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THE LAC INDUSTRY

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Many of us are, perhaps, unaware of the extreme economic importance of Lac Industry in India. It is a most fascinating subject as may be seen from the extensive use made of lac in the manufacture of many of the articles in common use such as sealing wax, gramophone records, varnishes, lacquer-ware, wooden toys, electrical goods, dyes, etc. The fact that, except for a small percentage contributed by Annam and Siam, India practically holds the monopoly for the world supply of this commodity, should be sufficient reason to justify our taking greater interest in the cultivation and production of lac. It is upto us to see that this industry is developed to the utmost on up-to-date lines so as to enable our controlling and dictating prices in the world market, instead of depending as at present upon the whims and fancies of purchasers in the foreign market. The total quantity and value of lac exported from India, as shown in the following table, indicate that this industry is by no means such a small and negligible one as it is supposed to be.

Year	Rupees	Tons
1923–24	90,526,887	24,284
1924–25	75,389,058	21,351
1925–26	68,759,299	27,046
1926–27	54,294,570	29,602
1927–28	69,112,746	27,129

It may be noted that there has been a decrease in the value of lac exported in recent years, which is, however, due to the fall in prices rather than to any decrease in the quantity of production. It is gratifying to add that this fall in prices has not been due to any successful competition arising out of the attempts to produce lac synthetically. It is again encouraging to learn that the Indian Lac Research Institute, Ranchi, has started work in right earnest so that ere long the production of lac of the best quality on a large scale may be an accomplished fact.

What is lac?

Lac is the name given to the resinous matter secreted by a scale insect—the Lac insect (*Tachardia lacca*) found living on certain kinds of trees. The lac is secreted to form an encrustation around its body serving to protect it from inclement weather and from its enemies. Dark-red in colour, the lac is composed mainly of a resin mixed with a small percentage of wax. Crude lac contains many impurities such as dust, bark, the remains of the lac insect, etc., and to prepare it for the market it has to be refined and specially treated in different ways; one of the well-known forms being Shellac, which is molten lac solidified so as to form thin flakes.

The life history of the lac insect

It will be now clear that the lac industry is based on the activities of the tiny lac insect, the successful rearing of which involves a certain amount of

expert knowledge as to its habits and life history. As already stated the insect lives and thrives upon particular species of trees. The insect starts its life as a tiny nymph emerging from under the encrustation of the mother insect in large numbers. These crawl about on the tender branches of the host-tree, in search of suitable places to fix themselves in for feeding. This exodus is called 'swarming'. Once settled, the insects never stir out, but continue to use their tubular mouth-parts for vigourously sucking up nutriment. As they grow into the adults, they continue to secrete lac till eventually they reach the swarming stage. Among these one can distinguish two kinds, the male and the female, the latter being the more preponderant. The male cell is found to be egg-shaped while the female one is fairly round with an irregular edge. During its active period, a sticky secretion called 'honey-dew' oozes out through its anal cleft and ants are often seen crowding round the cells attracted by this substance. When fully grown, the male insects, some of which may develop wings particularly in winter, emerge from their cells and move about to fertilise the females, with the fulfilment of which function their life comes to an end. The females continue to feed and grow till after some time the fertilised eggs hatch and the tiny larvae begin swarming and start another generation. The life-cycle is about four to four and a half months as observed under Mysore conditions on *Shorea talura*, but in North India there are only two cycles in the year, producing two crops of lac. What is known as the '*Katki*' crop is obtained from insects whose development is between June and November, while the '*Baisakhi*' crop is preceded by a longer season, from November to June. Under Mysore conditions therefore it has been possible to take three crops in about thirteen months. Cases have been noted, in Mysore, of the cycle being completed in about ninety days.

Suitable host-plants

Lac insect is by itself parasitic upon particular species of trees which vary with the tract to some extent. A study of the host-plant on which the insect entirely depends for its nourishment and growth, is also equally important in this industry. For it is found that the quantity and quality of lac produced generally depend upon the type of host-plant the insect has. The names of host-plants special to the different areas where lac is produced, are given below:

Tract	Local name	Botanical name
Punjab	*Ber*	*Zizyphus jujuba*
United Provinces	*Palas*	*Butea frondosa*
Bihar and Orissa	,,	,, ,,
	Kusum	*Schleichera trijuga*
Bengal	*Ber*	*Zizyphus jujuba*
Assam		*Ficus bengalensis*
		,, *rumphii*
	Rahar	*Cajanus indicus*
		Grewia laevigata
Burma	*Palas*	*Butea frondosa*
		Dalbergia sp.
Central India	,,	*Butea frondosa*
Central Provinces	,,	,, ,,
	Kusum	*Schleichera trijuga*

Tract	Local name	Botanical name
Mysore		*Shorea talura*
Madras (Salem and Palni hills)		" "
		Zizyphus jujuba
		Schleichera trijuga

Production of lac

The swarming larvae when settling on the succulent branches, nestle together so closely that ultimately when fully developed we find the encrustation continuous and completely covering the twigs. All branches bearing the encrustation are now cut and removed for lac extraction. By the time the 'harvest' approaches, the males have emerged and the female cells are found to be full of the newly-hatched larvae. Such twigs with well developed encrustations are then selected and tied on to a fresh set of host-trees kept ready for this purpose, by pruning them a few months in advance so as to ensure the availability of tender shoots for the young ones to settle upon. Thus a new group of host-trees are infected with what is known as the 'brood-lac' and the cultivation continued. After the removal of this brood-lac from the old hosts, all the lac-bearing branches, are cut out, thus effecting a pruning in itself and stimulating the trees to put forth fresh shoots so as to be ready for infection the next season. In North India generally during the long season, i.e., the *Baisakhi* crop, the activity of the insects ceases some six or seven weeks before swarming would naturally occur and therefore the collection of lac-bearing branches commences immediately, with the reservation, of course, of the brood-lac.

Schleichera trijuga has been found to yield the best quality lac as also the *Kusum* brood infected on to *Zizyphus* and *Butea*. The lac section of the Mysore Forest Department and the Indian Lac Research Institute have among many other things, taken up the study of host-plants and their influence on lac production. *Acacia catechu* has been found to give good lac, and from trials undertaken, much light is expected to be thrown on many other host-plants yet under study.

Preparation for the market

Crude lac contains many impurities as already stated above and has to be thoroughly cleaned before it can be ready for the market. The general method of refining is to disintegrate crude lac in a hand or power mill, work it in sieves, grade it according to the size of particles and then wash with ordinary water. For this it is immersed in water in a stone mortar about two feet in diameter and as deep and then constantly treaded by a man working his legs. This goes on for three days. The top layer of liquid with the impurities is now and then drawn out in a vessel and drained off and a fresh quantity of water added each time. Dissolved in the water thus drained off is the dye that originates from the body of the insect itself. This liquid is therefore not usually thrown off, but filtered and treated so as to recover the dye which is considered to be one of the fastest and best of its kind in the market.

After this process of washing, lac is spread out in trays indoors for drying. When completely dry, it is bagged, weighed and stored till prices are favourable for disposal. The cleaned lac can be distinguished by its attractive shining colour. The price offered per maund (80 lbs.) varies from Rs 35 to Rs 100 according to the fluctuations of the market. The demand is mainly

from foreign countries where lac is utilised largely as the basic substance in the manufacture of many well-known articles. Another form in which lac is also made available to a small extent is 'button lac'. This is probably the purest form of lac and is used where high grade quality is required. Button lac is in the form of flat buttons about two inches in diameter and is obtained by gently warming ordinary lac in a tough cloth bag and collecting the liquid lac that oozes out and pressing it into buttons of the required size before it solidifies. Shellac is another form, which is lac drawn out into fine flakes and highly suitable for ready use in industries where lac is freely used.

Some industrial uses of lac

Lac forms the essential material in the manufacture of gramophone records, insulators in electrical goods and machinery, sealing wax and many other articles requiring the peculiar qualities special to lac. Sealing wax contains about 33 to 35 per cent of pure lac, the other ingredients being kaolin, resin, turpentine and the required colouring matter. The mixture is melted in a slow fire upto boiling point and then poured into bronze moulds of the usual shape and size. The rods when cool are taken out and carefully worked on a glass plate after gently warming it previously, to smoothen the surfaces and otherwise make them perfect.

The liquid obtained by washing lac contains the dye principle which is excellently suited for colouring silk, wool and other organic fabrics. In the Mysore Government Lac Factory the cloth bag used in the preparation of button lac which contains along with the impurities small quantities of the lac adhering to the sides, is put into alcohol to dissolve the lac out. For this purpose, it is interesting to note, butter-churns are being used, as they are found to be very efficient for rinsing the cloth bags in alcohol. When all of the lac has been dissolved the bags are taken out, cleaned of the extraneous substances and again used. The alcohol is filtered into large bottles and the liquor thus obtained serves as a polish. The quantity of lac that has gone into the solution determines the density and hence the quality of the polish and the purposes for which it can be used.

In painting wooden-toys as manufactured in Chennapatna town of the Mysore State, lac is used in a peculiar and interesting manner. The necessary colouring matter is mixed with lac and rods of different colours are made and kept ready. These rods are handy for giving the finished toys delicate tints of various colours. This operation is done by simply pressing one end of the lac rodagainst the toy, as it is rotated fast fixed in a handlathe. By the heat gene rated by friction, the rod melts and a very thin layer of colour adheres to it and quickly gets polished in those shining and attractive tints with which we are very familiar in the wooden toys handled by children in our homes. The surfaces of several varieties of buttons obtainable in the bazaar, have been treated to a fine spray of lac which is responsible for the various delicate shades of scarlet observable on them. Bangles of different workmanship and colour as also sometimes necklaces are largely made out of ordinary lac. The possibilities of much more extensive utilisation of such a peculiar natural substance as lac in many other industries of our country, have yet to be explored.

The future of the lac industry

The comparative cheapness with which lac can be cultivated on a large scale in practically any part of the country and the large demand that exists

for this product as an essential and unreplaceable article in the manufacture of so many well-known articles, certainly call for a rapid expansion of this industry. The constant fluctuations in the prices, the want of facilities and encouragement for proper cultivation, the absence of more economic and upto-date methods of refining and preparing for the market, the paucity of well developed industries which would consume a great part of the production, all these are, on the other hand, factors which act adversely on such an expansion. There is, therefore, much scope for study and improvement both on the productive and the technical sides.

The question of the most advantageous host-plant from the point of view of quality and production of lac, has to be tackled with reference to particular tracts. Other conditions incidental to the growing period such as variations in temperature, humidity, rainfall and other natural causes have not been systematically studied for sufficiently long periods to enable us to draw conclusive inferences. The habits and life-histories of the insect-enemies of the lac insect have to be studied in connection with their proper control. These, combined with squirrels, birds and monkeys, cause appreciable loss to lac cultivation every year. The insect enemies fall into two groups called the predators attacking from outside and the parasites which start their activity of destruction from inside the cells. The control methods have to be carefully worked out and advantage is also to be taken of the existence of parasites upon these insect enemies, the introduction of which may control the inroads of these destructive breeds. The importance of the use of disease and pest-free brood-lac for infection has to be emphasised.

On the technical side there is yet large scope for improvement in the preparation of lac for the market and in the methods for utilising it in many of the minor industrial products. The most important factor is the production of lac in the cheapest manner possible. The whole industry is now threatened, as it were, by attempts which are being made in the West for producing synthetic lac, but which have not been, fortunately for India, successful so far. It is clear therefore that taking advantage of the exclusive favour bestowed by Nature on India, the cultivation and production of lac should be thoroughly improved and modernised with the aim of making the product so cheaply available that synthetic lac would find it very hard to compete. This is a fond, though legitimate hope, and from the way in which the Indian Lac Research Institute has started work along most of the lines mentioned above, it will not be too much to hope that the lac industry will have a very bright future.

On the commercial side, a good deal of advertising work has to be undertaken by the Government to popularise many of the articles manufactured out of and with lac in some of the lac factories and other industrial centres in the country. There is again the need for research to be carried out with a view to perfect the processes of manufacture of these articles on up-to-date lines consistent with economy. The consumption of lac in the country, as a result of industrial progress, should phenomenally increase, if foreign domination and market fluctuations are to be counteracted. There will be then definite encouragement given to an extensive cultivation of lac, attempts being made side by side to place the product in the market a very cheap rate.

In this connection it will be interesting to read the remarks of Rai Bahadur C. S. Misra on the working of the Mysore Government Lac Factory at Bangalore, which is as follows,

'From what I saw of the lac work at Bangalore, I was very much struck with the progress made. It demonstrated clearly what could be done with ceaseless efforts to organise the work and to put it on a paying basis. The work done was methodical and all the bye-products were usefully employed. The total produce, though 500 maunds now, is likely to expand soon, and this at Rs 20 per maund for the crude material works up to Rs 10,000, whilst the total expenses were not more than Rs 3,000. This practically represents the out-turn from four hundred acres which are much scattered about within the State. The processes employed for the utilisation of the refuse were interesting and showed that every care was taken to prevent waste. It was the only place visited by me where regular accounts were kept and where it was possible to see what could be done by improved methods of cultivation and refining to get the best results. I think this is all due to the untiring efforts of Mr. Basappa who was trained at Pusa, and who is in charge of lac work in Mysore.' [1]

My thanks are due to Mr. Basappa, Officer in Charge, the Government Lac Factory at Bangalore, who kindly supplied me with much of the information incorporated in this article and who was generous enough to present specimens of lac and lac-products available in the factory for exhibition in the Agricultural College Museum at Coimbatore.

[1] Published in the *Quarterly Journal* of the Mysore Forest Department, Volume I, No. 3.