

LAC INSECT

Lac is the resinous secretion of a number of species of Lac-producing insects, the most commonly cultivated of which is *Kerria lacca*. Lacs (*Kerria lacca*) are scale insects (insects that attach themselves in great numbers to plants and trees) which suck the sap from the bark of their host tree, allowing them to secrete lac resin, which is scraped off and manufactured into shellac. In 1709, Father Tachard described first the lac insect systematically in America.

There are four genera of lac insects:

1. *Kerria lacca*
2. *Tachardia signoret*
3. *Tachardiella cockerell*
4. *Tachardina cockrell*

Kerria lacca is commercially cultivated in Bangladesh.

Taxonomy

Kingdom: Animalia

Phylum: Arthropoda

Class: Insecta

Division: Pterygota

Order: Homoptera

Family: Kerridae

Genus: *Kerria*

Species: *K. lacca*

Host plants:

Ber (*Ziziphus mauritiana*), rain tree (*Samanea saman*), kusum (*Schleichera trijuga*), pigeon pea (*Cajanus cajan*), palas (*Butea frondosa*), babla (*Acacia Arabica*), khair (*Acacia catechu*) are the major host plants. Ber is widely used for commercial cultivation of lac in Bangladesh.

Areas of cultivation:

Lac production is found in Assam and other parts of North-East India, Bangladesh, Myanmar, Thailand, Laos, Vietnam and parts of China. It is also found in Mexico. In Bangladesh it is cultivated in Chapainwabgonj district.

Life cycle:

The **female** is **crimson coloured**, about 1.5 mm long, apodous and motionless, wingless, having piercing-sucking mouthparts. The **males** are crimson coloured, **winged** or **wingless**, with pale coloured antennae and legs. **Winged** males are often **larger** than wingless ones. They possess long anal **cerci** with hairy **antennae** and **legs**. The female lays about **200-1000** eggs for a period of five weeks and then dies.

The eggs are lodged in the brood cells. As soon as the first instar nymph hatch out, they bore **brood cells** and **swarm** to very tender succulent shoots and branches at about **60-80 nymphs** per linear **centimeter** area. They **suck** the plant sap voraciously and secrete **resinous secretion** over the body except **mouthparts** and two breathing **pores** and **anus**. They moult **3 times** so that the **third instar nymph** develops into **adult**. Males grow within **2 months** and form a small population. Females lay fertilized eggs after mating with winged or apterous male or unfertilized eggs parthenogenetically. **Male** secretes **small amount** of lac but it has **no commercial** value. The female secretes lac till the end of her life. Male and female ratio **1:3**.

Classes of lac insects

Two strains of lac insects, **Kusumi** and **Rangeeni** are cultivated. Kusumi are grown on kusum plants and Rangeeni on palas, ber and other plants. Both strains have two generations per year and there are two crops in a year.

1. Kusumi

- a) Jaistha (January/February to June/July)
- b) Aghrani (June/July to January/February)

2. Rangeeni

- a) Kartiki (June/July to October/November)
- b) Bashakhi (October/November to June/July)

Steps of Lac culture

1. Inoculation:

Lac is grown on managed trees which are pruned in order to stimulate the growth of young shoots. These young shoots provide sap which the lac insect can use as food. Four to six months after the trees have been pruned, a number of lac-infested branches are tied to them. These branches contain mature female lacs (**broodlac**) who laid up to 200 to 1000 eggs which hatch out into **nymphs**. These small red **nymphs** crawl out of the broodlac and settle on the twigs after swarming.

2. Lac secretion:

The nymph inserts their long suctorial mouthpart or proboscis into the bark and draw out food (tree sap). The **sap** is transformed to **lac resin** in the body and then secreted around the insect where it forms a hard protective covering to prevent attack by predators. Eventually the **lac resin** from each insect joins together, covering the entire swarm. The lac is secreted by the **dermal glands** spread all over the body except **mouthparts**, two breathing **pores** and **anus**.

The insects mature into adults under this protective layer, becoming sexually mature after about eight weeks. The males fertilize the females and then die. After fourteen weeks the females lay their eggs and also die. Usually the young lacs are given the opportunity to escape to a new home before the branches are harvested but some will inevitably remain and therefore be scooped up and killed during harvesting.

Thousands of lac insects colonize branches of suitable host trees and secrete the resinous pigment. The coated branches of the host trees are cut and harvested as **sticklac**.

3. Lac processing:

Seed lac

The harvested sticklac is crushed in crude by hand operated mortars and resulting material is changed into (a) granules of lac, the '**seed lac**, (b) **dust**, used for making toys, bracelets, bangles and (c) **wood**, used as a fuel.

Shellac

The seed lac is next soaked in water and tordden by foot which crushes and washes out the wine coloured pigment. After drying and bleaching in sun, granular lac is further refined by a system of hot melting and stretching into thin sheets which are subsequently broken into thin, small flakes, called **the 'shellac'**. About **300,000** insects are used to produce **1.0kg** of lac resin.

Problems of lac cultivation:

Incorrect pruning, infection of host tree, wrong cropping method, mortality due to over crowding of lac nymph, atmospheric excess heat and frost etc. sometimes cause about 40% loss. Several parasites and predators cause 5-25% loss.

a) **Predators:** There are two important predators:

1. Moth, *Eublema amabilis* larvae and
2. Moth, *Holocoera pulverae* larvae.

The eggs are laid close to the branch covered with lac. The caterpillars feed upon lac insects and encrust lac. Besides these black ants and birds cause damage to lac insects.

b) **Parasites:** The parasitoid **chalcid** grows after hatching, feed on lac insects showing parasitism.

Uses of Shellac

Shellac has been utilized in the manufacture of many products over the years. Today uses of shellac include:

- component of paint and varnish for wood, shoe and leather polish
- manufacturing gramophone records, electric equipments, dental plates etc.
- insulating electric materials,
- glaze for fruit and coating for tablets,
- cosmetics- hair lacquer, nail varnish and lipstick
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- confectionery
- ingredient of lithographic ink

It has been used in India as a **skin cosmetic** and **dye** for wool and silk. In China it is a traditional **dye** for **leather goods**. The use of lac for dye has been supplemented by synthetic dyes. It is used in medicine as **hepatoprotective** and **antiobesity drug**.

Lac By-Products and Derivatives

Lac dye (laccic acid) is obtained during the washing of seedlac. Shellac wax is retrieved from shellac resin, and has properties similar to carnauba wax. Shellac acid derivatives include aleuritic acid, jalaric acid and shellolic acid. By-products obtained during manufacture of shellac include lac dye, molamma, kiri, passewa, and shellac wax.

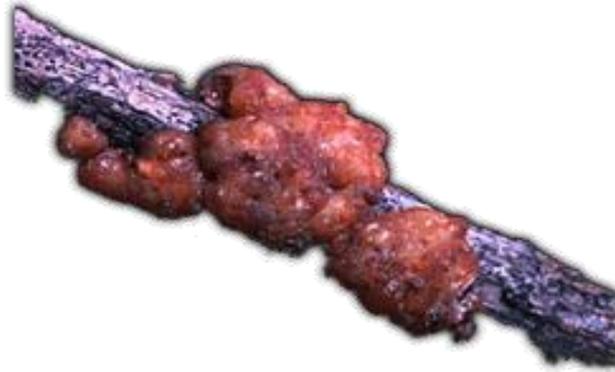


Figure: Sticklac



Figure: Seed lac