Zoology

B.Sc III Year Paper I Applied And Economic Zoology

UNIT – 3

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Topic- Sericulture

Production of silk from silkworm by rearing practice on commercial scale is called sericulture. The caterpillars of the domestic silk moth, also called *Bombyx mori* are the most commonly used silkworm species in sericulture. Today China and India are the two main producers with more than 60% of the world's annual production.

Silk is a pasty secretion of the silkworm produced by the silk glands.Silk glands are the modified salivary glands.

Different Types of Silkworms

- There are fives major types of silk of commercial importance, obtained from different species of silkworms which in turn feed on a number of food plants: Except mulberry, other varieties of silk are generally termed as non mulberry silks.
- India has a unique distinction of producing all these commercial varieties of silk.

SILK WORM TYPES ARE:-

1. Mulberry silk worms
2. Tasar silk worm
3. Oak Tasar silk worm
4. Eri silk worm
5. Muga silk worm

Mulberry silk worm.

- The bulk of the commercial silk produced in the world comes from this variety and often silk generally refers to mulberry silk.
- Mulberry silk comes from the silkworm, ***Bombyx mori*** *L.* which solely feeds on the leaves of mulberry plant.
- In India, the major mulberry silk producing states are **Karnataka, Andhra Pradesh, West Bengal, Tamil Nadu and Jammu & Kashmir** which together accounts for **92 %** of country's total mulberry raw silk production.

Tasar silk worm.

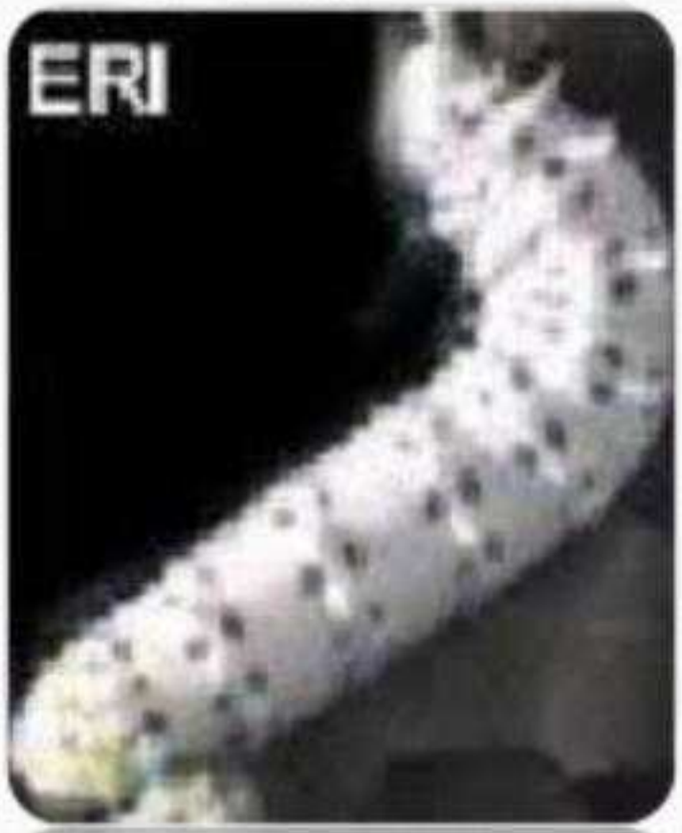
- Tasar silk is generated by the silkworm, ***Antheraea mylitta*** *which mainly thrive on the food plants Asan and Arjun.*
- It is less lustrous than mulberry silk, but has its own feel and appeal.
- tasar silk is mainly produced in the states of **Jharkhand, Chattisgarh and Orissa, besides Maharashtra, West Bengal and Andhra Pradesh.**
- Tasar culture is the main stay for many a tribal community in India.

Oak Tasar silk worm.

- It is a finer variety of tasar generated by the silkworm, ***Antheraea proyeli J.***
- in India they feed on natural food plants of oak, found in **abundance** in the sub Himalayan belt of India, covering the states of **Manipur, Himachal Pradesh, Uttar Pradesh, Assam, Meghalaya and Jammu & Kashmir.**
- China is the major producer of **oak tasar** in the world and this comes from another silkworm which is known as ***Antheraea pernyi***.

Eri silkworm.

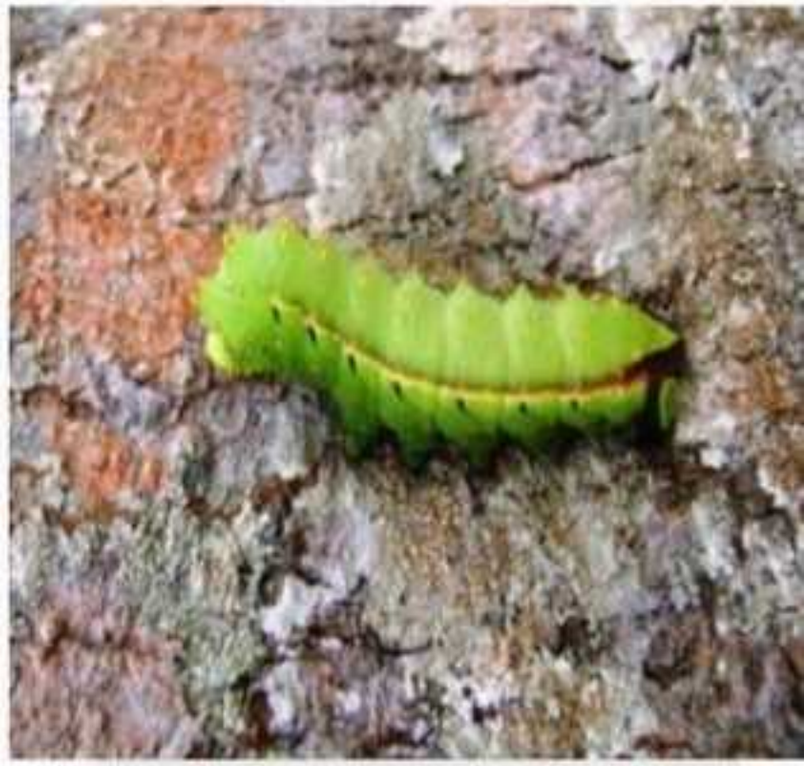
- Also known as Endi or Errandi.
- Eri silk is the product of the domesticated silkworm, ***Philosamia ricini*** *that feeds mainly on castor leaves.*
- Ericulture is a household activity practiced mainly for protein rich pupae, a delicacy for the tribal.
- The silk is used indigenously for preparation of *chaddars (wraps) for own use by these tribals.*
- In India, this culture is practiced mainly in the **north-eastern states and Assam**. It is also found in Bihar, West Bengal and Orissa.



Muga silkworm.

- Muga obtained from semi domesticated multivoltine silkworm, ***Antheraea assamensis***.
- This golden yellow colour silk is prerogative of India and the pride of **Assam** state.

- Muga culture is specific to the state of **Assam** and an integral part of the tradition and culture of that state.
- The muga silk, an high value product is used in products like **sarees, mekhalas, chaddars**, etc.



Type of silk	*Texture/ quality of silk*	*Sp. of silk worm*	*Food Plant*
Mulberry	Top quality, fibres shining and creamy white	Bombyx mori	Mora alba (Mulberry)
Eri	Moderate quality creamy white fibres but less shining	Attacus ricini	Ricinius communis (castor)
Munga	Light yellowish slightly tough fibre, moderate quality.	Anthraea assama	Tetraanthera monopetala or soma plant Listea citrata or Moyankuri plant.
Tasar	Copper brown colour, among the 4 the lowest quality	Anthraea mytilla A. paphia A. royeli A. perenyni	Terminalia sps., Zizyphus jujuba (plum tree)

Sericulture-Stages of production.

- The silk moth lays **eggs**.
- The eggs hatch, and the larvae feeds on mulberry leaves.
- When the silkworms are about **25 days** old, they are **10,000 times** heavier then when they hatched. 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 solidified when it comes in contact with the air.
- The silkworm spin approximately **1** mile of filament and completely encloses itself in a cocoon in about two or three days.
- Due to quality restrictions, the amount of usable silk in each cocoon is small. As a result ,**5500 silkworms** are required to produce **1 kg of silk**.
- The silk is obtained from the undamaged cocoon by brushing the cocoon to find the outside end of the filament.
- The silk filament are then wound on a reel.

SILKWORM LIFE CYCLE

The female moth lays many tiny eggs.

EGG

A tiny black caterpillar hatches out of its egg.

The caterpillar eats mulberry leaves and grows bigger and bigger. It goes through 4 molts.

LARVA

The caterpillar spins a cocoon of silk threads around itself.

PUPA

Inside the cocoon, the caterpillar changes into a pupa.

People unwind the silk thread from the cocoons to weave into silk cloth.

The pupa changes into a moth. The moth comes out of the cocoon.

ADULT

The adult moths mate with each other.

Life cycle of *Bombyx mori*

- The domestic silkworm undergoes Complete metamorphosis (Holometabola) and passes through four morphological stages i.e. egg, larva, pupa and adult.

- **Eggs**

  The silkworm eggs are tiny and weight around 2000 eggs to a gram. It measures 1-1.3 mm in length and 0.9 – 1.2 mm in width.

- The size, weight,shape, colour of the egg, number of eggs per laying vary among the different races and according to the season.

• Larva

- The newly hatched larva is black or dark brown in colour measuring about 3 mm in length. It is commonly called as **ANT** or **KEGO**.
- The head is large and the body is densely covered with **bristles**.
- the larva grows by passing moults to enter into later instars the body becomes smooth and light in colour due to rapid stretching of cuticular skin.
- The body has 3 divisions i.e., head, thorax, abdomen.

Continued:-

- **Pupa:-**
- The pupal stage is generally called the resting, inactive stage of the silkworm when it is incapable of feeding and appears motionless. This is a misnomer.
- The pupal stage is a transitional phase during which definite changes take place. During this period of biological activity the larval body and its internal organs undergo a complete change (Metamorphosis) and assume the new form of the adult moth.
- Soon after pupation the pupa is white in colour and soft, but gradually turns brown to dark brown and the pupa skin harden.

Metamorphosis

• During pupation active changes of destruction and construction occur simultaneously. The prolegs disappear and the thorax develops two pair of wings. As a result of complete metamorphosis pupa changes into imago.

Imago

• The imago secretes an alkaline fluid. Its feeds and increases in size and finally becomes sexually mature.

• The larva is called **silkworm.** The ripe silkworm produces a sticky gum like secretion which hardens to form silk thread. A continuous thread is spun around the body of silkworm to form cocoon. Most of the cocoons are boiled in water to kill the pupa inside. The silk is then reeled and gathered.