

Sericulture Or Silk Farming

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Introduction

Sericulture or silk farming is the cultivation of silkworms to produce silk. It involves rearing of silkworms for the production of raw silk, which is the yarn obtained out of cocoons spun by certain species of insects. The major activities of sericulture comprises of food-plant cultivation to feed the silkworms which spin silk cocoons and reeling the cocoons for unwinding the silk filament for value added benefits such as processing and weaving.

Sericulture is an agro-based rural industry having tremendous employment potential and foreign exchange earnings. It is the rearing of silkworm for the production of raw silk originated in China between 2600 and 2700 BC. Silk is called the “queen of textiles” due to its glittering luster, softness, elegance and durability. It is a very costly fiber, produced by silk worms.

Sericulture is a highly labour intensive, remunerative and rural welfare oriented agro-based industry. It is an age-old land-based practice in India with high employment potential and economic benefits to agrarian families. It is remarkable for its low investment and quick and high returns which make it an ideal industry or enterprise and fits well into the socio-economic fabric of India. It is also capable of providing continuous income to farmers as it is employment and income generating industry, it is rightly called as the “Kalpvriksha” or “Kamdhenu” of the poor farmers.

The life cycle of the silk moth may be univoltine (one crops/year), bivoltine (two crops/year), trivoltine (three crops/year), or multivoltine. Bivoltine *A. mylitta* (silkworms) has



two annual lifecycle, the first being the seed crop (July-August) having shorter larval span, yielding non-diapausing cocoons; while the subsequent one is called commercial crop (September-December) with longer larval span, yielding cocoons with thicker shell with prolonged pupal diapause period of 6-7 months.

The food plant of silkworm is Mulberry for producing Mulberry silk. Tasar silk producing silkworm feed on Terminalia Tomentosa and Terminalia Arjuna similarly Muga silk producing silkworm feed on scalu or som; Eri silk producing silkworm feed on Castor (Ricinus Communis). All the section of sericulture industry viz, mulberry cultivation, silkworm seed production, silk rearing, reeling and weaving of the silk and collection of by products and its processing provide a large scale employment, there by a source of livelihood for the rural and

tribal people. Sericulture has become one of the most important cottage industries in a number of countries like China, Japan, India, Korea, Brazil, Russia, Italy and France. Today, China and India are the two main producers, together manufacturing more 90% the world production each year. India is the second largest producer of silk in world and contributes 18% of the total world raw silk production.

What is Silk?

Silk is made of proteins secreted in the fluid state by a caterpillar, popularly known as 'silkworm'. These silkworms feed on the selected food plants and spin cocoons as a 'protective shell' to perpetuate the life. Silkworm has four stages in its life cycle viz., egg, caterpillar, pupa and moth. Man interferes this life cycle at the cocoon stage to obtain the silk, a continuous filament of commercial importance, used in weaving of the dream fabric.

Kingdom: [Animalia](#)

Phylum: [Arthropoda](#)

Class: [Insecta](#)

Order: Lepidoptera

 Family: Saturniidae

 Genus: Antheraea

 Species: *A. mylitta*

Types of Silk

There are four major types of silk of commercial importance, obtained from different species of silkworms which in turn feed on a number of food plants. These are:

1. Mulberry
2. Oak Tasar & Tropical Tasar
3. Muga
4. Eri

Commercially exploited sericigenous insects of the world and their food plant

Common Name	Scientific Name	Origin	Primary Food Plant(s)
Mulberry Silkworm	<i>Bombyx mori</i>	China	<i>Morus indica</i> <i>M. alba</i> <i>M. multicaulis</i>
Tropical Tasar Silkworm	<i>Antheraea mylitta</i>	India	<i>Shorea robusta</i> <i>Terminalia tomentosa</i> <i>T. arjuna</i>

Oak silkworm	Tasar	<i>Antheraea proylei</i>	India	<i>Quercus serrata</i>
Oak silkworm	Tasar	<i>Antheraea pernyi</i>	China	<i>Quercus dendra</i>
Oak silkworm	Tasar	<i>Antheraea yamamai</i>	Japan	<i>Quercus acutissima</i>
Muga Silk worm		<i>Antheraea assama</i>	India	<i>Litsea polyantha L. citrate</i> <i>Machilus bombycine</i>

Stages of silk production

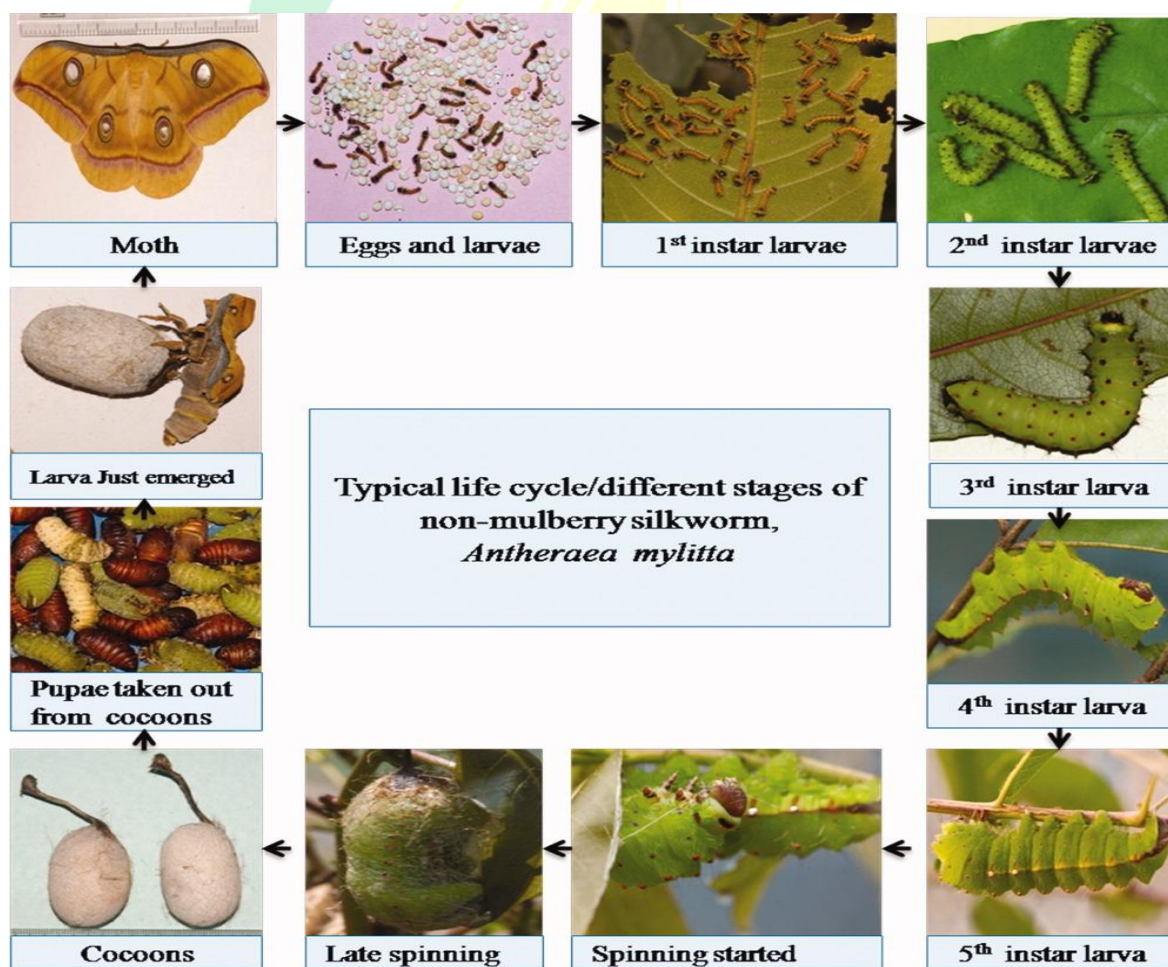
Though all four types of silkworms have different food plants and agro-climatic zone but the basic life cycle is almost the same.

The stages of production are as follows:

- The silk moth lays eggs.
- When the eggs hatch, the caterpillars are fed food plants leaves.
- When the silkworms are about 25 days old, they are 10,000 times heavier than when they hatched. During the feeding period the silk worm goes 4 to five times in molt which is its property to shed its skin as it grows alarmingly fast in size.
- They are now ready to spin a silk cocoon.
- The silk is produced in two glands in the silkworm's head and then forced out in liquid form through openings called spinnerets.
- The silk solidifies when it comes in contact with the air.

- The silkworm spins approximately 0.8 Km to 1.5 km of filament and completely encloses itself in a cocoon in about two or three days .The silk is obtained from the undamaged cocoons by boiling the cocoon to find the outside end of the filament. The live pupa inside the cocoon dies due to boiling.
- The silk filaments are then wound on a reel. The silk at this stage is known as raw silk.
- In order to continue the life cycle not all cocoons are boiled and reeled. some good cocoons are preserved and the moth is allowed to come out and lay eggs so that the life cycles is continued for the next crop are season.

Life cycle of tasar silkworm



DISEASES OF SILKWORM

1. GRASSERIE:

Causative agent: *Bombyx mori* Nuclear Polyhedrosis Virus

Source of infection: Silkworm gets infected when it feed on contaminated mulberry leaves. The milky white fluid released by the grasserie larvae, contaminated silkworm rearing house and appliances are the sources of infection.

Symptoms:

- The skin of infected larvae becomes shining before moult and fails to moult.
- Inter segmental swelling appears and the colour of the body becomes yellowish.
- The infected larvae move restlessly in the rearing bed/ along the rim of the trays.
- Infected larval body ruptures easily and turbid white haemolymph oozes out.

Management:

- Practice thorough disinfection of rearing house, its surroundings and appliances with any recommended disinfectant.
- Conduct an optional disinfection with 0.3% slaked lime solution when high incidence of disease noticed in the previous crop.
- Practice personal and rearing hygiene.
- Collect the diseased larvae and ensure its proper disposal.
- Maintain optimum temperature and humidity in the rearing house.
- Feed quality mulberry leaf and avoid overcrowding.
- Apply recommended bed disinfectant as per schedule and quantity.

2. FLACHERIE:

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Causative agent: *Bombyx mori* Infectious flacherie virus/*Bombyx mori*Densonucleosis virus or different pathogenic bacteria viz., *Streptococcus sp./Staphylococcus sp./Bacillus thuringiensis/Serratia marscesence* individually or in combination of bacteria and viruses.

Source Infection: Silkworm gets infected by eating contaminated mulberry leaf. Dead diseased silkworm, its faecal matter, gut juice, body fluid are the sources of pathogen contamination. The infection can also takes place through injuries/cuts/wounds

Symptoms:

- The larvae become soft and flaccid.
- The growth of infected larvae retarded, becomes inactive and vomit gut juice. The faeces become soft with high moisture content. Sometimes chain type excreta and rectal protrusion also observed.
- Larval head and thorax become translucent.
- When infected with *Bacillus thuringiensis* symptoms of toxicity such as paralysis and sudden death are observed. After death, larvae turn black in color and gives foul smell.
- Sometimes, the dead larvae turn red when infected with *Serratia spp.*

Management:

- Disinfect the rearing house, its surroundings and equipments with recommended disinfectant mentioned above.
- Pick up diseased larvae and dispose them by burning.
- Provide good quality leaf grown under good Sunlight and recommended inputs. Do not provide over matured/over stored /dirty leaf to the silkworms.
- Avoid starvation, overcrowding and accumulation of faeces in the rearing bed.
- Rear silkworms under optimum temperature and humidity.

- Avoid injury to the larvae.
- Apply recommended bed disinfectant as per schedule and quantity.
- Feed Amruth as per schedule to control flacherie disease.

3. MUSCARDINE:

Causative agent: Among fungal diseases, White Muscardine is common. The disease is caused by *Beauveria bassiana*.

Source of Infection: The infection starts when conidia come in contact with silkworm body. Mummified silkworms / alternate hosts (most are lepidopteron pests), contaminated rearing house and appliances are sources of infection.

Symptoms:

- The diseases larvae prior to death will be lethargic and on death are flaccid
- oil specks may be seen on the surface of larvae
- They gradually become hard, dry and mummify into a white or green coloured structure
- The diseases pupae will be hard, lighter and mummified

Management

1. Sundry the rearing appliances.
2. Disinfect the rearing room and utensils with 5 per cent bleaching powder
3. Avoid low temperature and high humidity in the rearing room
4. Keep the rearing bed thin and dry
5. Early diagnosis and rejection of infected lots

6. Apply Dithane M45 (3 kg/100 dfls) / Vijetha supplement as disinfectant on the larvae

7. Disinfect rearing rooms and trays with 4 per cent pentachlorophenol to control Aspergillosis.

4. PEBRINE:

Causative agent: Nosema bombycis / different strains of microsporidia.

Sources of Infection: Silkworm gets infected through eggs (Transovarian/Transovum transmission) or by eating contaminated mulberry leaf. Infected silkworms, faecal matter, contaminated rearing house and appliances and alternate hosts (mulberry pest) are the sources of infection.

Symptoms:

- Diseases larvae show slow growth, undersized body and poor appetite.
- Diseases larvae reveal pale and flaccid body. Tiny black spots appear on larval integument.
- Dead larvae remain rubbery and do not undergo putrefaction shortly after death.

Management

1. Produce healthy eggs
2. Disinfection of rearing room and utensils
3. Maintain strict hygienic conditions during rearing
4. Surface disinfects the layings in 2 per cent formalin for 10 minutes before incubation.
5. Collect and burn the diseased eggs, larvae, pupae and moths, bed refuses, faecal pellets, etc.