

Role of Endophytes in Sericulture

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Sericulture, the practice of rearing silkworms (*Bombyx mori*) for silk production, is highly dependent on the health and quality of mulberry plants (*Morus* spp.). Healthy mulberry leaves are the sole food for silkworms and directly influence larval growth, cocoon weight, and silk quality.

Endophytes—bacteria, fungi, and actinomycetes that live inside plant tissues without harming the host—play a critical role in sericulture. These microorganisms enhance mulberry growth, stress tolerance, leaf nutrition, and pest resistance, indirectly improving silkworm performance and silk productivity.

1. Endophytes and Mulberry Leaf Quality

Mulberry leaves are the primary feed for silkworms. Endophytes improve leaf quality in the following ways:

1.1 Nutritional Enhancement

- Certain endophytic bacteria fix nitrogen or solubilize phosphorus, increasing protein, amino acid, and mineral content of leaves.
- Better leaf nutrition leads to faster larval growth, higher larval weight, and stronger pupae, which in turn produces heavier and better-quality cocoons.

1.2 Growth and Yield

- Endophytes produce phytohormones like IAA that promote shoot and leaf growth.
- Increased leaf area ensures a continuous supply of fresh leaves for silkworm feeding during the rearing period.

1.3 Stress Tolerance

- Endophytes help mulberry withstand drought, temperature fluctuations, and mild pest attacks, ensuring stable leaf production throughout the season.

2. Endophytes and Silkworm Health

Healthy leaves enriched with endophytes directly benefit silkworms:

2.1 Improved Larval Performance

- Larvae fed on endophyte-rich leaves show higher weight gain, faster development, and lower mortality.
- Uniform growth reduces the chances of moulting problems and increases survival to the pupal stage.

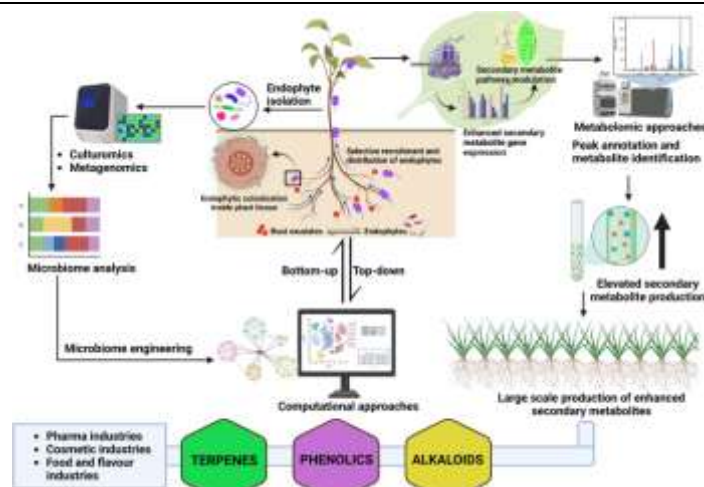


Fig. 1. Role of endophytes in plant

2.2 Enhanced Cocoon Yield

- Better larval nutrition leads to larger cocoons with higher shell weight.
- Silkworms consuming endophyte-enriched leaves produce longer silk filaments and stronger silk threads.

2.3 Disease Resistance

- Healthy leaves may carry beneficial endophytes that reduce the incidence of minor larval infections, indirectly supporting silkworm immunity.

Table 1. Types of Endophytes Important in Sericulture

Type	Examples	Role in Sericulture
Bacterial Endophytes	<i>Bacillus subtilis</i> , <i>Pseudomonas fluorescens</i>	Fix nitrogen, produce phytohormones, enhance leaf nutrition
Fungal Endophytes	<i>Trichoderma</i> spp., <i>Penicillium</i> spp.	Improve stress tolerance, suppress leaf pathogens
Actinomycetes	<i>Streptomyces</i> spp.	Produce antimicrobial compounds, maintain healthy leaves

4. Practical Applications in Sericulture

4.1 Mulberry Plantation Management

- Inoculating mulberry seedlings with endophytes improves leaf quality and yield.

- Healthy leaves reduce the need for chemical fertilizers and pesticides, making sericulture more eco-friendly.

4.2 Silkworm Rearing

- Larvae fed on endophyte-enriched leaves show better growth and cocoon quality.
- Farmers can schedule rearing periods to coincide with peak leaf quality, optimizing silk output.

4.3 Integrated Pest and Disease Management

- Endophytes suppress minor leaf pathogens and pests, reducing crop loss.
- Lower pest pressure improves leaf availability and larval feeding efficiency, indirectly supporting higher silk productivity.

5. Benefits for Sericulture

- Increased cocoon and silk yield

- Improved silk filament quality
- Reduced dependency on chemicals
- Stable mulberry leaf supply throughout the rearing season
- Eco-friendly and sustainable production

Conclusion

Endophytes are key contributors to sustainable sericulture. By improving mulberry leaf nutrition, stress tolerance, and resistance to pests, they enhance silkworm growth, cocoon yield, and silk quality. Adopting endophyte-based biofertilizers and biocontrol agents can lead to profitable, eco-friendly, and high-quality silk production, especially in regions like Karnataka where sericulture is a major livelihood.
