

Bulletin No. 23.

THE
Indian Lac Research Institute

**SOME SIMPLE METHODS OF REDUCING THE DAMAGE, DONE
BY INSECT ENEMIES, TO THE LAC CROPS**

(REVISED AND REPRINTED, DECEMBER 1955.)

BY
P. M. GLOVER, B.Sc.,
Entomologist, Indian Lac Research Institute,
Namkum, Ranchi, Bihar, INDIA.

INDIAN LAC RESEARCH INSTITUTE
Namkum, Ranchi, Bihar
1955

Price two Annas

Some Simple Methods of Reducing the Damage, done by Insect Enemies, to the Lac Crops.

BY

P. M. GLOVER, B. Sc.

*Entomologist, Indian Lac Research Institute,
Namkum, Ranchi, Bihar, India.*

The production of lac, the raw product from which shellac, seed-lac, and button-lac are manufactured, is virtually a monopoly in the hands of India.

The production of stick-lac in India averages to about 11 lakh maunds per annum.

Damage to the lac crops is of two kinds: that due to insect enemies, and that due to causes other than insect enemies. It is not proposed to deal with this latter class of damage here; it may be said to account for no less than 30%-40% of the original settlement of lac larvæ; in part it is unavoidable as the larval settlement is of such a density that if mortality did not occur there would be no room for the development of the cells; part is caused by climatic factors such as intense heat, frost, hot dry winds, etc; part is, however, reducible, being due to faulty cultivation methods such as incorrect pruning, infection of host trees for crops to which they are not suited or with unsuitable strains of lac.

The damage done by insect enemies to the lac crops is approximately 30%-40% of the lac cells. The actual crop obtained is roughly one third of the possible *hypothetical* crop because, although as few as 15%-20% of the cells may survive to the end of the crop, between 30%-40% take an appreciable part in lac secretion, and 30% of the original settlement is male.

The object of this pamphlet is to explain in easy terms simple methods of reducing this insect damage. By far the greater part of the lac, grown in India, is grown by raiyats of little education and scanty means, in small holdings over a very vast area (Chota Nagpur which produces more than 50% of the outturn of lac in India covers an area of over 27,000 square miles). Control measures for the raiyat's use must therefore be extremely simple and above all must require no financial outlay. Only methods of this type are herein described.

There are two groups of insect enemies which attack the lac crops, these are the Parasites and the Predators. The Parasites are small winged insects belonging to the Chalcidoidea, which lay their eggs into the lac cell. A grub hatches from the egg and feeds on the lac insect within its cell; these grubs do not feed on the lac encrustation. The damage done by this class of enemy has been shown to be small at Namkum, the average percentage parasitism over seven years amounted to 4.8% while the average maximum parasitism was only 9.9% for the same period, and this of cells other than those damaged by the Predators. This type of damage is not understood by the average cultivator who merely sees the lac cells dying without apparent cause.

Predator damage is by far the more serious, the insects mainly responsible are the larvae or caterpillars of *Eublemma amabilis* and *Holcocera pulverea*; other minor predators occur; these two are, however, responsible for practically the whole of the damage of this type, amounting to about 35% of the lac cells. Estimates of damage include all cells whether male or female. The life history of both predators is similar. The female moth lays her eggs on, or near, the lac encrusted branches. A larva hatches from the egg and bites its way into the lac encrustation, inside which it spends the whole of the larval life, feeding on the lac insects and also on the lac encrustation. The larvæ, as they feed, form a tunnel or gallery lined with silk, excreta and pieces of the encrustation, they pupate in this gallery; the adult finally emerges to repeat the cycle.

The following simple controls are recommended to all cultivators, all are easy to carry out and do not necessitate any expense. Their great importance lies in the fact that they are effective against both groups of enemies, Parasites and Predators.

CONTROLS

1. Lac intended for use as brood should be cut as near to the time of swarming as possible, never more than one week before for optimum results. The practice of cutting lac for brood several weeks to a month before swarming is due, by cutting off the female insect from her food supply, results in devitalised brood and should be abandoned. (Institute Bulletin No. 87: Simple English version, and Hindi, Oriya and Bengali translations, explain how to forecast swarming dates.) This control aims at the production of healthy brood and a healthy swarm.

2. In choosing lac for use as brood, healthy lac showing the minimum of parasite and predator attack should be selected; insect enemy-affected sticks should be rejected. This control has for its object the reduction to a minimum of the emergence of insect enemies from lac in use as brood.

3. The maximum swarming period for an individual Baisakhi female is 11 days, the average 6 days, for Katki females 16 days is the maximum and 7 days the average swarming period. The February (Aghani) periods are similar to the Katki. Swarming is at a maximum between the 1st and 5th days of the swarming period: Swarming does not start simultaneously from all cells; in 2 weeks, however, the greater part of the emergence has occurred from all cells, and after 3 weeks emergence has usually ceased. Thus after 2-3 weeks the brood is no longer of any value as brood.

Although emergence of parasites and predators occurs from the lac crops while they are on the trees, by far the heaviest emergence occurs at, and during, the first 2-6 weeks after cutting the crop in the case of parasites, and shortly after cutting and during the first and second month after, in the case of predators. In the Katki crop after cutting in October-November, some of the predators emerge, others hibernate in the cut lac to emerge in February-March and to some extent in the intervening months. Therefore once the emergence period of the lac larvae is over, the brood is of no value as such, and is in fact harmful as it acts as a breeding and distributing centre for insect pests.

(a) Lac tied to the trees as brood should be removed after a maximum period of 3 weeks from the date swarming began; if the trees are sufficiently covered with larvae it should be removed earlier. Two weeks is generally ample for infection of host trees.

(b) Natural infection (leaving a certain amount of Lac (cheenti) on the tree uncut to swarm *in situ*) should be abandoned particularly in October—November. Exceptions to this rule may be necessitated by climatic conditions, an example being natural infection of Palas (*Butea monosperma*) in hot and arid districts; or by other factors such as shortage of labour in June-July when the raiyat is planting his own food crops prior to the monsoon, which may compel natural infection at this season.

4. Lac cropped from the trees is frequently stored, prior to sale, in the vicinity of trees infected for the new crop, or in districts where both Rangeeni and Kusumi crops are grown, of trees infected for the simultaneous crop. Parasite enemies, as has already been stated, continue to emerge for 2-6 weeks after the crop is cut, and predators for 1-2 months. From the Katki crop cut in October-November, predator enemies hibernate in the stored lac to emerge in February-March and to some extent in the intervening months. These enemies on emerging from stored lac, in lac growing districts, infect the new or simultaneous crops.

All lac cut from the tree and not required for brood and all brood lac after use should be scraped from the stick at once. (Lac not required for brood may be cut shortly before swarming is due.) This action alone destroys many of the larvae and pupae of the parasites and predators, and exposes others to climatic factors and to attack by ants.

As lac is, in general, sold scraped from the stick, all this control implies is immediate scraping instead of scraping after some delay. While scraping, larvae and pupae of *E. amabilis* and *H. pulverea*, which are observed, may be killed by crushing or by dropping them into hot water. While scraping, any small white cocoons should not be harmed as these are constructed by friendly insects parasitic on the larvae of the predators.

The scraped lac should also be removed where possible from the vicinity of lac infected trees. The control outlined in this paragraph is particularly important in the case of Katki lac.

5. The storage of lac leads to a falling off in quality and yield on manufacture. The ideal treatment of lac is, its sale, as soon as possible after cutting, to the manufacturer for immediate washing and conversion into seed-lac (*chowrie*). This satisfactorily eliminates the parasites and predators in the lac which, as has been stated, would emerge in due course to infect the new crop with pest. The seed-lac should then either be exported as such immediately, or be converted into shellac and shipped immediately to a cool climate.

This control serves the double purpose of reducing the prevalence of insect enemies and ensuring good quality and a good yield on manufacture (see also *Some Information and Advice to Shellac Manufacturers*, published by this Institute).

As has been stated, *E. amabilis* and *H. pulverea* feed not only on the lac insects but also on the resin (encrustation) and thus there is, in addition, a loss during storage from this source. Other insects of less importance may also feed on stored lac, among these are *Pyroderces falcatella* and *Ephestia sp.* Early conversion into seed-lac would prevent this damage to lac during storage.

6. Kusum (*Schleichera oleosa*) brood should be avoided for the inoculation of trees other than Kusum and Khair (*Acacia catechu*) in July for the Aghani (Kusmi) crop in regions where the principal crops are Rangeeni (*i.e.* Katki and Baisakhi). The Aghani crop matures in February, 3-4 months later than the Katki. During this time it becomes further infected with insect enemies. These enemies emerge in February-March and attack the Baisakhi crop which uptill then is not heavily pest-infected, but has by then reached a stage at which it is prone to insect attack.

7. In general it is unwise to grow Kusmi lac in areas which are predominantly Rangeeni, or Rangeeni lac in areas which are predominantly Kusmi.

The adoption of these simple methods of control by *all* cultivators will very greatly reduce the damage done by the insect enemies of lac, and hence benefit the raiyat by decreasing the costs of production and by increasing the yield, and above all the *quality*, of the lac obtained. An increased yield would also benefit the land owner by raising the value of his trees. Finally the reduction of pest in the crop would benefit the manufacturer in that the lac purchased by him would be cleaner, as it would contain fewer predator larvae and pupae and their frass. This, combined with the fact that the lac would be superior as it would contain fewer tunnels bored by the predator larvae, would mean that a better yield on washing would be obtained, thereby reducing manufacturing costs.

inse
dr
fe