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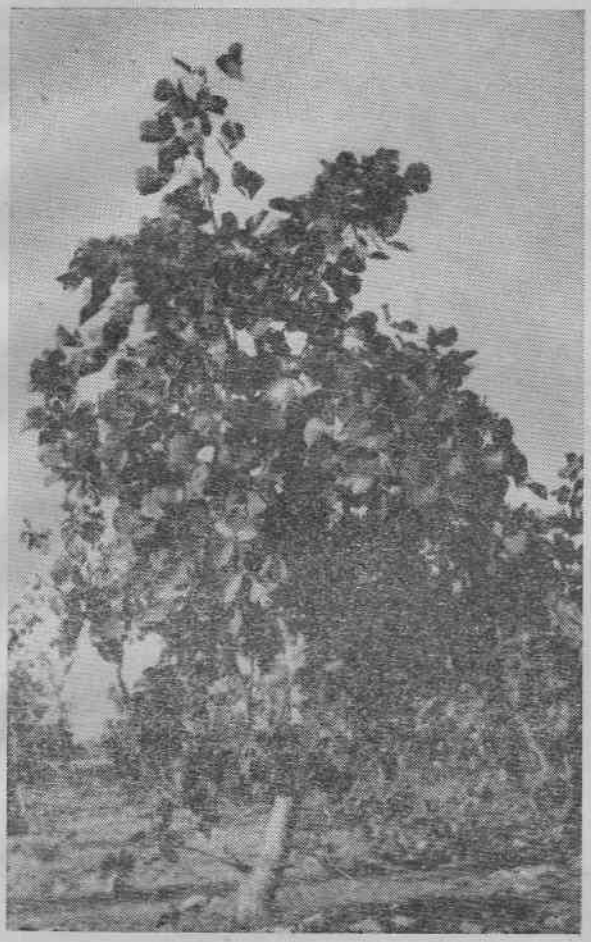

Palas tree

IMPROVED LAC CULTIVATION

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LAC resin is a gift of nature and is the hardened secretion of the tiny insect, *Kerria lacca* (Kerr)., thriving on certain trees only which are consequently called host trees. The resin is known to mankind from time immemorial. However, only at the end of the last century the importance of the resin was realised, and attention was given for its systematic cultivation.

There are two distinct strains of lac insects in India, namely *Kusmi* and *Rangeeni*. The former is mainly available from *kusum* (*Schleichera oleosa*) tree or other hosts with *kusum* brood while the latter from hosts other than *kusum*. Each strain passes through two generations in a year and consequently produces two crops per year. The two *Kusmi* crops are called *Jethwi* (January-February to June-July) and *Aghani* (June-July to January-February)

Lac encrustation on *palas*

A close-up view of lac encrustation on *bhalia* bush

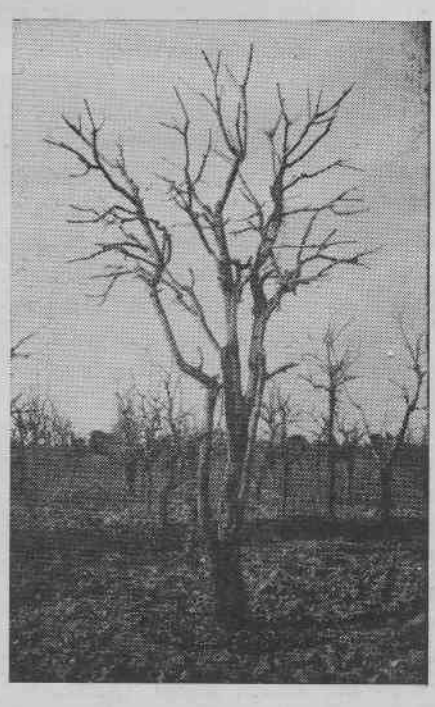
while the *Rangeeni* crops are *Katki* (June-July to October-November) and *Baisakhi* (October-November to June-July). Of the total output in India, nearly 80-90 per cent are obtained from *Rangeeni* crops. The *Kusmi* crops, though produced in smaller quantities, are superior in quality, have greater demands and fetch better prices.

Lac cultivation is a source of subsidiary income of a large number of people mainly adivasis. The lac host trees, namely *palas* (*Butea monosperma*), *ber* (*Zizyphus mauritiana*) and *kusum* as are obtainable around their huts are brought under cultivation by them. The common practice in most parts of the country consists in keeping the host trees continuously under inoculation. After the maturity of the crop, a part of the crop is harvested leaving some for further propagation on the same tree by self-inoculation. Due to this continuous operation for a few years without any rest whatsoever the health and vitality of the host trees are considerably affected leading ultimately in poor or practically no crop for years together.

In case of *palas*, the trees are inoculated during Oct./Nov. and thereafter partial crops are collected in April/May as *ari* (immature) lac and in next Oct./Nov. as broodlac. In the case of *ber*, heavy inoculation is carried out in Oct./Nov. every year and crops harvested completely as *ari* in April/May. While in case of *kusum*, mature crops, however, are collected partially in every season.

Normally, artificial inoculation is not practised but whenever carried out, it is done very heavily by placing big bundles of broodlac at a few places on the tree. This results in uneven settlement, some twigs having heavy while others very sparse or no settlement at all. This practice is, therefore, very wasteful and is not commendable with the amount of broodlac used.

Further, the continuous lac cultivation through repeated self-infection is also very harmful as the enemy insects get sufficient opportunity to thrive unhindered from crop to crop and multiply in increasingly large numbers. This happens even when artificial infection is also carried out because the cultivators do not carefully select their broodlacs free of enemy infestation.



Properly pruned *kusum* trees

By adopting the aforesaid cultivation practices, very often the cultivators face serious broodlac shortage especially after severe summers when insect mortality is very high. The direct result is that there is no sustained lac production year after year and the returns from lac are far from steady and satisfactory.

The main disadvantages, therefore as will be evident from the above cultivation practices, may be summarised as follows:

(i) Fluctuating yield of lac crops,
(ii) Scarcity of broodlac due to *ari* harvesting,
(iii) Adverse effects on the host trees due to continuous lac cultivation, and
(iv) Increase in the number of enemy insects due to continued presence of previous lac crops allowed for self-inoculation.

With a view to overcoming the above disadvantages and ensuring maximum sustained production from season to season, research was carried out at the Indian Lac Research Institute which resulted in the development of improved methods of lac cultivation.

Coupe System. In order to avoid the local practice of utilising all the host trees for continuous operation, the coupe system of cultivation was evolved. This aims at infecting fully a particular number of trees only in a coupe or compartment so that on maturity the crop can be harvested fully and another set of trees from a different coupe may be taken up for subsequent inoculation. This arrangement will not only allow sufficient time for development of new succulent shoots with foliage in the trees from which crop was harvested but also the much needed rest to regain their vigour. This coupe will be taken up for cultivation in rotation. Adoption of coupe system for lac cultivation will result in sustained production of lac giving at the same time maximum yield of crop.

The number of coupes in which the hosts will be divided depends on the species of the hosts and their growing habits. The *Rangeeni* host, *palas,* should be divided into 3 coupes with equal number of trees in each. Two coupes should be utilised for raising the *Baisakhi* cum-*Katki* crops in alternate years from October-November to Oct.-Nov. of the succeeding year, while the third coupe for the commercial *ari* crop every year from October-November to April of the succeeding year.

Ber, may be utilised for growing a commercial *ari* crop like the third coupe under *palas.* In the case of the slow growing *kusum* trees, these are divided into 4 coupes and each coupe is utilised for raising crop once in every two years. The trees thereby will get sufficient rest for $1\frac{1}{2}$ years.

Pruning. Maximum yield of lac can only be obtained if sufficient number of young shoots are available on the host trees during inoculation. This objective can only be met by the most imortant and essential operation of timely pruning of the host trees.

Kusum tree

Plantation of lac encrusted *bhalia* bushes in rows

The operation should be carried out with sharp instruments in order to get clean cuts. Branches 1.25 cm to 2.5 cm in diameter should be cut at a point so as to leave a stalk of 40-45 cm in length while branches of less than 1.25 cm should be cut flush with the branch wherefrom these arise. Branches more than 2.5 cm in diameter should not be normally cut.

The proper time of pruning *palas* and *ber* trees is about the middle of April. In case of *kusum* trees the cropping operation itself serves as pruning if properly conducted with due care.

Cropping. Lac crops should be harvested only when the crop is mature and this should not be done earlier than one week prior to larval emergence which will ensure satisfactory emergence of healthy larvae for next generation. To forecast the date of larval emergence, either the laboratory method of examining the development of the eggs in the ovary of the mother insects or the simple and easy visual method based on the "yellow spot" should be followed.

Inoculation. A successful crop can only be raised if inoculation is carried out properly. For inoculation, healthy and mature broodlac free from enemy insect infestation should only be used by careful selection. The optimum amount of broodlac necessary per tree also plays an important role in ensuring maximum inoculation of available shoots. Particular care should be taken to utilise the mature broodlac at its earliest opportunity and in no case it should be allowed to remain unutilised after 2 or 3 days of noting of larval emergence. A few broodlac sticks, 15 cm to 30 cm long, are tied into bundles and are then securely tied on the upper surfaces of the branches of trees to be inoculated in such a way as to give maximum contact with the branches. This will ensure full and uniform settlement of the larvae round the shoots. These broodlac bundles should be removed as soon as the emergence is over which normally may take two to three weeks.

The brood rate for inoculation also has some direct bearing on the yield of crop. It has also been clearly established that in the inoculating hosts the rate of broodlac should be such as to give settlement of lac larvae over 10 to 15 times the length of the broodlac sticks.

The important host tree, *palas, ber* and *kusum* are slow growing species and require 10 to 15 years from the time of sowing to become ready for inoculation and hence it is not worthwhile to have lac cultivation on plantation basis on these trees. For intensive cultivation of lac on plantation basis alternate hosts were searched and *bhalia (Moghania macrophylla),* a natural bush, 2.5-3.0 m high has received considerable attention. It has been found to be suitable host for both *Kusmi* and *Rangeeni* strains. It has already been recommended for intensive cultivation of lac on plantation basis.

However, *bhalia* has been found to be unsuitable for lac cultivation in the *Jethwi* season because the plant is unable to sustain large population of the insects during the summer months. For sustained lac production, a mixed plantation of *bhalia* and *galwang (Albizzia lucida),* which has been successfully trained into bushes, has been shown to be more satisfactory, *bhalia* for the *Aghani* crop and *galwang* for the *Jethwi.*

It is possible to raise plantations of these mixed bushes under agricultural conditions on acre basis.

Bhalia becomes ready for inoculation within 1½ years and *galwang* within 3 years from the time of raising. The cost of lac cultivation in comparison to the tall trees is greatly reduced as all the lac operations such as inoculation and cropping can be performed very easily from the ground itself. This consequently will increase the margin of profit considerably. In these bushes the cropping operation itself serves the purpose of pruning and become ready for re-inoculation within a year and therefore, three coupes will be needed for cultivation in rotation.