income flowing from urban centres back to villages (Bhattarcharjya *et al.*, 2020; CSB, 2024).

3. Minimal Gestation, Maximum Yields

An estimated investment ranging from Rs. 12,000.00 to Rs. 15,000.00 (excluding the expenses of land and rearing

space) is considered adequate for engaging in the raising of silkworms and mulberry farming on an acre of moistened land. Mulberry typically requires six months to reach maturity for silkworm rearing. Once planted, mulberry can continuously support silkworm rearing for 15 to 20 years, reliant on the level of management and inputs were given. In tropical conditions, it is possible to harvest five crops in a single year. By implementing the recommended package of practices, a farmer can attain annual net income of up to Rs. 30,000.00 acre^{-1} (Bhattarcharjya *et al.*, 2020; CSB, 2024).

4. Women Friendly Occupation

Women make up more than 60% of the workforce engaged in downstream sericulture activities nationwide. This is facilitated by the fact that tasks such as managing mulberry gardens, harvesting leaves and rearing silkworms are efficiently undertaken by women. Moreover, women play a significant role in the silk reeling industry and weaving, providing substantial support in these sectors as well (Bhattarcharjya *et al.*, 2020; CSB, 2024).

5. Program of Choice for the Society's Weaker Segments

Sericulture can be pursued even with minimal land holdings, as just a family of three can maintain an acre of mulberry garden and rear silkworms without needing to hire additional help. Its characteristics, such as short gestation period and high returns from sericulture make it a suitable venture for economically disadvantaged sections of society. Additionally, the extensive tasar food plantations situated in forests across the country, if utilized effectively for Tasar silkworm rearing, have the potential to provide additional and beneficial employment opportunities for tribal communities (Bhattarcharjya *et al.*, 2020; CSB, 2024).

6. Environment Friendly Activity

Mulberry, as a perennial crop with extensive spread of roots and foliage, helps preserve soil and serves as green cover. The waste produced during the raising of silkworms can be recovered and used as plant fertilizer. The dried twigs and branches of mulberries are utilized as fuel, reducing the demand for firewood and alleviating pressure on vegetation and forests. Since sericulture is predominantly labor- and agricultural-intensive with very little usage of machinery that emits smoke. Development programs aimed at mulberry plantation primarily target upland areas, converting fallow cultivable land into productive resources. Mulberry can be cultivated alongside different plantations as an intercrop. Given its deep-rooted nature, mulberry can be grown in areas with open space, hillsides and watersheds. Currently, mulberry cultivation occupies just 0.1% of the nation's arable land (Bhattarcharjya *et al.*, 2020; CSB, 2024).

7. Allayes Equality Concerns

The advantages of sectoral value addition mainly benefit rural families. Since the end-product consumers typically belong to higher economic strata, wealth flows from affluent groups to less privileged ones. Instances of landless families participating in cocoon production by utilizing mulberry obtained through agreements with local farmers are prevalent in certain states (Bhattarcharjya *et al.*, 2020; CSB, 2024).

Conclusion

The journey through the world of sericulture reveals a tapestry of benefits that extend from the rural landscapes to urban markets. From its humble beginnings in mulberry cultivation to the intricate process of silk production, sericulture intertwines economic prosperity with environmental stewardship. Its ability to thrive on small land holdings and provide sustainable livelihoods to rural households underscores its importance as a tool for rural development. Moreover, sericulture's role in soil conservation, waste recycling and fuel substitution showcases its environmental resilience. The flow of wealth from higher economic groups to lower ones through sectoral value addition exemplifies its potential for inclusive growth. Instances of landless families engaging in cocoon production highlight the democratizing impact of sericulture on rural economies. As sericulture continues to expand its reach, it holds the promise of not only weaving together the fabric of rural livelihoods but also contributing to broader socioeconomic development. By nurturing mulberry gardens and fostering sericulture activities, we provide the ground for a more equitable and sustainable future, where the threads of prosperity are woven into the very fabric of society.

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