

Muga Silkworm Rearing Practices-The Richest Silk of India

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Muga silk is the pride of India and remains a unique monopoly of North-eastern India, particularly Assam, where it forms an integral part of rural life and culture. In other northeastern states, muga sericulture serves as a supplementary source of income for rural communities. Muga silkworms primarily feed on *Persea bombycina* (Som) and *Litsaea monopetala* (Soalu), along with several secondary host plants. Plantations are maintained at a spacing of 3 × 3 m and pruned to a bush height of about 5 feet. Light pruning is practiced up to the third instar, while plants are allowed to grow taller for later stages to provide shade and support larval development. After each pruning, FYM @ 0.5 t/ha along with NPK (4:4:2) or chemical fertilizers is applied.



Soalu Plant



Som Plant

The northeastern climate supports five to six muga crops annually, namely Jethua (April - May, Commercial crop), Aherua (June-July, Pre-seed crop), Bhodia (August-September, Seed crop), Kotia (October-November, Commercial), Jarua (December-January, Pre-seed crop) and Chatuwa (February-March, Seed crop). Among these, Jethua and Kotia are commercial crops, Aherua and Jarua are pre-seed crops, and Bhodia and Chatuwa are seed crops. Seed crops are crucial for maintaining continuity and quality in commercial cocoon production.

Pre-brushing and Young-age Rearing

One month before brushing, host plants are sprayed with 0.03% Dantmon or 0.03–0.05% Rogor to control sap-sucking pests. Before brushing, host plants are thoroughly cleaned by removing dry twigs, yellow leaves, weeds, ant nests, spiders, and other pests. Bleaching

powder is sprayed on selected plants twice at 3–4 day intervals, and a mixture of slaked lime and bleaching powder (9:1) is dusted on the ground to control pathogens. For disease management, 0.02% sodium hypochlorite solution is used during rearing.

Eggs are brownish and oval, hatching within 7–10 days in summer and 15–20 days in winter. Worms hatching within the first three days are selected for brushing. One disease-free lay (DFL) requires about 14 kg of leaves. Overcrowding and handling during moulting are avoided to reduce stress and disease incidence. Nylon nets are used during early stages to protect larvae from predators, ensuring adequate aeration to prevent excess humidity.



Muga silkworm Eggs



Muga silkworm brushing

Life Cycle and Rearing Practices of Muga Silkworm

The life cycle of the muga silkworm begins with the hatching of eggs into larvae. The feeding period before the first moult is known as the first instar. The larva undergoes four moults during its growth and takes about 22–28 days to become a fully mature larva. After maturity, the larva crawls down the host plant and spins a cocoon. Within 4–5 days of cocoon formation, it transforms into the pupal stage, and after 14–18 days, the adult moth emerges through metamorphosis. Muga silkworm rearing is carried out outdoors on host plants and is exposed to fluctuating temperatures (28–37°C) and high humidity (85–95%), particularly during summer. Such conditions, along with frequent attacks by pests, predators, and diseases, adversely affect larval growth and cocoon production.



First instar Muga silkworms



2nd instar muga silkworms



3rd Instar muga silkworms



4th Instar muga silkworms

The life cycle varies widely with season, lasting about 44–55 days in summer and 120–147 days in winter. Optimal conditions for pre-seed crops include a temperature of 22–26°C and relative humidity of 75–80%, which are essential for producing quality seed cocoons.

Colour of the Tubercles

- ❖ 1st Instar larvae has black color tubercles
- ❖ 2nd Instar larvae has sky blue (Cyan) color tubercles

- ❖ 3rd Instar larvae has Violet color tubercles
- ❖ 4th Instar larvae has red color tubercles
- ❖ 5th Instar larvae has brick red color tubercles

Late-age Rearing

Late-age larvae are reared on semi-mature leaves. Infected or dead larvae are collected and disposed of safely with bleaching powder or formalin to prevent disease spread. Larvae are transferred carefully using a bamboo device called a *Chaloni*, ensuring minimal disturbance.

Maturation and Cocooning

Larvae become mature after 8–10 days of feeding in the fifth instar. Mature larvae stop feeding, become translucent, and crawl down the plant in search of suitable places for spinning. Maturation generally occurs at dusk and continues for 2–3 hours. Mature worms are collected, identified by their rustling sound when touched, and placed in bamboo baskets or jail nets for spinning.



Cocooning devices (Jali) are prepared using twigs arranged in various shapes to facilitate cocoon formation. Recently, a box-type bamboo mountage has been introduced as an eco-friendly, cost-effective alternative to traditional jail nets.



Summary

Muga silk is the costliest and most exclusive silk among the four major silks of India, renowned for its natural golden luster and durability. Its production is uniquely confined to North-eastern India, especially Assam, where muga sericulture is deeply interwoven with rural livelihood, tradition, and culture. The rearing of muga silkworms is entirely outdoor-based and highly season-dependent, with larval duration and crop success varying widely with climatic conditions. Although the region supports 5–6 crops annually, only a few are commercially viable, while others are crucial for seed maintenance and continuity of production.



Muga Cocoons

Knowledge Gained from Muga Rearing

Muga silkworm rearing highlights the strong interdependence between climate, host plant management, and silkworm biology.

- ✧ Careful synchronization of crop season, temperature, and humidity.
- ✧ Scientific management of host plants through pruning, spacing, and nutrient application.
- ✧ Strict hygiene and disease-prevention practices during pre-brushing and early instars, late-age larvae.

Major Constraints

- ✧ High sensitivity of larvae to climate variability, leading to disease outbreaks and heavy crop losses.
- ✧ Absence of identified eco-races and limited genetic variability in muga silkworms.
- ✧ Limited improvement and quality traits in host plants.
- ✧ Semi domestic and dependence on outdoor rearing, making worms vulnerable to pests, predators and extreme weather.
- ✧ Labour-intensive practices with low survival rates, especially during summer crops.
- ✧ These challenges make muga rearing risky and difficult to sustain under changing climatic conditions.

Future Vision and Possible Solutions

The future of muga sericulture depends on strengthening resilience and sustainability through scientific interventions.

- a. Development of climate-resilient muga silkworm strains and identification of eco-races.
- b. Genetic improvement and quality enhancement of host plants
- c. Introduction of semi-controlled or protected rearing systems for young-age larvae at farmers level
- d. Improved disease surveillance, eco-friendly pest management and early warning systems
- e. Host plant can inter crop with other agricultural crops or border crop
- f. Capacity building, training, and policy support for farmers, along with value addition and market strengthening

With focused research, technological support, and conservation-oriented development, muga silk can continue to remain the pride of India while ensuring sustainable livelihoods for rural communities of North-eastern India.