



## Lac production and its importance

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### Introduction:

Lac is a natural resinous secreted by insects called lac insects. According to the definition of lac culture, this process involves the systematic control and breeding of lac insects to produce high-quality lac for use in commerce. Management involves the selection of host plants, inoculation of plants with lac insects, rearing of lac insects, pest management and harvesting and processing of lac. Actually, females release lac as a form of defence. It generally infests about 400 plant species and feed on the host tissues. The females are degenerated in form and feeds on the sap of its host plants. Male undergoes complete metamorphosis while female undergoes degeneration. Natural resin known as lac is secreted by microscopic insects; primarily *K. lacca*. The insects are cultured on tender shoots of several plants called hosts. However in costal region of West Bengal and Odisha, a tri-voltine insect, *Kerria sharda* is found which produce three crops in a year.

**Historical background:** Lac has been used for centuries by Indians. The renowned "Lakshagraha," a house made of lac that was constructed to burn the Pandavas, is described

in detail in the epic Mahabharata. One might therefore conclude that Indians are aware of lac's flammability as well as its various use. Indians have also used lac to create toys and ornaments in addition to this. Evidence also points to the ancient Greeks and Romans using Lac. Father Tachard initiated the study of lac scientifically in 1709. After numerous revisions, the name *Laccifer Lacca* was chosen.

**Lac Culture:** It is a scientific approach to lac insect management. Humans use lac insects to harvest a significant amount of quality lac. Humans have traditionally valued animals for their diverse uses. Both domesticated and wild animals have numerous advantages for us. Animals of all shapes and sizes provide benefits to humans in numerous ways. The lac bug is an amazing, little insect that gives us a useful product that may be used in a number of different ways.

**Major function of lac culture:** The major functions of lac culture are:

- ✓ Cultivation of host plants of lac insects
- ✓ Pest management of host plants
- ✓ Rearing of lac insects

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- ✓ Pest management of lac insects
- ✓ Harvesting the lac
- ✓ Production of commercially usable lac

**Systematic Position of Lac Insect:** The lac insect is classified as follows:

**Kingdom:** Animalia

**Phylum:** Arthropoda

**Class:** Insecta

**Order:** Hemiptera

**Superfamily** — Coccoidea

**Family** — Kerriidae

**Genus** — Laccifer

**Species** — lacca

**Host Plants of Lac Insects:**

The lac insect is an ectoparasite that feeds on plant sap that is drawn from the plant's vulnerable shoot. They can only be raised on particular trees, which are known as host plants. The lac cultivator needs to be aware of the host plants and which plants are best suited to the local climate. In order to manage the lac, healthy host plants must be raised to a stage where the lac insects can collect the sap. The host plants of lac insects are given in the table 1.

**Life Cycle of Lac Insects:**

A lac cultivator needs to understand the lac insect life cycle and be able to recognize the stage at which lac production peaks and should be collected.

**Table 1: Host plants of lac insects**

Vernacular Name	Scientific Name
Kusum	<i>Schleichera trijuga/oleosa</i>
Palas	<i>Butea frondosa</i> or <i>Butea monosperma</i>
Ber (plum)	<i>Zizyphus jujuba</i>
Babul	<i>Acacia arabica</i>
Khair (Ranjeeni)	<i>Acacia catechu</i>
Arhar	<i>Cajanus indicus</i>

The lac insects have very pronounced sexual dimorphism and physical differences. The life cycle of lac insect has 4 stages as-

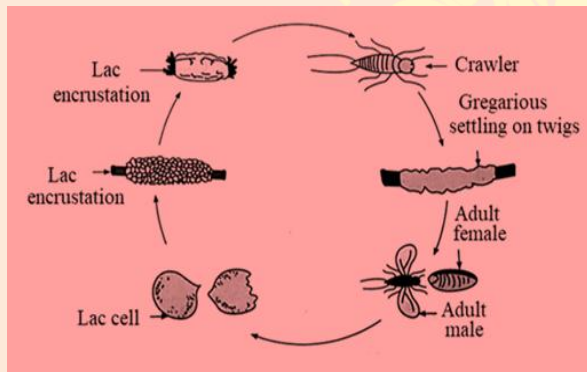
1. Eggs
2. Larva
3. Pupa
4. Adult

The phases of the lac culture life cycle of insects are as follows:

1. **Fertilization:** the male adult walks over the female incrustations and inserts it into the female cells, where it fertilizes the female.
2. **Egg-laying:** After fertilization, the female grows rapidly till it becomes capable of egg-laying. A single female lays an average of 200200 to 500500 eggs after

fertilization and deposits inside the incubating chambers of the female cell.

3. **Egg Hatching:** After 6 weeks, the eggs are hatched into first instar larvae. The mass movement of these larvae in search of a suitable place to suck plant sap is called **swarming**.
4. **Pupa:** A larva feeds slowly and continuously. Through the body's release of a resinous substance, it encases both the twig and itself. When the secretion comes into touch with air, it solidifies and becomes a lac cell. The larva undergoes three moultings inside the lac cell. Both males and females lose some body parts when they moult.



**Fig. 1: Life Cycle of Lac Insect**

5. **Adults:** Male larvae grow into male insects as adults, but since they lack mouthparts, they cannot feed. One adult male bug can fertilise multiple females before quickly dying. The adult female lacks wings and legs and is smaller than

the male. Once they settle after swarming, the female larvae never leave the compartment.

### Lac Secretion and Composition:

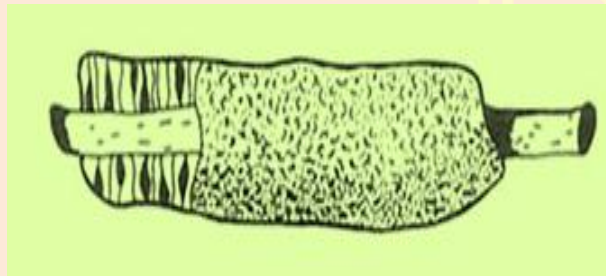
The only commercial resin of known animal origin is lac. It is a resinous substance that the lac insects secrete. Both the skin of larvae and adults contain unique glands called lac glands. Resin makes up the majority of lac's combination of other components. According to speculation, it is a polyester made by a straight chain of complicated fatty acids. The major constituent of lac is the resin. Lac resin is a polyester complex of straight-chain hydroxy fatty acids of C<sub>14</sub> – C<sub>18</sub> carbon chain (such as Aleuritic acid, butolic acids), mono- and di-hydroxy acids along with hydroxy terpenic acids. Other constituents present are: dye, wax, sugar, proteins, soluble salts, sand, woody matter, insect body debris etc. Lac wax is a mixture of anthroquinoid derivatives. Percent-wise composition of lac given below:

Constituent	Percentage
Lac resin	68
Lac wax	6
Lac dye	1-2
Others	25

### Culture Technique of Lac Insect

The farmer introduces a plant with a female cell containing ready-to-hatch eggs to start the

lac cultivation process. The host plant becomes infested by the larvae as soon as the eggs hatch and the first instar larvae appear. This process is known as swarming. The larvae begin secreting the resinous substance all over their bodies after locating the best places to feed. This substance initially has a shiny appearance and becomes harder when exposed to air. Thus, the lac casing encloses both the larva's body and the branch it is feeding on. A lac incrustation is created when a large number of lac cells from adjacent larvae fuse together. This is the lac that a lac culturist is interested in.



**Fig. 2: Heavy Lac Encrustation**

The culture technique of lac insect involves the following steps:

1. **Inoculation:** inoculation means the introduction of lac insects to the host plant. Inoculation can be natural (without any human intervention) or artificial.
2. **Cultivation** of host plants: since the larvae of lac insects suck the plant sap from the tender shoots of host plants, proper cultivation and pruning become important in lac culture.

3. **Lac Crop:** the life cycle of lac insects of 66 months and hence two crops in a year are regular. There can be four lac crops as lac insects behave differently on Kusum and non-Kusum host plants.

4. **Harvesting and Extraction of Lac:**

- The twigs with thick encrustations are cut and removed from the site. This is **stick lac**.
- Then the lac cells are scraped from the twig, and the lac is the **granular lac**. If the cutting and scraping are done before swarming, it is 'Ari lac', and if it is done after swarming, it is 'Phunki lac'.
- The scraped lac is washed thoroughly with water. Drying and bleaching of lac are done by exposing it to sunlight.
- Lac granules are melted in a pot over an open charcoal fire.
- The molten lac is then spread in the form of sheets. The sheets are dried, broken into pieces and sold in the market as flakes.

**Types of Lac:** Depending on the host plant, lac is of two types:

1. **Kusumi Lac:** insects are reared on Kusum plants, and lac is harvested from these plants.
2. **Ranjeeni Lac:** when the lac insects are reared on non-Kusum plants, the lac is known as Ranjeeni lac.





**Fig. 3: Types of Lac**

### Lac Culture Uses:

Lac is used to make toys, bracelets or bangles, fill ornaments, seal wax, and make gramophone records, among other things. It is also employed in the production of grinding stones, the creation of varnishes and paints, the silvering of mirror backs, the encasing of cable wires (thanks to lac's insulating properties), etc. A dye is accidentally left in the water after washing scraped lac, and this dye is later used for colouring. Nail polish, lithographic ink, and shoe polish are a few by-products of lac.

**Medicinal Uses of Lac:** For the medicinal purpose the purified stick lac is used. This is known as Shellac.

- It is used for reducing weight.
- It reduces heart rate.
- It is used for strengthening the bones.
- It is used to cure pain in bones.
- In the case of the vomiting of blood, finely powdered Shell lac mixed with honey is given.

- In dentistry, it is used to make dentures and other dental products.
- It is used for coating the medicines.

### Economic Importance of Lac

- Lac is largely used as a sealing wax and adhesive for optical instruments. It is used in electric industry, as it is a good insulator.
- It is used in preparations of shoe and leather polishes and as a protective coating of wood.
- It is used in laminating paper board, photographs, engraved materials and plastic moulded articles.
- Used as a filing material for gold ornaments.

### Summary:

Lac culture is the collective term for the scientific management of the lac insect, which encompasses the rearing of the insect and its host plants, pest management, and the cultivation and harvesting of lac. The lac bug, a tiny insect belonging to the Hemiptera group, is raised for the resin it secretes during its life cycle. The primary stages that produce lac are larva and pupa. The only commercial resin of known animal origin is lac. Economically, absence of culture makes self-employment a more attractive alternative, and many villages, including indigenous people, work in this industry. When it comes to lac production for commercial purposes, India leads the world.

## References:

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