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Not All Silk Is White: The Natural Colours of Sericulture

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Silk has long been celebrated for its luster, strength and luxury. The stereotypical image of silk evokes pristine white threads spun by the domesticated silkworm *Bombyx mori*. However, in the diverse realm of sericulture, not all silk is white. Various wild and semi-domesticated silkworms, such as those producing tasar, eri and muga silk, naturally spin threads in rich hues of gold, green, brown and creamy tones. These naturally coloured silks are not only environmentally sustainable but also culturally significant, particularly in regions like India, China, and Southeast Asia. This article explores the biological, ecological, cultural and commercial dimensions of naturally coloured silk, while shedding light on their significance in modern textile industries and conservation efforts.

Keywords: Naturally coloured silk, tasar silk, eri silk, muga silk, wild silkworms, sustainable textiles, sericulture, silk biodiversity, silk pigmentation and eco-friendly fabrics

1. Introduction

Silk, often called the "queen of textiles," has been integral to human civilization for over 5000 years. While white silk from *Bombyx mori* is widely known and cultivated across the globe, several lesser-known silks offer natural coloration without chemical dyes. These include golden muga silk from Assam, brown tasar silk from tropical forests and creamy or brick-red eri silk from the North-East Indian region. These varieties of silk are not mere curiosities but are embedded in indigenous practices and hold potential for eco-friendly textile production. This paper provides a comprehensive overview of naturally coloured silk, discussing the biology of silkworm species, their habitats, production systems, cultural importance and environmental implications.

2. The Biology Behind Natural Silk Coloration

2.1. Silk Glands and Pigmentation

Silk is produced by the labial glands of silkworm larvae, which secrete fibroin (core protein) coated with sericin (gum-like protein). While *Bombyx mori* is genetically selected to produce white silk, wild species retain pigmentation either from their genetic makeup or from the consumption of pigment-rich host plants. The pigment is often embedded in the fibroin or sericin layer.

2.2. Genetic and Dietary Influence

Colour in silk fibres can result from:

- ✓ Genetic inheritance (e.g., *Antheraea assamensis* producing golden silk)
- ✓ Diet (e.g., *Samia cynthia ricini* fed on castor leaves influences eri silk hue)
- ✓ Environmental factors (e.g., humidity and leaf chemistry)

3. Major Naturally Coloured Silk Types

3.1. Muga Silk

Scientific Name: *Antheraea assamensis*

Colour: Natural golden-yellow
Habitat: Endemic to Assam, India
Host Plants: *Machilus bombycina*, *Litsea polyantha*
Features: Lustrous, durable and improves with age
Cultural Significance: Traditional Assamese attire, considered auspicious
Unique Aspect: Cannot be dyed easily-its golden sheen is prized in natural form

3.2. Tropical Tasar Silk

Scientific Name: *Antheraea mylitta* and *Antheraea proylei*
Colour: Brown to coppery or reddish tones
Habitat: Tropical forests in Jharkhand, Chhattisgarh, Odisha
Host Plants: *Terminalia arjuna*, *Terminalia tomentosa* and *Shorea robusta*
Features: Coarse texture, rich earthy shades
Uses: Sarees, tribal textiles and blended fabrics
Sustainability: Often collected from the wild; semi-domesticated practices are being developed

3.3. Eri Silk

Scientific Name: *Samia cynthia ricini*
Colour: Creamy white to reddish-brick, depending on strain and feed
Habitat: Northeast India, Bhutan and Thailand
Host Plants: Castor (*Ricinus communis*), Kesseru (*Heteropanax fragrans*)
Features: Soft, warm, wool-like texture; spun rather than reeled
Cultural Significance: Symbol of peace (non-violent silk); used in Buddhist robes
Unique Aspect: Suitable for vegans as it allows silkworms to complete metamorphosis

4. Ecological and Cultural Significance

4.1. Indigenous Knowledge and Practices

Traditional communities have cultivated coloured silk for centuries. In Assam, the Ahom and Mishing tribes have intricate weaving traditions using muga and eri silks. Similarly, tribal women in Chhattisgarh and Odisha use tasar silk in traditional weaving.

4.2. Habitat Conservation

The production of wild silk supports forest conservation. Unlike mulberry cultivation, tasar and muga silkworms thrive in natural forests, creating incentives to protect host plant diversity.

4.3. Women Empowerment

In north-eastern India and tribal belts, naturally coloured silk sericulture offers livelihood opportunities for women in rearing, spinning, weaving and dye-free textile production.

5. Naturally Coloured Silk in Modern Industry

5.1. Sustainability Appeal

Naturally coloured silk aligns with the global shift toward sustainable fashion. Avoiding chemical dyes reduces environmental pollution and appeals to eco-conscious consumers.

5.2. Handloom Revival

Handwoven products made from eri and tasar silk have gained popularity in luxury and boutique markets. Designers are blending traditional techniques with modern aesthetics.

5.3. Challenges in Commercialization

1) Irregular supply due to dependence on natural conditions
2) Lack of organized market channels
3) Limited awareness among consumers
4) Higher cost of production compared to *B. mori* silk

6. Scientific Advances and Innovations

6.1. Breeding Programs

Research institutions like Central Silk Board (CSB) and regional sericulture centres are engaged in:

1) Improving productivity of coloured silk varieties
2) Developing hybrid strains for better disease resistance and colour intensity

6.2. Molecular Studies

DNA sequencing of wild silkworms has revealed genes associated with pigmentation and stress tolerance. Gene expression studies may help in enhancing silk quality without genetic modification.

6.3. Biochemical Studies

Analyses shows that tasar and muga silks contain higher amounts of certain minerals and amino acids, contributing to their colour and tensile properties.

7. Environmental Benefits and Ethical Aspects

7.1. Chemical-Free Processing

Natural colour eliminates the need for synthetic dyes, which often involve toxic effluents. This is particularly advantageous for small-scale weavers without wastewater treatment access.

7.2. Ethical Sericulture

Eri silk is a key player in "Ahimsa Silk" or "Peace Silk" movements where the cocoon is not boiled. The process is more humane and increasingly in demand among ethically driven consumers.

8. Future Directions

8.1. Branding and Geographical Indications

Muga silk already holds a Geographical Indication (GI) tag. Similar GI tagging for other natural coloured silks can improve market value and prevent imitation.

8.2. Technology Integration

- ❖ IoT and AI are being tested to monitor cocoon development and climate conditions in wild silkworm habitats.
- ❖ Mobile apps for tribal farmers help track host plant availability and larval stages.

8.3. Export Potential

With growing global interest in ethical and sustainable textiles, there is immense potential for naturally coloured silks in Europe, Japan and also in North America.

9. Conclusion

The world of sericulture extends far beyond white silk. Naturally coloured silks like muga, tasar and eri represent a confluence of biodiversity, tradition and sustainability. They are more than fabrics, they are woven legacies of communities, forests and evolution. As the textile industry pivots towards greener practices, promoting and preserving these silks becomes both a cultural and ecological imperative. Embracing the full spectrum of silk colours invites us to see beauty not in uniformity, but in natural diversity.

References

1. Ahmed, S. A., Singh, N. I. & Sarkar, C. R. 2015. Role of forest biodiversity in conservation of non-mulberry (vanya) silk in India. *Munis Entomology & Zoology*, 10 (1): 342-357.
2. Central Silk Board, Ministry of Textiles, Government of India. (2023). Annual Report on Indian Sericulture.
3. Devi, N. R., & Singh, T. K. (2020). Eri silk: An eco-textile from Northeast India. *Asian Journal of Environment and Ecology*, 13(1), 33-40.
4. Goswami, D., Rabha, B., Veer, V. (2016). *Muga* Silk- The Golden Thread of Assam. In: Purkayastha, J. (eds) Bioprospecting of Indigenous Bioresources of North-East India. Springer, Singapore. https://doi.org/10.1007/978-981-10-0620-3_17.
5. International Sericultural Commission. (2022). *Wild Silk Database*. Retrieved from [https://inserco.org]
6. Singh, R., & Agarwal, R. (2020). Wild silks of India: Diversity, production and sustainability. *Journal of Sericultural Science*, 58(2), 125-138.