## Redefining Silk Farming: A New Age with Sericulture 4.0

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## Abstract

Silk farming, also known as sericulture, has a 5,000-year history. It promotes employment opportunities, economic growth, and well-being by raising mulberry trees for a variety of purposes. The industry produces high-quality silk thread and high-protein foods for both humans and animals. It relies on a multipurpose plant to improve human health and soil conservation. A sustainable silk derivatives sector might replace petrochemicals with fibroin molecules found in common health items, biopharmaceuticals, and implants. Sericulture is an agricultural-based business that produces food plants and breeds silkworms. Common silkworm species include Bombyx mori caterpillars, Eri, Muga, and Tasar for 'wild silks'. India has a long history of silk manufacture, extending back to the 14th century. It is the world's only country that produces muga silk. Silkworms go through four stages in their life cycle: egg, larva, pupa, and adult. Filaments from numerous cocoons are wrapped together to form a single raw silk thread. The genome of the Bombyx mori silk moth was sequenced in 2004, a significant step forward in insect genomics research. This finding has uncovered crucial genes involved in silk manufacture, development, immunology, and other biological processes. This information has applications in agricultural enhancement, silk quality, disease resistance breeding, and molecular breeding techniques. Advances in genetics and analytical technologies point to new discoveries in silkworm study and sericulture. Sericulture, a traditional agribusiness, exploits mulberry silkworms to generate natural silk in cocoons. However, synthetic fertilizers can degrade leaf quality and soil health, posing a threat to silkworm health. Natural or organic alternatives to mulberry leaf improvement include farmyard manure, compost, vermin compost, green manures, and bio-fertilizers. These solutions seek to increase the industry's success. This chapter investigates the environmental implications of collecting natural or synthetic fibers including cotton, wool, silk, polyester, nylon, rayon, and acrylic. It focuses on water and air pollution, solid waste creation, freshwater usage, dangerous toxic compounds, and wastewater generation. The manufacture of textile fibers requires enormous volumes of fresh water, harmful chemicals, and wastewater, emphasizing the importance of sustainable textile industry approaches.

## Keywords

Seri-Compost, Organic Mulberry Production, Silk Fibroin, Bombyx Mori, Sericin, Genome Sequencing

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