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DIRECTIONS FOR DEMONSTRATION STAFF

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As soon as you arrive at an area, care should be taken to study the existing practice of lac cultivation and to apply the following methods wherever necessary :—

I. Pruning

If trees are to be pruned for bringing them under cultivation or to improve the existing cultivation, the following directions are to be observed for the different important hosts :—

A. **Kusum**—Kusum trees should be pruned either in January-February or in June-July. While pruning Kusum trees, branches and shoots more than one inch in diameter should not be cut. Branches and shoots less than $\frac{1}{2}$ " in diameter should be cut close to the place from which they arise. This sort of pruning gives rise to thin shoots which are suitable for the growth of the lac insect. Kusum trees should be divided in 4 groups for cultivation of lac and each group should be infected one and half years after pruning and crop cutting, in rotation.

B. **Palas**—In the case of Palas also, branches more than one inch in diameter should not be pruned. Branches or shoots about one inch in diameter should be cut leaving a stalk of at least one and half feet from its base. Shoots less than half an inch in diameter should be cut close to the place from which they arise.

To grow the Katki crop on Palas, they should be pruned in the first half of February and to grow the Baisakhi crop, in the 2nd and 3rd week of April.

Where there is cultivation on Palas only, trees should be divided in three groups and one group should be used to cultivate one crop only, in rotation.

C. **Ber**—Ber can stand heavy pruning and even the thick shoots are suitable for cultivation of lac especially in the Katki

season. But in the interests of both the cultivator and the trees, it is better to prune them in the same way as described for Palas. To grow the Katki crop on Ber it should be pruned in the first half of February and to grow the Baisakhi crop, in the 3rd and 4th week of April. Where there is cultivation on Ber only, the trees should be divided into three groups and one group only should be used for cultivation of each crop by rotation.

D. Khair—Khair should be used to grow only either the Katki crop or the Aghani crop. It does not carry through either the Baisakhi or Jethwi crop. To grow the Katki crop, it should be pruned in February and to grow Aghani crop, from fourth week of April to first week of May.

Apart from the general instructions on pruning given above, a recent discovery that is to be applied refers to the defoliation of Palas and light pruning of Ber for producing healthy brood lac in June-July and also to avoid wastage of brood lac at the time of infecting Palas in October.

Palas—In October, about one to two weeks before the infection time, only the top three leaves should be left on each shoot and the rest should be taken out along with leaf stalk either by hand or by striking at the base of the leaf stalk from inside with small sticks about 3 feet long. This procedure (1) reduces the amount of brood lac required to infect a tree at least by $\frac{1}{3}$ rd; and (2) allows the growth of new leaves about a month earlier than they normally appear on trees which have not been treated in this way. The effect of earlier appearance of new leaves is that due to shade on the tree, more lac insects survive in the summer season than usual and the cultivator gets more brood lac to infect his Katki crop and also a higher yield of stick lac.

Ber—When the Baisakhi crop is on the trees, *between the last week of December and the first week of January*, shoots or branches not carrying lac, and also shoots which are less than the thickness of the little finger of a man should be cut away as they are unlikely to carry any crop or carry it through to maturity. Shoots on which mostly male lac insects have settled should also be pruned away. Partial pruning towards the top of the branches is more important than towards the base. By adopting this partial pruning the trees will have green foliage in the hot summer months and as a result there will be less mortality of the lac insects.

2. Alternation of hosts

Whenever it is possible to alternate hosts, every attempt should be made to do so, and observe the following directions :—

(i) If a cultivator has Palas, Ber and Khair trees in sufficient numbers, he should use Palas to grow the Baisakhi crop only and Ber and Khair to grow the Katki crop. The Palas trees should be divided into two groups, and one group of Palas should be used to grow one Baisakhi crop and the other to grow the next year's Baisakhi crop. In the same way the first group of Ber and Khair should be used to grow one Katki crop and the second to grow the next year's Katki crop.

(ii) If a cultivator has Kusum and Khair he should divide Kusum into two groups and Khair also into two groups. While preparing the groups it should be kept in mind that one tree of Kusum is equal to 8 trees of Khair in crown; so the ratio of Kusum to Khair should be 1 : 8.

One group of Kusum trees should be used to grow the Jethwi of one year and the second to grow the Jethwi crop of the next year.

In the same way one group of Khair should be used to grow the Aghani crop of one year and the second group to grow the Aghani crop of the next year.

3. Selection of brood lac

Only healthy lac sticks should be selected for brood lac. Sticks showing webs or domes of the enemy insects or holes bigger than the head of a pin caused by enemy insects should not be used as brood lac. In the *Baisakhi* and *Jethwi* lac, pitted and dry yellow appearance of lac indicates that the lac insects have died due to heat and drought. Such lac sticks should not be used for brood. Lac sticks bearing individual lac cells in general and the lac cells which coalesce to make up continuous encrustation of lac less thick in growth than an average-sized dry black gram (*urid*) seed should also be avoided as far as possible.

4. Destruction of enemy insects of lac

It should be remembered that about 50% of the crop is annually destroyed by the enemy insects. Therefore all the lac sticks that are not wanted for brood lac should be tied in bundles of convenient

sizes and kept under water for 3 days, either in running water inside fenced area of a river or stream near the bank, or in village pond; in the latter case, the water level should be about 2 feet over the lac sticks. On the fourth day, the bundles should be taken and dried in shade either under a tree or in a verandah, and the lac should be scraped from the sticks. This method kills practically all enemy insects, makes scraping easy and reduces the amount of dust on the stick lac.

5. Infection

As far as possible single sticks or bundles of two or three sticks should be tied on each shoot in such a way that there is maximum contact between the shoots and the brood sticks. Any healthy 'Dal' that falls from the sticks can be put in 'Donas' or baskets and tied to the shoots for infection.

The brood lac sticks should not be allowed to remain on the tree for more than 3 weeks.

It should be remembered that one healthy brood lac stick is sufficient to infect about twelve times its length. Therefore, the proper quantity of brood lac to be used for infection should be based on this ratio.

6. Crop Cutting

Preferably no 'chenti' lac should be left on trees for self infection. As far as possible crop cutting should be carried out as described under pruning.

The female lac insect continues producing lac almost to the last day of its life. Each female lac insect in its full life is capable of producing only a few *ratees* of lac. In spite of this a very large portion of *Aghani*, *Baisakhi* and *Jethwi* crops is cut *Ari* by the cultivators. The practice of *Ari* crop cutting in *Aghani* and *Jethwi* is partly due to ignorance of the fact that the female lac insect continues producing lac almost to the last day of its life and partly for fear of theft whereas in the *Baisakhi* crop the practice is prevalent because the lac insects die in large numbers on *Ber* and *Palas* in summer months due to hot winds, leaflessness of host trees and shortage of food supply both to the host plant and to the lac insect thriving on its sap.

To get the maximum amount of lac from each crop the lac should be allowed to remain on trees nearly up to the swarming time of lac larvae and should not be cut *Ari*. *Ari* (immature) crop cutting must not be resorted to in the case of Kusum either in *Aghani* or *Jethwi* crops. In the case of Rangeeni hosts *Katki* crop must not be cut *Ari* and in the case of *Baisakhi* crop, if necessary from the middle of April onwards only those branches may be removed in which the lac insects have completely died. Any lac stick which shows pitted and dry appearance may be taken as an indication that the lac insects have died on it.

7. Forecast of swarming of lac larvae

The crop must not be cut earlier than 10 days before the swarming of the lac larvae is due. Preferably the crop should be cut about 3 to 5 days earlier than the swarming is due and infected on the trees before the swarming has started. By doing so the cultivator will get the maximum amount of lac from his crop and avoid weakening or wasting the progeny by premature or late cutting of brood lac. This can be easily done by the following method:—

On the anal region of each healthy full-grown female is to be found a yellow spot on its covering of lac. As the insect approaches its complete maturity, the muscles of the region contract, with the result that the body of the female is separated from its covering of lac in this region and in the space thus caused, the female deposits wax and eggs. The yellow spot now covers a considerably large area and looks orange in colour. This area gradually increases in size and in about eight days half the insect looks orange coloured and, half red. It is about this stage that the lac larvae begin to come out. About 5 days before swarming starts the yellow-orange area is about $\frac{1}{4}$ th the size of a lac cell and about 3 days before $\frac{1}{3}$ rd the size of lac cell.

In order to ascertain that one is looking at the anal region of a female sufficiently healthy to lay eggs, the bunch of white wax filaments or bunch of brown bristles projecting from the anal tubercular hole (the only hole visible to a naked eye on the top of healthy lac cell) should be touched with a needle or a long thorn. If the insect is healthy, the touch will make the insect partly withdraw the bunch into the test and generally bring out at the top of the bunch a drop of sweet liquid called the 'honey dew.' Further, if the covering of lac is carefully cut or removed without injuring the female from over the yellow-orange area, inside will be found small pieces of wax and eggs and larvae lying on the wax.

8. Hot areas

In areas which are very hot and where most of the *Baisakhi* crop invariably dies before reaching maturity or in areas where a particular *Baisakhi* crop is affected by heat, the succeeding *Katki* crop may be grown by natural infection on the same trees but in no case natural infection should be resorted to, to grow the *Baisakhi* crop. Under this system, the Rangeeni hosts should be divided into two groups and one group should be used to grow one set of *Baisakhi* and *Katki* crop and the other to grow the next *Baisakhi* and *Katki* crop.

Use of *Ficus* species

Whenever *Ficus* species like *Ficus glomerata* (Gular or Dumbar), *Ficus infectoria* (Pakaur or Pakri or Pipalee), *Ficus religiosa* (Pipal), *Ficus glabella* (Putkul or Barpipal) and *Ficus bengalensis* (Bargad or or Bar) etc. are found, they should be pruned in April in the same way as described for Kusum and used to grow the *Baisakhi* crop, and the brood lac obtained from them in June-July should be used to grow the *Katki* crop on Ber, Palas, Khair and Puttari (*Croton oblongifolius*) etc.