

Properties and Applications of Muga Silk

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Opinion

Muga silk is a rare, golden-yellow, non-mulberry silk indigenous to Assam, India, produced by *Antheraea assamensis* worms. It is renowned for its extreme durability, natural golden luster, high tensile strength (2.84g/den), and exceptional UV protection. It is primarily used for high-end traditional garments, accessories, and, due to its biocompatibility, emerging biomedical applications.

Key Properties

- Unique color & luster:** Possesses a natural, shimmering golden-yellow sheen that increases in luster after washing.
- Exceptional durability:** Known as one of the most durable natural fibers, with garments lasting for decades.
- High strength & low elongation:** It has high tensile strength (Up to 7.5MPa or 4g/den).
- Thermal stability & comfort:** Superior thermal stability (>300 °C) and good, absorbing up to 85% of harmful UV rays.
- Composition:** Composed mainly of the insoluble protein fibroin (roughly 72-76%) coated with sericin.
- Comfort:** It is breathable, lightweight, and hypoallergenic, with good moisture regain (10%).

Applications

- Traditional apparel:** Primarily used for making traditional Assamese attire like Mekhela Chador, sarees, and shawls.
- Fashion & accessories:** Used for high-end fashion garments, scarves, and accessories due to its luxurious, exclusive, and expensive nature.
- Interior decor:** Utilized for high-end soft furnishings, including upholstery, curtains, and cushions.
- Biomedical & technical:** Due to biocompatibility, it is used in, or researched for, tissue engineering scaffolds, wound dressings, and sutures. It is also used for specialized industrial products.

Key Challenges

- High cost & rarity:** Limited geographical production in Assam (assigned a Geographical Indication tag in 2007).

- b) **Labor intensive:** Requires significant manual labor for rearing, reeling, and weaving.
- c) **Production vulnerability:** The silkworms are susceptible to climate changes and pollution, threatening future production.

Muga silk is considered one of the most durable and prestigious silks in the world, often referred to as the “golden thread” of Assam.

Muga silk is a rare, naturally golden-yellow fiber produced exclusively in Assam, India, by the *Antheraea assamensis* silkworm. Renowned as one of the world’s strongest natural fibers, it is distinguished by a shimmering luster that deepens and improves with every wash.

Key Properties of Muga Silk

Muga silk’s unique value stems from a combination of physical, chemical, and biological characteristics:

- a) **Natural golden luster:** It possesses a permanent, brilliant golden-yellow hue derived from the silkworm’s diet of *Som* and *Soalu* leaves, eliminating the need for synthetic dyes.
- b) **Exceptional durability:** It is widely cited as the strongest natural silk. Garments are known for their longevity, often lasting over 100 years and outliving the original wearer.
- c) **UV protection:** The fabric’s microstructure naturally absorbs approximately 85% of harmful ultraviolet rays, offering skin protection against sun damage.
- d) **Thermal regulation:** Like other silks, it is a poor conductor of heat, making it breathable and cool in summer while providing warmth in winter.
- e) **Hypoallergenic & skin-friendly:** The fiber is 97% protein and contains 18 amino acids that can aid skin regeneration and moisture retention. It is highly resistant to dust, fungus, and mold.
- f) **Stain resistance:** Because the fiber is naturally less porous than other silks, it is highly resistant to staining and cannot be easily bleached.

Traditional and Fashion Applications

Muga silk is a cornerstone of Assamese heritage and a high-end luxury textile globally:

- a) **Ceremonial attire:** Its primary use is in traditional Assamese garments such as the *Mekhela Sador* (a two-piece women’s dress), *Gamosa* (rectangular cloth), and wedding *Sarees*.
- b) **Modern global fashion:** International designers utilize Muga for contemporary luxury items, including **kimonos**, evening gowns, jackets, stoles, and neckties.
- c) **Home furnishings:** Due to its durability and stain resistance, it is used for upscale upholstery, wall hangings, cushion covers, and window treatments.

Emerging Industrial and Biomedical Applications

Beyond textiles, Muga silk’s high tensile strength and biocompatibility have led to innovative technical uses:

- a) **Biomedical engineering:** Researchers utilize Muga silk fibroin for tissue engineering scaffolds, wound dressings, and bone/cartilage regeneration. Its antimicrobial properties also make it a candidate for surgical applications.
- b) **Industrial strength products:** It is used in the manufacture of high-performance items such as **parachute ropes**, aircraft and bicycle tires, and artillery gunpowder bags.
- c) **Sustainable tech:** Recent studies have explored using silkworm pupae waste for high-quality biodiesel production and using the protein for 3D printing bio-inks.

Top Product Recommendations

- a) **Assam muga silk saree:** A traditional, 100% genuine handloom product often certified with a Govt. Silk Mark for authenticity.
- b) **Guna muga silk saree:** A heritage piece typically adorned with floral motifs woven in *guna* (*zari*).
- c) **Indidha pure muga silk saree:** Praised for its smooth texture and elegant drape, suitable for formal occasions.