

## STUDIES ON THE CULTIVATION OF SIND LAC INSECT

### Part IV. Two Important Consideration in Cultivating the Sind Lac-Insect

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Soil moisture reaching the host plant of lac-insects enables the latter to grow well but as mother-insects, constituting brood-lac, they deliver a progeny in which the sex-ratio is not favourable to the female and these alone form the main lac encrustation. Thus there is a paradox between "vegetative growth" and "female sex determination". For improved cultivation of lac, area reserved for cultivation should be subdivided, so that where soil moisture is poor it should be reserved for always supplying brood-lac. The main crop naturally would first be exploited as brood-lac, whatever be its quality, and then disposed as the harvest crop.

The quality of brood-lac used can be judged by the sex-ratio determination of the larvae that have swarmed from it. The earliest convenient time of determining sex-ratio would be when the larvae are half grown in the first stage. This can be done by using a pocket lens with the magnification of ten. The next and better time would be when the larvae are in the early second stage. Two articles with illustrations showing differences between the cells of male and female larvae have been offered before.

**Key words:** Lac, Insect, Cultivation.

#### Introduction

Lac has gone up very high in price and attempts are being made to increase and even improve its cultivation as already existing. A few years ago the Chinese sent a delegation to inspect the cultivation of lac in the forests not far from Hyderabad Sind and I was asked to be present at the occasion. This naturally shows that the Chinese are serious in trying to improve their method of cultivation by not missing an opportunity of adopting any method which may prove better for the purpose. It then seems to me that if the Chinese thought of finding a better method of lac cultivation in Sind surely the indigenous methods here are efficient to some extent and on that very account more capable of being improved upon. The past history shows that when lac cultivation was undertaken seriously, the revenue from this source increased most satisfactorily. In a previous article [2] I have shown that when Mr. Maitland-Kirwan became the Divisional Forest Officer of Hyderabad Sind due to his enthusiasm the revenue from lac during the following three years grew as indicated below.

For the year	Revenue from lac
1904	Rs. 4,200/-
1905	Rs. 15,051/-
1906	Rs. 20,000/-
1907	Rs. 85,001/-

I have quoted the figures from an article in Indian Forest 1908 when such is the progress of cultivating lac it should tempt others to allow history to repeat itself to-day.

#### Material and Methods

Lac is often seen naturally infecting a few trees which appear to be its favourite host plant. The species concerned is a lac insect specific to Sind and has been named *Kerria sindica*, Mohd. The trees on which it has been naturally found are *Zizyphus jujuba*, *Abezzia lebbek*, and *Acacia arabica*. It is the last named tree on which it is grown on a large scale in the forests of Sind, particularly in the district of Hyderabad Sind. Now that the question has been raised of improving if possible the simple existing methods of transferring brood-lac from one tree to another we may refer to two methods based upon the biology of the species *Kerria sindica*. They refer to the selection of area where lac is to be cultivated and to examine the sex ratio among the male and female lac insects in a generation which is to yield the crop of lac to be harvested at the end of the insect's life-cycle. Now in Mysore there are two species of lac insects. One is *Kerria mysorensis* which is regularly cultivated on *Shorea talura*. The other is *K. communis* often seen naturally infecting *Ficus mysorensis* but usually as small chunks of about 3 inches long. Now this species is never cultivated. A similar case was observed in Hyderabad State. Up north, nearing Berrar, lac was cultivated on *Butea frondosa* (Palas) but the same insect *K. communis* was also seen naturally infecting *Ficus bengalensis* and *F. religiosa* as also *Zizyphus jujuba* and others. Nevertheless even in Hyderabad the species *K. communis* was never cultivated. However, no reason has been found why in Mysore and in Hyderabad the insect *K. communis* was not cultivated, when lac cultivation was successfully carried out using other species of lac insects.

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I found *Acacia farnesiana* to be a favourite host plant of more than one species of lac insects. I took two plots with *A. farnesiana* and inoculated the trees with brood lac of *K. communis*. These two plots were kept different. One plot was sufficiently irrigated and the other was left to itself. Now the insects on trees which were duly supplied with water grow well and better than those on plants which belonged to a relatively dry plot. But the same insects, with excellent vegetative growth, gave rise to a generation which comprized only of males and these were all winged. We may now consider the insects growing on plants on the dry plot. Here mortality was obvious but those that survived as mother-insects gave rise to a generation in which the females predominated and the males that emerged were all wingless. The above experiment clearly revealed the peculiar biological fact of *K. communis* which grows well on well watered host plants but the moisture which reaches it is detrimental to female-sex formation. This explains why the above species is not cultivated any where in South India, certainly neither in Mysore nor in Hyderabad.

Mr. Navanif a later Divisional Forest Officer at Hyderabad Sind, kindly sent me brood lac of Sind lac insect which had been cultivated on *Acacia arabica*. Working with this species, or *K. sindica*, I found it was almost but not quite as bad as *K. communis*. To express clearly the Sind lac-insect is best cultivated where soil moisture is relatively poor, since its host plants, if well watered, induce the lac-insect to produce more males which means a poor crop. This is a biological fact which suggests that areas where lac is to be cultivated must be on an elevated, well drained ground, or far from the Indus river and its canals. Moreover part of the region must be reserved for always supplying proper brood-lac while it is obvious that the main crop, whatever be its quality, must be exploited also as brood-lac first and later treated as the harvest crop. Then the first suggestion for improving the present conditions of growing lac is to divide the area selected for the purpose as "dry" and "moist" and further subdivided the "dry" area into a portion reserved for always producing brood lac. The "moist" area producing the main crop naturally can also be used as the source of brood-lac irrespective of its quality or of the sex-

ratio, be it favourable or otherwise to the female as long as some of the latter are always there.

The second suggestion is to assure oneself as early as possible of the quality of brood-lac employed. It means that when a tree has been infected with lac-insects, issuing from the brood lac used, the sex-ratio is as 1:1 as female and male, or even more favourable to the female. The sex ratio is conveniently determined by a pocket magnifying lens giving a magnification of 10. When the larvae are half grown, in their first stage, they show sufficient difference to identify their sex leading to the determination of proper sex-ratio. Such sex-ratio determination can be carried out by selecting a few samples of twigs infected with lac-insects. The next time of such sex-ratio determination would be after the first moult when the insects are in their early second larval stage. Both such cases have been duly illustrated in earlier communications [4,5] the second and third articles of this series. The importance of such sex-ratio determination consists first in assuring the quality of brood-lac used and on the quantity of lac crop which is expected at the end of the life-cycle. Of this there are two, one of five months of the humid season, from June to October, the other of drier season, from November to May. These are idealized timings, where in reality, they would be longer or less but there are always two crops and the one growing through the humid season, at the end of October, is always the larger. This because the brood lac used at the beginning of June is always better, with sex-ratio favourable to the female.

Finally it may be mentioned that the ideas expressed here are mainly those communicated as early as 1941 [1] in a paper read at the first forest conference held at Hyderabad, India and later published in the Hyderabad Forest Magazine with the title "the consideration of soil moisture in new system of cultivating lac".

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