

Lac Insect, Its Natural Enemies and their Management

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Introduction

- The lac insect or scale insect *Laccifer lacca* belonging to family Coccidae and order Hemiptera secretes a resinous by product which is marketed as shellac.
- It is only known commercial resin of animal origin.
- Lac produced is a mixture of resin, dye and wax.
- Rearing of lac insects is known as Lac culture. Lac is secreted by the dermal glands spread all over the body except mouth parts, two breathing pores and anus.
- Cultivation of Lac not only provide livelihood to millions of lac growers, but also help in conserving vast stretches of forest and biodiversity associated with lac insect complex.



Fig. 1 Indian Lac insect

Life cycle of Lac insect

Lac insect female lays about 300-500 eggs in the brood cells. The eggs hatch within few hours into tiny crimson red first instar nymphs (crawlers). The emergence of nymphs is called swarming. The nymphs crawl reach soft succulent twigs and start sucking the plant sap voraciously and start secreting resinous secretions over the body. They moult thrice so that the 3rd instar nymph develops into the adult. After the first moult both males and females nymphs lose their legs antennae and eyes and become degenerate.

The females stay as degenerate form and continue feeding, growing in size and secreting resin. The male is slipper like with an operculum at the rear end and female is globular. After the final moult males emerge as winged poor wingless adults which mate with females and they die afterwards (Jaiswal and Sharma 2011).

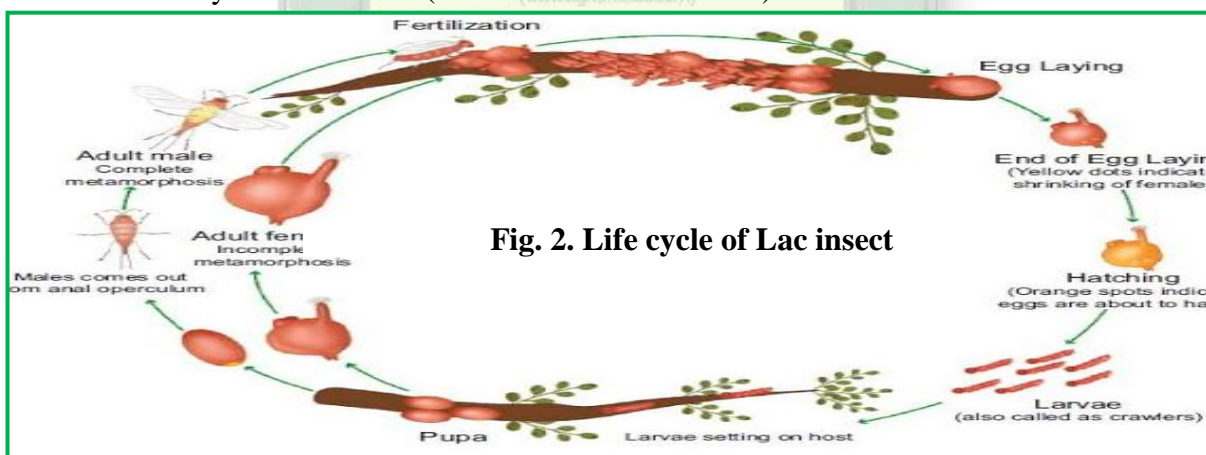


Fig. 2. Life cycle of Lac insect

Strains of Lac insect

There are two strains of lac insects grown in India.

Strains	Host Plant	Generations per year
<i>Kusumi</i>	<i>Kusum, Ber, Flemingia</i> sp.	<i>Jethwi</i> (June/July to Jan/Feb) and <i>Agani</i> (Jan/Feb to June/July), each six months
<i>Rangeeni</i>	<i>Butea, Ziziphus</i> and <i>Shorea</i>	<i>Katki</i> (Jun/July to Oct/Nov) and <i>Baisakhi</i> (Oct/Nov to Jun/July) four months and eight months duration respectively

Importance of Lac Insect

- Lac is the only known commercial resin of animal origin.
- The lac insect yields:
 - 1. Lac dye:** It is used to colour wool and silk and also used in food and beverage industry for colouring.
 - 2. Lac wax:** It is used for polishes applied on shoes, floor, automobiles etc. Lipsticks, Crayons, Cosmetics (used in hair spray, hair shampoos, and binder for mascara and electric (as binder for Lamp cements).
 - 3. Lac Resin**



Fig. 3. Lac Dye



Fig. 4. Lac Wax



Fig. 5. Lac Resin

- 4. Lac** is also used in flock medicine as a hypato-protective and anti-obesity drug.

Natural enemies of Lac insect

Two types of enemies are found with lac insect are: 1. Parasites 2. Predators

- 1. Parasites:** Parasites are small winged insects belong to family Chalcidae of Hymenoptera. These insects lay their eggs in the lac cells and grubs on hatching devour lac insects inside the cells (Varshney *et al.*, 1976).
- 2. Predators:** The predators are serious and may damage upto 30-35% to the cells in the crop. Three predators which are most important are as under:
 - Larger white lac moth, *Eumblemma amabilis* (Noctuidae:Lepidoptera). It is most destructive predator of lac insect and cause most damage during Katki & Aghani lac crops (Rehman *et al.*, 2009).
 - Smaller black lac moth, *Holocerca pulvera* (Gelechiidae: Lepidoptera). Both moth lay eggs on or near the lac encrusted branches. The larvae on hatching bite their way into the lac encrustation and feed on the lac insects and lac encrustations.
 - Lace wing fly, *Chrysopa* sp.: The maggots move about the lac encrustations and feed on the body contents of the lac insects.

Table 1. Parasities and Predators of Lac insect

Parasites	Family	Predators	Family
<i>Anicetus dodonia</i>	Encyritidae	<i>Eumblemma amabilis</i>	Noctuida
<i>Atropates hautefeuillei</i>	Encyritidae	<i>E.coccidiphaga</i>	Noctuida
<i>Aphrastobracon flavipennis</i>	Encyritidae	<i>E.scitula</i>	Noctuidae
<i>Bracon greeni</i>	Encyritidae	<i>Pseudohypatopa pulverea</i>	Blastobasidae
<i>Coccophaqus tchirchii</i>	Aphelinidae	<i>Chrysopa lacciperda</i>	Chrysopidae
<i>Eupelmus tachardiae</i>	Eupelmidae	<i>Silvanus iyeri</i>	Cucujidae
<i>Tetrastichus purpureus</i>	Eulophidae	<i>Ischonoptera fulvastrata</i>	Blattellidae

Prevention and control of Natural enemies

Preventive measures

- a) Parasite and Predator free brood lac should be used for inoculation.
- b) Self-inoculation of lac crops should be avoided as far as possible.
- c) Inoculated brood bundles should be kept on the host tree for a minimum period only.
- d) Phunki (empty brood lac sticks) should be removed from the inoculated trees in 2-3 weeks time.
- e) All lac cut from the tree and all phunki brood lac (after use as brood lac) not required for brood purpose should be scraped or fumigated at once).
- f) Cultivation of Kusmi strain of lac should be avoided in predominantly Rangeeni area and vice versa.

Cultural method: Pruning means cutting the old, weak and diseased branches. It is done in January or June. Its objective is to ensure new, good, healthy and succulent branches.

Mechanical control:

- ❖ Use of 60 mesh synthetic netting (brood bag) to enclose brood lac for inoculation purposes can reduce infestation of enemy insects of lac.

The emerging lac larvae easily crawl out from the minute pores of the net and settle on the twigs of the lac host plants, whereas the emerging adult predator enemies cannot move out of the brood bags and get entrapped within the net. This can check the egg laying by the predator moths on the new crop.

Chemical control: Application of 0.05% Endosulfan at 30-35 days stage of crop has been identified as the most effective dose of insecticide without any adverse effect on the economic attributes of the lac insect.

Microbial control: Use of bio-pesticide, Thuricide (*Bacillus thuringiensis*) at 30-35 days stage of crop is the effective microbial control measure for important enemy insects of lac in field condition.

Biological control: Egg parasitoids, viz., *Trichogramma pretiosum*, *T.chilonis*, *T.poliae*, *Trichorammatodea bactrae* and *Telenomus remitis*, have been found to be effective in management of many lac predators like *H. pulverea*.

Conclusion

- *K. lacca* is a valuable insect of economical and ecological interest.
- Lac production is an economical activity among rainfed farmers and forest dependants in Central Indian region.
- *K. lacca* is prone to biotic and abiotic stress, thus affects the productivity, influencing the cash inflow of poor and marginal farmers.
- Predators and parasitoids cause heavy yield loss to the lac crop, requires to be managed sustainably.
- By following the approaches mentioned here the natural enemies may be managed effectively resulting in increase of production.

References

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