

# SERICULTURE - A POTENTIAL AGRO BASED ENTERPRISE

## Abstract

In addition to its agricultural roots and modern industrial infrastructure, sericulture is a highly established and significant rural agro-based sector. Because so many Indians rely on agriculture and related farm operations for their income, the health of the country's economy is directly tied to its productivity. One of the best ways to improve society economically is through the sericulture business, which includes both on- and off-farm activities in rural areas and has a huge potential to create jobs. Many types of people engage in a wide range of on- and off-farm activities within the sector. The educated youth of semi-urban and urban areas, as well as the rural masses, can find lucrative employment in this industry. The expansion of sericulture will boost the rural economy by giving aspiring business owners a new avenue to explore. The study highlighted the business potential in agricultural sericulture activities in light of the industry's importance to the national economy.

**Keywords:** Agro-based, Enterprise, Sericulture, women participation, Employment, silkworm rearing

## Authors

### **Sulagna Pati**

C. V. Raman Global University  
Bhubaneswar, Odisha, India.  
sulagnapati2001@gmail.com

### **Prateek Ku. Dash**

C. V. Raman Global University  
Bhubaneswar, Odisha, India.

### **Devidutta Dash**

C. V. Raman Global University  
Bhubaneswar, Odisha, India.

### **Shammo Shopan Dutta**

C. V. Raman Global University  
Bhubaneswar, Odisha, India.

## I. INTRODUCTION

The word "Su" (Si) denotes silk, and it is from this that the term "Sericulture" has been coined. The cultivation of silkworms, their feeding plants, the raising of silkworms, and the creation of silk constitute the science and art of sericulture. As a labor-intensive agro-based cottage business, sericulture is a substantial source of income and employment in the rural parts of various states. In India, cultivating mulberries alongside raising silkworms and reeling silk is known as "sericulture," a legitimate agricultural activity. The Mulberry silk worm/domestic silk moth (*Bombyx mori*), the Eri silk worm (*Philosamia ricini*), the Tassar silk worm (*Antheraea mylitta*), and the Muga silk worm (*Antheraea assamensis*) are the four main types of silk worms bred in India. Karnataka, West Bengal, and Jammu and Kashmir are all home to thriving mulberry industries, while Assam is the country's center for muga silk production and Bihar, West Bengal, Madhya Pradesh, and Orissa are home to thriving tassar silk industries. The states of Assam and Orissa are the only places in the world where eri silk can be produced. Malda, Murshidabad, Bankura, Purulia, Darjeeling, Uttar Dinajpur, Cooch Behar, North and South 24-Parganas, Jalpaiguri, Midnapur, Dakshin Dinajpur, Burdwan, Birbhum, and Nadia are only few of the districts in West Bengal where mulberry sericulture has long been practiced. When talking about tassar silk, the regions of Purulia, Bankura, Midnapur, and Birbhum stand out as the most important. Mulberry is West Bengal's main focus for crop expansion. India's silk industry is second only to China's in the world, and it plays a crucial role in improving the country's economy and providing jobs for the rural poor. About 188,000 hectares (ha) of land are used for mulberry farming in the country as a whole. Karnataka, Andhra Pradesh, West Bengal, Tamil Nadu, and Jammu & Kashmir are the five traditional states in India responsible for more than 98% of the country's mulberry silk production. Our country enjoys ideal conditions for raising silkworms and cultivating mulberry trees year-round. Temperatures in Kashmir are more favorable to silk worms from May to October, while those in Karnataka, India's primary silk-producing state, range from 21°C to 30°C. Mulberry tree cultivation is known as Moriculture. About 20 species of mulberry exist, although just four—*Morus alba*, *M. indica*, *M. serrata*, and *M. latifolia*—are commonly grown for their fruit. After 12 productive years, the plants are uprooted and replaced with new ones. About 30–40 t/ha/year can be harvested from mulberry trees.

**Sericulture:** what it is and how it works Silkworms and their silk Growing mulberries, processing the silk, coloring the silk, and weaving the silk are all part of the same agricultural enterprise known as sericulture. Shortly. Raising silkworms for the purpose of making silk is called sericulture. The natural silk fiber is the country's principal export. Silk is the common name for the protein fibers released by the Silk Moth, an insect belonging to the phylum Arthropoda. Silk is a protein fiber extracted from the silk glands of silkworms; it is the softest, strongest, smoothest, and longest-lasting fiber available. The silkworm (*Bombyx mori* L.) is a little Lepidopteron insect of huge regional and global economic significance. The larvae of several different species of moths, all of which acquire a special salivary gland called a "Silk gland" that is adapted for the formation of cocoons, are collectively known as silkworms. Ethiopia is home to both the Mulberry silkworm and non-Mulberry silkworm (such the Eri silkworm) industries. Silkworm moth oil has pharmacological use in addition to its use in producing superior soaps and textile colors.

- 1. Sericulture has Many Advantages:** Mulberry silk, tassar silk, muga silk, and eri silk are all produced in India, making it the only country in the world to do so. People with limited formal education or technical experience can still find work in the silk reeling industry and get valuable reeling experience while doing so.

Sericulture may generate employment @ 11-man days per kg of raw silk production throughout the year, which can help boost the rural economy and employ anywhere from 60-100 million people, especially in forested areas like tribes.

Second, it gives life to local economies by redistributing wealth; the cocoon growers receive around 57% of the fabric's gross value. Mulberry requires only six months to mature, yet it may sustain silkworm rearing for up to twenty-five years with the right inputs and care.

In a tropical climate, you can harvest five times a year instead of only twice.

In India, women make up over 60% of the total workforce in downstream industries; they manage mulberry gardens, collect leaves, and raise silkworms, and they also provide 100% of the support for the silk reeling sector, which includes weaving.

- 2. Characteristics that Set Sericulture Apart:** The post-cocoon industries of silk reeling are opened up by sericulture, expanding it beyond the traditional agricultural operations of mulberry farming, silkworm breeding, and seed generation. Garment production including twisting, weaving, dyeing, and printing. Farmers in the countryside engage in sericulture in order to gather cocoons, whereas semi-urbanites and city dwellers are responsible for the bulk of the silk reeling/spinning and weaving. The process of reeling is an essential link in the chain that leads from the agricultural product of the cocoon to the manufactured good of yarn. The cocoons go through a lengthy and complicated procedure called reeling to become raw silk. Charka, Cottage basins, domestic basins, multi-end reeling machinery, and Automatic reeling machines are just few of the reeling devices used in India's largely decentralized reeling sector.
- 3. Business that can Adapt:** The mulberry tree is a perennial plant that provides food for silkworms. It's adaptable to several types of soil and climate, and may be grown in both rainfed and irrigated regions. In order to increase the production and, ultimately, the net farm revenue, sericulture can be integrated with other agricultural crops, animals, vegetables, and plantation in an integrated farming system.

Sericulture is a sustainable farming practice that benefits the natural world. Mulberry is a perennial plant, so it doesn't put the soil at risk of being washed away or blown around by the wind. In order to protect and enhance the natural eco- system, sericulture promotes the use of eco-friendly technologies such as bio-fertilizers, recycling of sericulture wastes into nutrient rich organic manure, bio- control measures for pests and diseases of mulberry and silkworm, and the use of safe chemicals for disinfection of rearing houses and appliances.

Good for the less robust among us: Due to the fact that sericulture is ideal for low-resource farmers. One way to address the problem of farmers selling off smaller plots of

land is to encourage them to take up sericulture, which can provide more money with less work. It'll double farmers' income.

It's simple to incorporate sericulture into your existing farming methods: Aquaculture, apiculture, vegetable growing, and livestock raising are only some of the numerous farming activities that can be combined with silk production. Silkworm larvae are utilized as farmyard manure and silkworm pupae from reeled cocoons are beneficial for feeding poultry and fish. Mulberry leaves have several uses besides just feeding silkworms. They can also be used to feed animals and produce fruit. Farmers often feed their chickens and other poultry dead and over-produced worms (which are high in protein) from their silkworm farms. You can also find mulberry leaf intercropped with other plants and growing wild along roadside verges and fences. Castor seed is processed into biofuel, and this technique can be utilized to sustainably grow the sericulture industry as well. Pupa and excess silk are being recycled into animal feed. After appropriate processing at a reasonable cost, waste silkworm pupae are regarded an essential dietary protein source for chickens. Due to their high protein and fatty acid content, silkworm pupae have been utilized as food in piggery, poultry, pisciculture, and as dog chow. Rabbits' weight gain and fur growth were enhanced by the deoiled pupae meal.

**Women's Participation in the Sericulture Industry:** Women play an essential role in the sericulture sector, contributing 60%, primarily in the areas of silkworm rearing and reeling, making it a farm-based economic enterprise. By giving them a voice in the production and decision-making processes, sericulture helps women improve their economic standing and their standing within the family and the community. Lei-su, wife of the emperor Huang-di, is said to have taught people how to raise silkworms, reel silk, and weave clothes as early as 2600 BC in China. According to Chinese mythology, Chinese Empress Salien-chi discovered silk's practical use in the year 2640 B.C. This means that women played an integral role in developing sericulture. The principles and recommendations of the International Council on Women are compatible with the sericulture sector. Women typically handle silkworm raising tasks like as leaf chopping, bed cleaning, feeding the silkworm, maintaining cleanliness, plucking the ripe worms, arranging them on mountages, and so on, in addition to their other home duties. Their contributions as workers are substantial, and women are far more likely than men to take part in the manufacture of silk cocoons.

## II. PROCESS OF SERICULTURE

The natural silk fiber can be obtained through a variety of production methods and in a wide range of agroclimatic conditions; this process is known as sericulture. Sericulture entails many steps, including the growing of mulberry leaves or castor oil plants to feed silkworms, which in turn spin silk cocoons, the rearing of silkworms (for the production of raw silk), the production of silkworm eggs, the production of raw silk, the production of rearing equipment, the drying of cocoons, and the reeling of cocoons to unwind the silk filament for processing and weaving. It takes about a month from the time you hatch the eggs till the time the adult silkworms die of natural causes. Along the way, they go through the cocoon, the pupal stage, and five distinct stages of larval development (the first, second, third, fourth, and fifth instars). Ethiopian silkworms have a 46-56 day life cycle: 10-13 days in the egg stage, 21-30 days in the larval stage, 2-3 days in the cocoon spinning stage, 10-15

days in the pupal stage, and 3-5 days as adults. Approximately 300-500 eggs are laid by each female, and they hatch after around 12 days. The caterpillar-like larvae of the mulberry silkworm grow to a length of about 40 centimeters. Pupae are killed using a technique called stifling for raw silk manufacturing. Reeling refers to the process of extracting silk yarn from cocoons, which involves first cooking the cocoons in water to dissolve the glue that keeps them together, and then unwinding the filaments. Before the adult moths emerge, or the process will shred the fibers. The raw silk is first cooked in water to remove any leftover gum, then it is dyed and bleached before it is ready to be woven into a garment.

**1. The Making of Mulberry Silk- The Workers and the Methods:** The commercial manufacture of silk is a lengthy and intricate process that requires the expertise of many different people at various stages. Sixty million Indians are involved in some aspect of sericulture every single day of the year. Here is a rundown of the many processes and personnel involved in creating mulberry silk.

First, silk is produced by cultivating the silkworm, *Bombyx mori*, in a laboratory. After the female silkworm lays her eggs in a box, they will hatch into larvae after being incubated for a few days. They're at the stage where mulberry leaves can be introduced.

For the silk industry, planting mulberry saplings in nurseries and waiting for them to mature is a 6-month process. The silkworm larvae are then fed picked leaves from mulberry plants.

Silk farmers feed the larvae a diet of finely chopped mulberry leaves for around six weeks to raise them into silkworms. They undergo four molts and gain around an inch of length throughout this time. The silkworm's ability to spin silk begins once it stops eating. The worm's body is fixed to a frame, and its rotation causes it to exude saliva at a steady rate. When exposed to air, the saliva dries, turning into two strands of silk. It also secretes a sticky substance called sericin, which protects the filaments by binding them together. In order to transform into a pupa, the silkworm spends the following four days spinning a cocoon out of around 1 kilometer of filament before completely enclosing itself inside. The next generation of silkworms is produced by setting aside a small number of male and female pupae from each batch of cocoons and allowing them to mature into moths. The remaining cocoons are transferred to a silk factory to be processed.

To prepare silk for reeling, the cocoons are cooked in water, which both destroys the pupae inside and softens the sericin. After the cocoon is opened, the silk threads are removed and wrapped onto a reel. Raw silk is created by combining the filaments of numerous cocoons into a single thread. A pound of raw silk requires about 2500 silkworms to make.

Fifthly, raw silk, which is used for twisting, still has the sericin gum on it. Soap and boiling water are used to get rid of it. In order to create the strands of silk yarn, the resulting silk is twisted. Crepe, organzine, singles, and other varieties of silk yarn are all the result of distinct twisting techniques. Dye baths of various hues are used to color the yarn at this point.

Weavers then use looms (both hand and power) to weave the silk yarns into silk cloth. The wide range of silk fabrics we see today is the result of a number of distinct weaving techniques and looms that hold the warp and weft yarns in different ways.

## **2. Significant Limitations on Sericulture**

### **Major Obstacles in Sericulture Include the Following:**

- One of the obstacles to growing mulberries is a lack of available laborers.
- They are accessible, but come at a premium price because of the high cost of labor.
- Mulberry leaf harvesting is a labor-intensive process.
- A higher density and frequency of harvests are required. Because of seasonal water loss due to evaporation, irrigation water is in short supply in the summer.
- Consequently, farmers are unable to devote more land to mulberry farming
- Insect and disease infestations; caterpillars and stem borer pests in particular cause a significant drop in production.
- Most farmers don't raise cattle anymore, therefore there's no farm yard manure available.
- There is insufficient visual effect to raise public awareness about the use of bio-fertilizers.
- Not enough people know what kinds of plants will grow well.

### **Constraints in Silkworm Raising Include:**

- A lack of trained laborers and
- A lack of knowledge about how to keep the cocoons at the right temperature, with enough airflow, and in the right amount of light.
- Not knowing how to properly use disinfectants Cutting mulberry leaves, feeding silkworms, changing bedding, keeping the right temperature and air circulation, and keeping a clean habitat are only some of the many stages involved in silkworm rearing.
- Only if the workers are well-trained and equipped can all these tasks be completed successfully.
- It takes years of experience and training for laborers to acquire new skills. When making cocoons, it's crucial to keep the environment at just the right level of warmth, ventilation, and light.
- Most farmers lack the information necessary to properly identify disinfectants, which spreads disease.

## **3. Limitations On The Cocoon Industry**

- Price fluctuations due to the fact that the quality of cocoons is the primary factor in determining their value on the market.
- Inadequate feeding schedules, dirty larvae, inconsistent room temperature, and other factors may all contribute to the production of low-quality cocoons.
- Market prices may fluctuate because
- low-quality cocoons fetch only modest prices.

- Market's Relative Isolation Increased spending on transportation
- Since most major marketplaces are situated in inconveniently far-flung areas,
  - i.e., commuting is a major issue for them.
  - Second, few people have their own means of transportation.
  - Many of them must pay extra money to hire transportation vehicles like vans, tempos, and buses. Since the government handles most of the marketing, there may be a lag in payments from customers.

**4. The Sericulture Department's Most Important Interventions:** The Department of Sericulture has Proposed Key Interventions to Increase Production and Address Challenges.

- Releasing new, high-yielding mulberry cultivars.
- Second, provide discounted seedlings and pots.
- Thirdly, distribution of equipment and supplies used in child parenting.
- The care and propagation of original silkworm seeds.
- Boost the post-cocoon industry by improving reeling and twisting facilities.
- Stakeholders, including government officials, farmers, reelers, and private seed producers, undergo training and capacity building.
- Seventh, help for the producers' marketing efforts.

**Silkworm Mulberry Waste Products**

- First, the pupae's shells can be used to make garlands after the silk thread has been extracted.
- Second, the oil from the pupae is used in the soapmaking industry.
- After oil has been extracted, the remaining exuviae is utilized as a vitamin E and K-rich chicken feed.
- Silkworm feces are high in nutritious organic matter and can be utilized as fish food.

**5. Mulberry Wine is Often Regarded as One of the Best Wines Around:** Sixth, the mulberry plant's woody stems can be used to make a few different kinds of sports equipment and toys.

It's clear that there's more than one thing that sets the sericulture sector apart. The economy relies heavily on agricultural products like cocoons and cottage industries. Finding a gap in the market, investing in R&D, involving the local community, and learning from mistakes are all crucial. There is little doubt that sericulture offers economically rewarding "employment" to rural families. In India, the production of silk is both an age-old practice and a vibrant cultural phenomenon. It's a cottage and small-scale industry that relies heavily on agricultural labor and has commercial potential. Farmers, business owners, and craftspeople in rural areas might benefit greatly from this opportunity because of the high return on investment for a little initial outlay. It helps small farmers and other disadvantaged persons in rural areas to make a living and find stable work. Since no other cash crop offers such high returns in such a short time, sericulture has been a source of great pride for rural economies. Women, especially those living in rural areas, play an integral role in society and play an important role in helping families and communities prosper. The advancement of society and the nation as a whole

depends on women's participation in sericultural activities; as such, women must be given ample opportunities for growth through education, training, and the demonstration of technologies, processes, techniques, etc. Since it requires little initial capital, has a short gestation time, can produce a large number of workers, and yields a substantial profit, sericulture has taken the lead among cash crops. Appropriate for every demographic, whether wealthy or impoverished, young or old, male or female. This Sericulture industry is vital for several reasons, including ecological preservation, sustainable development, social and economic transformation, and the creation of rural jobs.

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