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Report on the

MARKETING OF LAC

IN

INDIA

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FOREWORD.

This report deals with the marketing of lac—a commodity in the production of which India holds a virtual monopoly, but for the disposal of which she depends almost entirely on the export market. The survey of the marketing of this commodity in India was taken up at the instance of the Indian Lac Cess Committee, which also provided funds for clerical staff and deputed an officer with the Agricultural Marketing Adviser to the Government of India for some time, besides meeting the cost of collection and analysis of samples.

The facts set out in the report indicate that better prices can be secured for the producers by improving the conditions of trading in primary markets and assembling centres, by reducing the fluctuations in shellac prices and bringing about closer relationship between shellac, seedlac and stick lac prices, by improving methods of preparing seedlac and shellac and standardising the grades, by expanding the market for lac and lac products in India and by reducing waste and loss in storage.

Thanks and acknowledgments are due to the Indian Lac Cess Committee, to the large number of merchants, brokers, manufacturers, shippers and trade associations who helped in the survey and to the Director and other members of the Indian Lac Research Institute, Namkum, for the work done in connection with the analysis of samples and the help and advice which they freely gave in regard to technical matters from time to time. Acknowledgments are also made for the

CHAPTER I.—SUPPLY.

A.—Introductory note.

Lac is a resinous substance secreted as a protective coating by the insect *Laccifer lacca* having its habitat on certain trees, shrubs and creepers known as its hosts. The larvae settle down in large numbers on the young succulent shoots, pierce the bark and start feeding on the sap of the host and secreting lac. The secretion forms a coating over their bodies but they grow inside this coating and continue to add fresh coats from inside. The coating of one insect meets the coating of another so that a thick continuous or semi-continuous encrustation is formed over the shoots. After some time, the male insects come out of their cells and moving over the encrustation fertilise the females and die. The females then start secreting lac more liberally. At the same time, eggs develop in their bodies and when mature are oviposited into a space formed in the cell. Here they hatch into larvae which afterwards emerge from the cells. The emergence, technically known as swarming, continues for about three weeks, after which the mother insects die. This life cycle is repeated twice in a period of twelve months.

The encrustation formed on the branches is scraped and forms the stick lac of commerce. It contains, apart from woody matter, the lac resin, lac dye, bodies of insects and some wax. Seed lac is obtained by grinding and washing this stick lac. Shellac is made by melting seed-lac or extracting it by a suitable solvent.

India holds a virtual monopoly for lac, accounting for nearly 85 per cent. of the total world production. Much of the lac produced outside India in Burma, Straits Settlements, Siam, Indo-China, Ceylon, Java and China, is imported into India in the form of stick lac to be worked up into seedlac and shellac.

B.—Indian production.

(1) Lac cultivation areas.

The main lac producing zone, as will be seen from the map facing page 2, extends over certain districts of Bihar, the Central Provinces, the United Provinces, Orissa and Bengal together with some of the Central India and Eastern States. There is a second smaller lac zone in Assam. Besides these two zones, lac is also grown in small quantities in the Punjab, Sind, Rajputana, Bombay, Hyderabad, Mysore, Travancore, Madras and Kashmir.

The distribution of the lac area in various provinces and States is given below :—

Bihar.—The lac area starts at the extreme southern end of the Gaya district and extends to all the districts of Chhota Nagpur (namely Palamau, Hazaribagh, Ranchi, Manbhum and Singbhum) and Santhal Parganas.

Central Provinces.—The chief centres of lac production are in the eastern and northern portions of the province in the districts of Bilaspur, Raipur, Chanda, Bhandara, Balaghat, Jubbulpore, Saugor and Hoshangabad.

United Provinces.—The main lac producing district is Mirzapur.

Orissa.—Lac is grown in the Sambalpur district.

Bengal.—The cultivation is mainly in the Murshidabad and Malda districts, while small quantities are produced in the Birbhum, Bankura and Midnapur districts also.

Assam.—Lac occurs in the forests of Kamrup, Khasi and Jaintia Hills, Garo Hills, Nowgong and Cachar districts and in the Manipur State.

Central India States.—The main centres of cultivation are in Rewa and Maihar States.

Eastern States.—Mayurbhanj and Keonjhar are important centres.

Sind.—Lac is mostly grown in the Hyderabad district.

Bombay.—Lac occurs in the West Khandesh, Nasik and Satara districts and some States in the Panchmahal district.

Punjab.—Lac is mainly grown in the Hoshiarpur district and the adjoining areas in the Ambala, Kangra and Gurdaspur districts.

Madras.—Lac is grown in the Madura and Salem districts.

Mysore.—The most important lac producing area is in the Tumkur district, while small quantities are produced in the Bangalore, Kolar and Hassan districts.

(2) Lac hosts.

A large number of trees, shrubs and creepers serve as hosts for the lac insect. These may be divided into two groups, *viz.*, major hosts and minor hosts. The major hosts consist of *Kusum* (*Schleichera trijuga*), *Ber* (*Zizyphus jujuba*) and *Palas* (*Butea frondosa*). The minor hosts are numerous but the more important of these are *Khair* (*Acacia catechu*), *Ghont* (*Zizphus xylopyra*), *Babul* (*Acacia arabica*) and *Arhar* (*Cajanus indicus*). A detailed list of the lac hosts is given in Appendix 1.

The importance of the various lac hosts differs in different tracts. In some areas, lac is grown on more than one host in the same district, *e.g.*, *Ber, Palas* and *Kusum* are all met with in the Manbhum and Ranchi districts. In some other areas, a particular host predominates in a certain locality, *e.g.*, *Ber* in the Malda and Murshidabad districts (Bengal), *Palas* in Gondia (Bhandara district, Central Provinces), *Ghont* in Damoh (Saugor district, Central Provinces) and *Arhar* in Assam. Considering the various provinces, *Palas* predominates in the Central Provinces and the United Provinces, *Ber* in Bengal and *Arhar* in Assam. All the three major hosts are of importance in Bihar.

The different hosts used for lac cultivation in the various centres of the 12 lac divisions, which will be referred to later, are indicated in Appendix 2.

(3) Lac crops.

The two life cycles of the lac insect in 12 months lead to two crops in a year, one harvested in summer and the other in winter. The lac insect, however, behaves somewhat differently on a *Kusum* host than on other hosts so that lac secreted on *Kusum* trees is harvested at different periods, although like other hosts there are two crops. There are thus 4 lac crops in a year.

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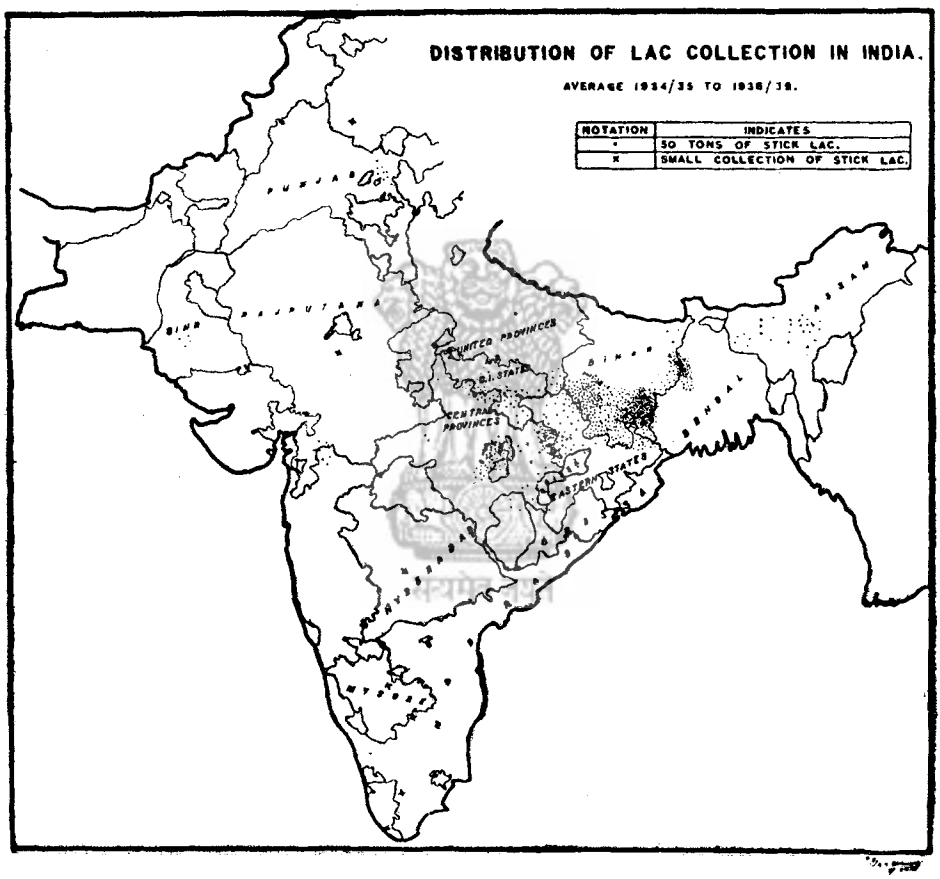

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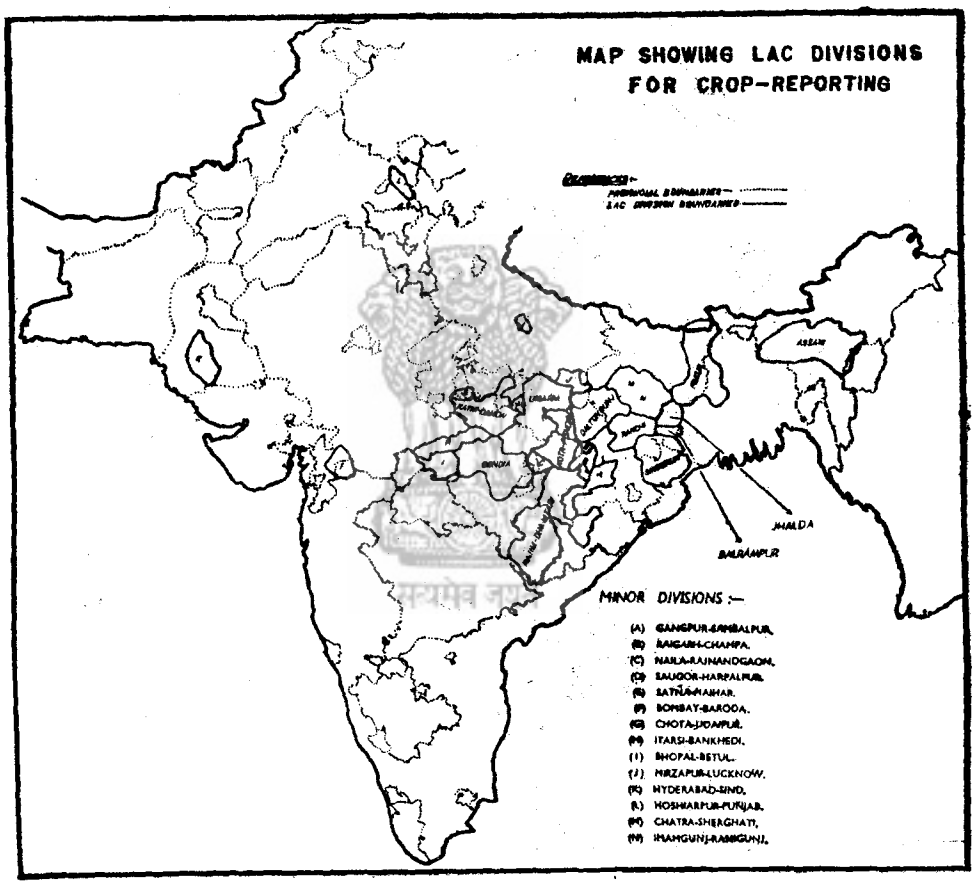


The different crops are known after the names of the Hindu months in which the collection of each commences. The two crops from hosts other than *Kusum* are known as *Baisakhi* and *Katki* (also called *Rangeen*) after the months *Baisakh* (April-May) and *Katik* (October-November) respectively. The crops from *Kusum* hosts are known as *Jethua* or *Jethwi* and *Aghani* after the months *Jeth* (May-June) and *Aghan* (November-December) respectively. The *Aghani* crop is usually referred to as *Kusmi*.

Lac harvested before the larvae emerge is called *ari* lac and contains the living insects, while lac harvested after the swarming, *i.e.*, after the emergence of the larvae is called *phunki* lac and contains the dead bodies only of the insects.

Baisakhi crop (called *Hari* in the Punjab) is the biggest and the most important commercial crop. The harvesting of this crop extends over a period of about three months. A part of the crop is harvested *ari* in April-May, a part is left on the trees for natural infection for *Katki* crop and the rest is harvested *phunki* in June-July. *Katki* crop is generally cut in October-November both for sale and brood for *Baisakhi* crop. This crop is generally smaller than the *Baisakhi* crop from the same hosts although in some particular areas, *e.g.*, Assam, *Katki* crop is the bigger of the two crops. It may be noted that while *Baisakhi* crop generally results from artificial infection of hosts with *Katki* brood, *Katki* crop is usually from natural infection resulting from part of *Baisakhi* lac left on the trees.

In the case of *Kusum* host, the winter crop *Aghani* (*Kusmi*) is the bigger of the two crops. It matures in January-February but the cutting of the crop begins in November-December and continues till February. The *Jethwi* crop is comparatively a small crop. It is usually cut mature in June-July, and largely used as brood for *Aghani* crop.

The periods of infection and harvesting of the four crops are summarised below :—

Name of crop.	Time of infection.	Time of harvesting.
Non-*Kusum crops*—		
Baisakhi (*Bysacki*)	October-November ..	April—July.
Katki (*Rungeen*)	June-July	October-November.
Kusum-crops—		
Jethua	January-February ..	June-July.
Aghani(*Kusmi*)	June-July	November—February.

The crops are different when *Jalari* (*Shorea talura*) trees are used as hosts. In this case, 3 crops are harvested in 13 months, as shown in the table below :—

Crop.	Time of infection.	Time of harvesting.
Pre-monsoon crop	March-April	July-August.
Monsoon crop	July-August	November-December.
Post monsoon crop	November-December ..	March-April.

The cultivation of lac on *Shorea talura* is confined to Mysore State and the Salem district of Madras.

(4) Estimation of production.

The cultivation of lac on a vast number of hosts of different kinds, its collection by numerous small growers, and the wide variations in the

yield depending on the type and size of host, the method of infection and cultivation and seasonal conditions, present serious difficulties in the estimation of production of this crop. The earliest available estimates are for the years 1918 to 1921. These were made by a member of the trade on the basis of enquiries made from his agents in various centres. The Indian Lac Association for Research later examined the possibilities of a regular annual estimation of the crop, but the cost involved in collecting the information and its doubtful accuracy prevented any systematic estimates being made. The committee had a crop assistant, who toured in different areas at each crop time and sent his observations regarding the extent of infection, condition of the crop and arrivals and stocks in markets to the Association for the use of its members. This arrangement continued for a number of years, figures of despatches of lac from important centres and an estimation of the crop in terms of annas being added later.

The Indian Lac Cess Committee, which succeeded the Indian Lac Association for Research developed the forecasts of lac production initiated by the Association, and regular estimates of production are available since 1928-29.

For the purpose of framing crop estimates, the lac growing areas extending over Bihar, the Central, Provinces, the United Provinces, Orissa, Bengal, Bombay, the Punjab, Sind and a number of Indian States but excluding Assam and certain "non-reporting areas" are divided into 12 divisions,* listed below :—

1. Balarampur.
2. Jhalda.
3. Ranchi.
4. Singbhum.
5. Pakur.
6. Daltonganj.
7. Kota-Pendra.
8. Rajim-Dhamtari.
9. Gondia.
10. Katni-Damoh.
11. Umaria.
12. Other minor divisions.

These divisions are named after important lac markets or shellac manufacturing centres. In many cases a lac division includes tracts located in more than one political division. The lac divisions are subdivided into centres. A list of the lac divisions together with their subdivisions, and the districts and States included in each division, are given in Appendix 3.

The method adopted by the Indian Lac Cess Committee was essentially the same as that adopted previously by the Indian Lac Association for Research. The crop statistician of the Indian Lac Cess Committee gave estimates of the crop in each division by touring in a number of centres in each division. With a view to improve the accuracy and utility of the forecasts, the system was slightly modified in 1938 and "the Skeleton

*The Indian Lac Cess Committee in their meeting held in July-August, 1940 decided to make certain changes in the division. Subsequent crop estimates have been made on the basis of revised divisions.

System '' of crop reporting was introduced. Under this system the crop statistician is provided with skeleton forms for reporting the climatic conditions, progress of the crop, damage by insects, host trees used and the estimated yield in different divisions for preliminary, semi-final and final reporting. Specimens of forms used for reporting under the '' Skeleton System '' are given in Appendix 4. The reports for different divisions are consolidated in a general report. Three reports, Preliminary, Semi-Final and Final are made in respect of the *Baisakhi* crop, two reports each, Preliminary and Final, for the *Katki* and *Kusmi* crops and only one Final report for the *Jethua* crop.

The estimates of the four crops harvested during a year are collectively verified by preparing a statement on the lines indicated below :—

Crop verification statement for lac.

Approximate stocks on 1st April.

Add estimated production of 4 crops.

Add foreign lac received.

Less shellac, seedlac and stick lac removed from different lac divisions in terms of stick lac.

Approximate stock on the following 1st April.

The stocks of a commodity like stick lac are, however, difficult to estimate with any degree of accuracy. Again while the figures of foreign lac received are accurately recorded, the figures representing the total removals of shellac, seedlac and stick lac in terms of stick lac are liable to considerable error because the yield of shellac or seedlac from stick lac varies considerably under different conditions. The reported figures of lac production should, therefore, be considered as only approximate and inferences drawn from such figures taken only as tendencies and rough approximations. The possibilities of further improving the accuracy of production figures and the system of crop reporting may be examined by the Indian Lac Cess Committee, which has paid considerable attention to this question in the past.

As the Provincial Governments generally have arrangements for reporting the acreage, yield, etc., of various agricultural crops and publish estimates of the same, it may be possible for them to publish estimates of the lac crop. Their Revenue departments could also help the Crop Statistician in the collection of data for estimation of the crop.

(5) AVERAGE YIELD PER HOST TREE.

The yield of lac from a host tree varies considerably depending upon a number of factors, such as the kind of the host tree, its size and condition, the nature and extent of infection, the quality of brood lac used, weather and soil conditions and the damage due to insect attack.

A *Kusum* host generally gives a higher yield than the other hosts, but it is slow to recover and throw out new branches after pruning. It is usual, therefore, to infect one side of the tree only at one time. *Ber* throws out profuse long branches as compared with *Palas* so that *Ber* provides a larger surface area for lac insects. Consequently, *Ber* generally gives a higher yield than *Palas*.

The yield from a particular host further varies according to its size.

The following figures of average yield from Bihar will give some idea of the extent of variation depending on the size of a host.

Estimated average yield per tree.*

(Pounds.)

	Small.	Medium.	Large.
Kusum	8 to 10	10 to 30	30 to 60
Ber	½ to 2	2 to 4	4 to 8
Palas	½ to 1	1 to 4	4 to 10

Trees, which are systematically infected with proper quantity of brood lac, give higher yields than those naturally infected or on which too little or too much brood lac has been put.

Taking all these factors into consideration, the average yields per tree for different hosts, are estimated as under :—

Average yield of stick lac per tree.

(Pounds.)

Kusum	12
Ber	3
Palas	2
Minor hosts	1½

(6) TOTAL PRODUCTION.

The production of lac in the main producing areas of India was estimated between 29,000 tons and 45,000 tons approximately between 1918-19 and 1921-22, as will appear from the following figures :—

Lac collected† in India from 1918-19 *to* 1921-22.

Year.	Tons.
1918-19	28,729‡
1919-20	33,659
1920-21	44,985
1921-22	42,520
Average	37,473

Since 1928-29, the production in the 12 reporting divisions has varied (see Appendix 5) from a minimum of 31,000 tons (in 1931-32) to a maximum of 58,000 tons (in 1936-37), the average for the quinquennium 1934-35 to 1938-39 being about 46,000 tons. The production in Assam during the same period has varied from a minimum of 800 tons (in 1933-34) to a maximum of over 2,000 tons (in 1930-31), the average for the period 1934-35 to 1938-39 being nearly 1,200 tons. The production in non-reporting areas is estimated to average nearly 600 tons (figures being available only since 1934-35).

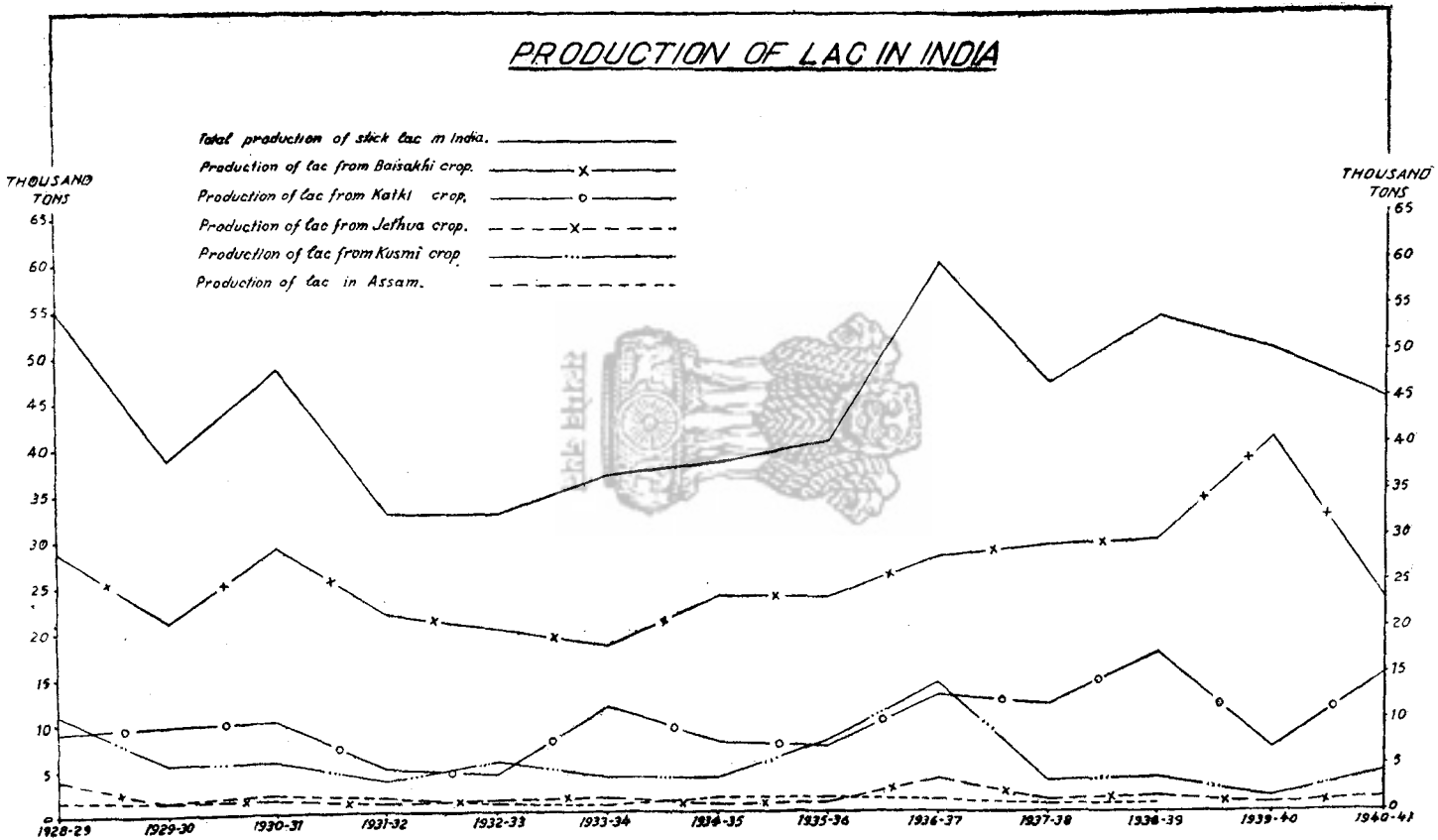
The total production in India in the quinquennium 1934-35 to 1938-39 thus averaged 47,750 tons or roughly 48,000 tons.

The figures given above, which are taken to represent the production of lac, in fact represent not the quantities produced but the quantities collected. The amount of lac collected may differ from the quantity produced. For instance, if a lac producer finds a small quantity on a

*Estimated by the Director, Indian Lac Research Institute, Namkum.

†"Lac cultivation in India". P. M. Glover.

‡Excluding *Jethua* crop, figures for which are not available.



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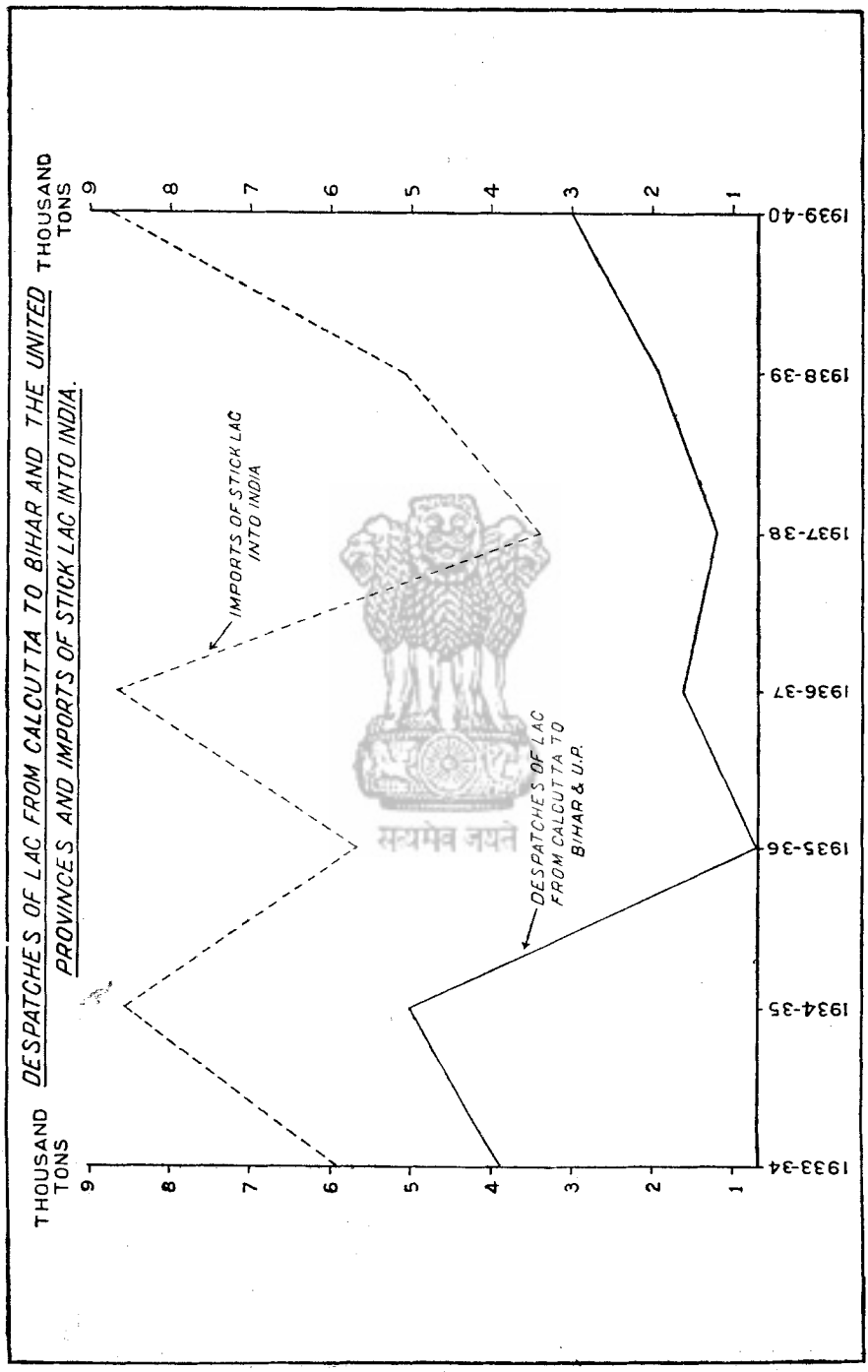

few branches of a tree and reckons that the cost of collection will be more than the value of lac collected, he does not collect it but leaves it on the tree. It may be collected with a later crop, when more lac has been formed on the tree, or not collected at all. The amount of lac, left uncollected, from year to year is very difficult to estimate.

(7) Trend of production.

The trend of production in India will be clearly seen from the diagram facing page 6 (which is based on figures given in Appendix 5) and the following four-yearly averages, from which it will be apparent that the production showed a substantial increase during the last four-year period.

Production of lac in India.

	Tons.
Average 1918-19 to 1921-22	37,000
Average 1928-29 to 1931-32	44,000
Average 1932-33 to 1935-36	37,000
Average 1936-37 to 1939-40	53,000

The production fell from about 55,000 tons in 1928-29 to between 32,000 and 33,000 tons in 1931-32 and 1932-33. After this, a continuously upward trend was maintained upto 1936-37, when the record figure of about 60,000 tons was reached. There was a fall in 1937-38 followed by a recovery in 1938-39. The production in 1939-40 differed little from that in 1938-39. The average production during the quinquennium 1934-35 to 1938-39 amounting to 48,000 tons was well over the average of any previous five years.

As regards the trend of the individual crops, the production of *Baisakhi* crop fell from nearly 29,000 tons in 1928-29 to about 18,000 tons in 1933-34, after which there was a steady upward trend up to 1939-40 when there was a record yield of about 41,000 tons. The crop in 1940-41 declined to about 23,000 tons. The other crops do not show any definite trend. A record *Katki* crop of over 17,000 tons was collected in 1938-39 and record *Kusmi* and *Jethua* crops of about 14,000 tons and 4,000 tons in 1936-37 and 1928-29 respectively. There was a very small *Kusmi* crop of only about 1,600 tons in 1939-40, but in 1940-41, the *Kusmi* crop was over 4,300 tons.

The crop in Assam fluctuated from a minimum of about 800 tons (in 1933-34 and 1938-39) to a maximum of over 2,000 tons (in 1930-31). A continued downward trend is seen since 1934-35 and this is reported to be due to low prices.

(8) Production from different crops.

The production of lac from different crops in each of the different lac divisions, Assam, and non-reporting areas from 1934-35 to 1938-39 together with the average for the quinquennium is given in Appendix 6. It will be observed that considering the average for the quinquennium about 56 per cent. of the total lac production was collected from the *Baisakhi* crop. *Katki* crop contributed about 26 per cent. so that *Baisakhi* and *Katki* crops together were responsible for nearly 82 per cent. of the total lac collected. *Kusmi* and *Jethua* crops accounted for less than 14 per

cent. and 4 per cent. respectively of the total ; the two crops together thus contributed nearly 18 per cent. to the total..

The proportion of lac produced in different crops, however, varied in different areas, as will be seen from the following figures :—

Approximate proportion of each crop in different areas.

(Average 1934-35 to 1938-39.)

Lac divisions.	*Baisakhi.*	*Katki.*	*Kusmi.*	*Jethua.*	Total.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Balarampur	61	13	22	4	100
Jhalda	59	16	20	5	100
Ranchi	49	18	28	5	100
Singbhum	48	16	26	10	100
Pakur	69	31	..	..	100
Daltonganj	74	25	1	(*a*)	100
Kota-Pendra	59	39	2	(*a*)	100
Rajim-Dhamtari	18	15	49	18	100
Gondia	47	53	(*a*)	..	100
Katni-Damoh	39	61	..	..	100
Umaria	65	34	1	..	100
Minor divisions	59	28	8	5	100
Total of 12 divisions	58	24	14	4	100
Assam	..	98	..	2*	100
Non-reporting areas	55	32	9	4	100
Total ..	56	26	14	4	100

It will be observed that during the period 1934-35 to 1938-39 the *Baisakhi* crop accounted for as little as 18 per cent. of the total lac collected in Rajim-Dhamtari and as much as 74 per cent. in Daltonganj and 69 per cent. in the Pakur division. Balrampur and Jhalda divisions collected nearly 61 per cent. and 59 per cent. respectively of their lac from *Baisakhi* crop. The *Katki* crop contributed 61 per cent. and 53 per cent. respectively in the Katni-Damoh and Gondia divisions and nearly 13 per cent. only in the Balrampur division. In Assam, 98 per cent. of lac was collected from the *Katki* crop.

The *Kusmi* crop was responsible for 28 per cent. of lac collected in the Ranchi division and 26 per cent. in the Singbhum division, while in the Rajim-Dhamtari division, as much as 49 per cent. was collected from the *Kusmi* crop. The *Jethua* crop contributed an appreciable proportion only in the Rajim-Dhamtari and Singbhum divisions, where about 18 per cent. and 10 per cent. respectively were collected from the *Jethua* crop.

A reference to Appendix 6 further shows that the proportion of the

(*a*) Proportion is very small.

*The crop in Assam is not raised on *Kusum* hosts but on account of the summer crop being collected later, the period of harvesting coincides with the *Jethua* crop in other areas.

different crops in the total production varied from year to year. The share of *Baisakhi* crop varied during the quinquennium 1934-35 to 1938-39 from nearly 47 per cent. in 1936-37 to over 63 per cent. in 1937-38. The proportion of *Katki* crop varied from 21 per cent. in 1935-36 to over 34 per cent. in 1938-39. The range of variation in the case of *Kusmi* crop lay between 7 per cent. in 1937-38 and 23 per cent. in 1936-37 and that of *Jethua* crop from about 2 per cent. in 1934-35 to over 6 per cent. in 1936-37.

(9) Production on different hosts.

The *Kusmi* and the *Jethua* crops are obtained from the *Kusum* tree. The average annual production of these two crops (excluding Assam but including non-reporting areas) during the five-year period ending 1938-39 averaged about 8,200 tons. The other two crops, namely, *Baisakhi* and *Katki*, the average production of which (excluding Assam and including non-reporting areas) amounted to 38,300 tons, are produced mainly on *Ber* and *Palas*, comparatively small quantities being produced on other minor hosts. The average production of a little over 1,200 tons in Assam is largely on *Arhar* hosts.

(10) Production in different provinces and States.

It has already been stated that the production of lac is estimated by certain special lac divisions and that many of these divisions include tracts lying in different political territories. The production in different provinces and States can be estimated by splitting the figures of some of the divisions and assigning them to their respective provinces and States. The average annual production of lac in different provinces and States during the quinquennium 1934-35 to 1938-39, estimated on the above basis, is given below :—

Estimated approximate production of lac in different provinces and States.

(Average 1934-35 to 1938-39.)

	Tons.	Approximate share in total production.
		Per cent.
Bihar	28,500	60
Central Provinces	6,000	13
Bengal	3,700	8
Eastern States	4,800	10
Central India States	1,500	3
Assam	1,200	2
United Provinces	800	2
Punjab	250	
Bombay (including Baroda and Panch Mahal States) ..	100	
Orissa	200	2
Sind	50	
Madras (including Madras States)	50	
Others	600	
Total ..	47,750	100

Bihar accounted for as much as 60 per cent. of the total Indian production. The Central Provinces and Bengal followed with about 13 per cent. and 8 per cent. respectively, so that about 81 per cent. of the total production was concentrated in these three provinces. Of the Indian States, the Eastern States and the Central India States were responsible for about 10 per cent. and 3 per cent. respectively of the total production.

C.—Imports.

(1) Quantities and sources.

The imports of lac into India by sea since 1900-01 are given in Appendix 7. It will be observed that the quantities imported varied from a minimum of 173 tons stick lac and 3 tons other forms of lac in 1911-12 to a maximum of 8,656 tons stick lac and 93 tons other forms of lac in 1936-37. The average imports during the quinquennium ending 1938-39 amounted to 6,268 tons stick lac and 19 tons other forms of lac. from which it will be clear that the imports consist almost wholly of stick lac.

The main sources for imports were Burma, Straits Settlements and Siam. The quantities imported from different sources may be seen in Appendix 8. The relative shares of these countries during different periods may be seen from the table below :—

Imports of stick lac into India by sea.

Source.	Average 1909-10 to 1913-14.	Percentage to total.	Average 1929-30 to 1933-34.	Percentage to total.	Average 1934-35 to 1938-39.	Percentage to total.
	(Tons.)		(Tons.)		(Tons.)	
Burma	600	67·1	2,293	58·5	1,727	27·6
Straits Settlements and Siam (Thailand)	266	29·8	1,609	41·0	4,533	72·3
Other countries ..	28	3·1	18	0·5	8	0·1
Total ..	894	100·0	3,920	100·0	6,268	100·0

It will be observed that during the quinquennium immediately preceding the 1914—18 War, more than two-thirds of lac imported into India came from Burma and nearly 30 per cent. from Straits Settlements and Siam. During the quinquennium ending 1933-34, although the quantities imported from Burma increased, her share in the imports declined to 58 per cent., while that of Straits Settlements and Siam (Thailand) increased to 41 per cent.

The following five-year period, *viz.*, 1934-35 to 1938-39 saw a further fall in Burma's share which declined to 28 per cent. only of the total. The Straits Settlements and Siam (Thailand) became the chief source for

imports of stick lac into India and accounted for over 72 per cent. of the total imports.

Almost the whole of the imports are landed at Calcutta from where appreciable quantities find their way to the manufacturing centres in Bihar and the United Provinces, as will be borne out by the following figures of despatches by rail from Calcutta to Bihar and the United Provinces.

Despatches of lac by rail from Calcutta to Bihar and the United Provinces and imports of stick lac into India.

(Tons.)

Year.	Despatches.		Total Bihar and United Provinces.	Imports of stick lac into India.
	To Bihar.	To United Provinces.		
1933-34	3,284	604	3,888	5,921
1934-35	3,394	1,609	5,003	8,558
1935-36	545	112	657	5,640
1936-37	1,363	243	1,606	8,656
1937-38	832	360	1,192	3,392
1938-39	1,702	198	1,900	5,092
1939-40	2,625	405	3,030	11,261
1940-41	1,104	83	1,187	3,346

A comparison of the figures of despatches of lac from Calcutta to Bihar and the United Provinces with the imports of stick lac into India shows that an increase in imports from abroad is generally attended with an increase in despatches from Calcutta to Bihar and the United Provinces and *vice versa* (see diagram facing page 7).

As no shellac or seedlac is shipped from India as a product made from imported stick lac, it appears that stick lac imported from Burma and Siam finds use in the preparation of seedlac and shellac along with Indian stick lac. Buyers abroad* have expressed an opinion that the practice of admixture of Burma and Siam lac with Indian lac, which in their opinion is increasing, makes the maintenance of bleached shellac standards difficult and as such is bound to react on the future demand for shellac. On the other hand, some manufacturers in India consider Burma and Siam lac to be suitable for the preparation of certain qualities of shellac. It is, therefore, desirable that when Burma or Siam lac is wholly or partially used for the preparation of seedlac or shellac, the product should be declared to that effect. The origin of lac cannot however, be found by any analytical tests. The position, therefore, appears to be that while, on the one hand, it is desirable that when Burma or Siam

*Report by Sir David Meek and Dr. Gregory on the "Prospects of Indian Trade with the United States of America" (1939).

lac is wholly or partially used for the preparation of seedlac or shellac, the product should be declared to that effect, on the other hand, the enforcement of measures drawn with this object present serious difficulties.

(2) TREND.

The diagram facing this page illustrating the annual imports given in Appendix 7 and the ten yearly averages given below clearly indicate that, although the imports have been fluctuating considerably, they have increased appreciably during the last two decades.

Average imports of stick lac into India.

(Tons.)

Average 1900-01 to 1909-10	1,313
Average 1910-11 to 1919-20	1,282
Average 1920-21 to 1929-30	4,254
Average 1930-31 to 1939-40	5,362

During the quinquennium 1934-35 to 1938-39, the imports were between 8,000 and 9,000 tons in two years, *viz.*, 1934-35 and 1936-37, although the average for the period was about 6,000 tons. In 1939-40, the imports were over 11,000 tons.

(3) PERIODICITY.

The periodicity of imports of stick lac into India is indicated by the monthly figures given in the table below :—

Monthly imports of stick lac into India.*

(Hundred tons.)

Months.	1934-35.	1935-36.	1936-37.	1937-38.	1938-39.	Average.	Percentage.
April	9·5	..	5·5	8·0	1·5	4·9	7·8
May	18·0	0·5	5·5	3·5	1·5	5·8	9·3
June	11·0	0·5	6·5	0·5	0·5	3·8	6·1
July	6·0	0·5	6·5	1·5	1·0	3·1	5·0
August	2·5	1·5	5·0	0·5	2·5	2·4	3·8
September ..	1·5	2·0	2·0	2·5	3·0	2·2	3·5
October	1·5	4·5	1·0	3·0	2·0	2·4	3·8
November.. ..	6·5	8·0	10·0	1·0	5·5	6·2	9·9
December ..	11·0	13·0	11·0	2·5	5·0	8·5	13·6
January	15·5	12·0	17·0	4·5	8·5	11·5	18·4
February	2·0	7·0	10·0	4·0	13·0	7·2	11·5
March	..	7·0	6·5	2·5	7·0	4·6	7·3
Total ..	85·0	56·5	86·5	34·0	51·0	62·6	100·0

Source :—Accounts relating to the sea-borne Trade and Navigation of British India and Accounts relating to the Coasting Trade and Navigation of British India.

*Exports of stick lac from Burma to India have been taken for arriving at the monthly imports during the years 1934-35 to 1936-37.

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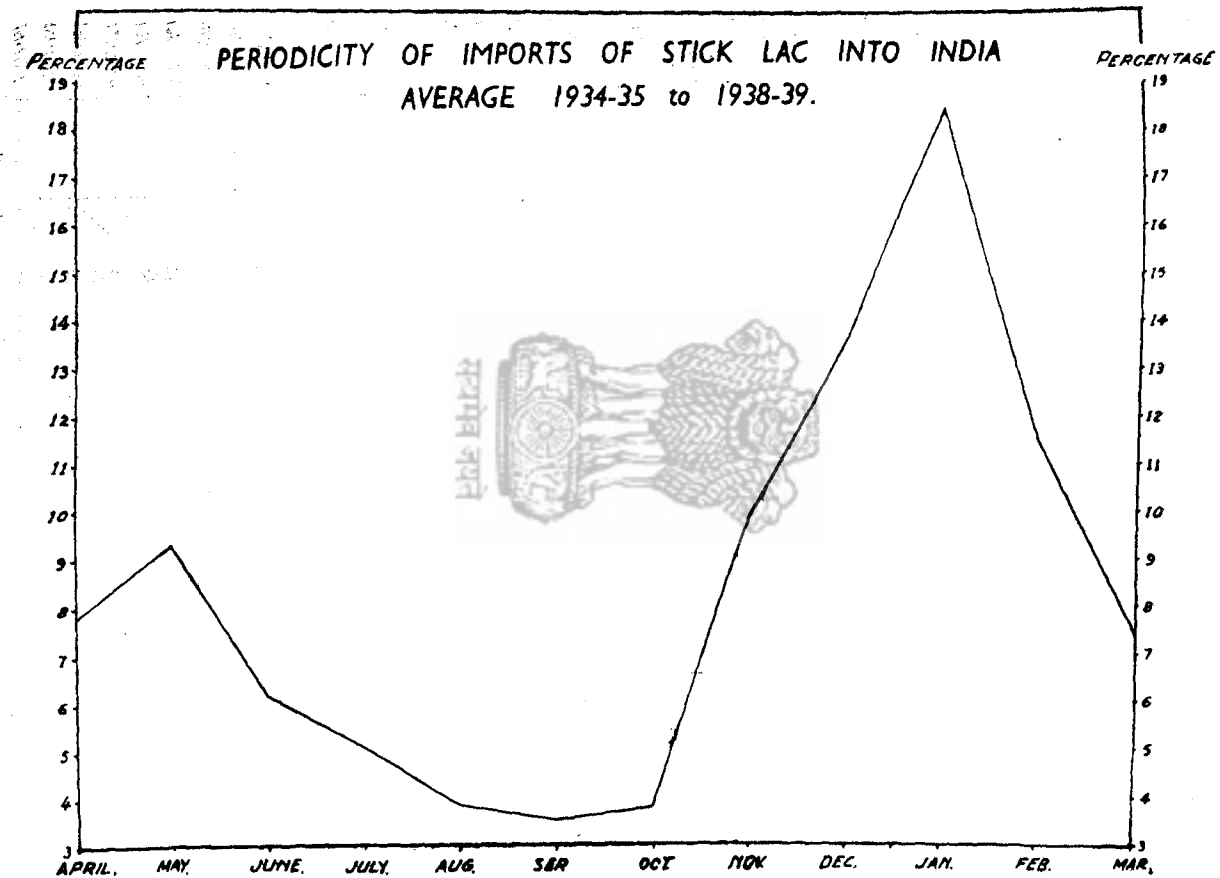
(10 months.)



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It will be observed from the figures given above and the diagram facing this page that, considering the average for the period 1934-35 to 1938-39, the imports were lowest from August to October. With the approach of winter season, the imports showed an upward tendency and the peak was reached in January, after which the imports continued to decline except for some increase in May. The imports in four months, November to February, accounted for more than 53 per cent. of the annual imports. It should, however, be noted that the quantities imported in different months do not show the same seasonal variations in individual years. For instance, in 1934-35 the imports were highest in May ; in 1935-36 they were highest in December while in 1936-37 the highest imports were registered in January. In 1937-38 April was the month of highest imports in contrast with 1938-39 when the highest imports were received in February.

(4) Factors affecting imports.

Since the major portion of the stick lac produced in Burma, Siam, Indo-China, etc., finds its way into India, it is reasonable to conclude that the imports are mainly influenced by the quantities of lac collected in these countries. The increased demand for lac appears to have led to bigger production in these countries and consequently bigger imports into India. The quantities imported into India appear to be little affected by her own production. The relation between the production, imports into and exports from India together with the course of prices are shown in the diagram facing page 14. It will be observed that although the lower level of prices in contributing to an increased demand for lac brought about an increase in exports, the rise in demand has failed to react on the prices.

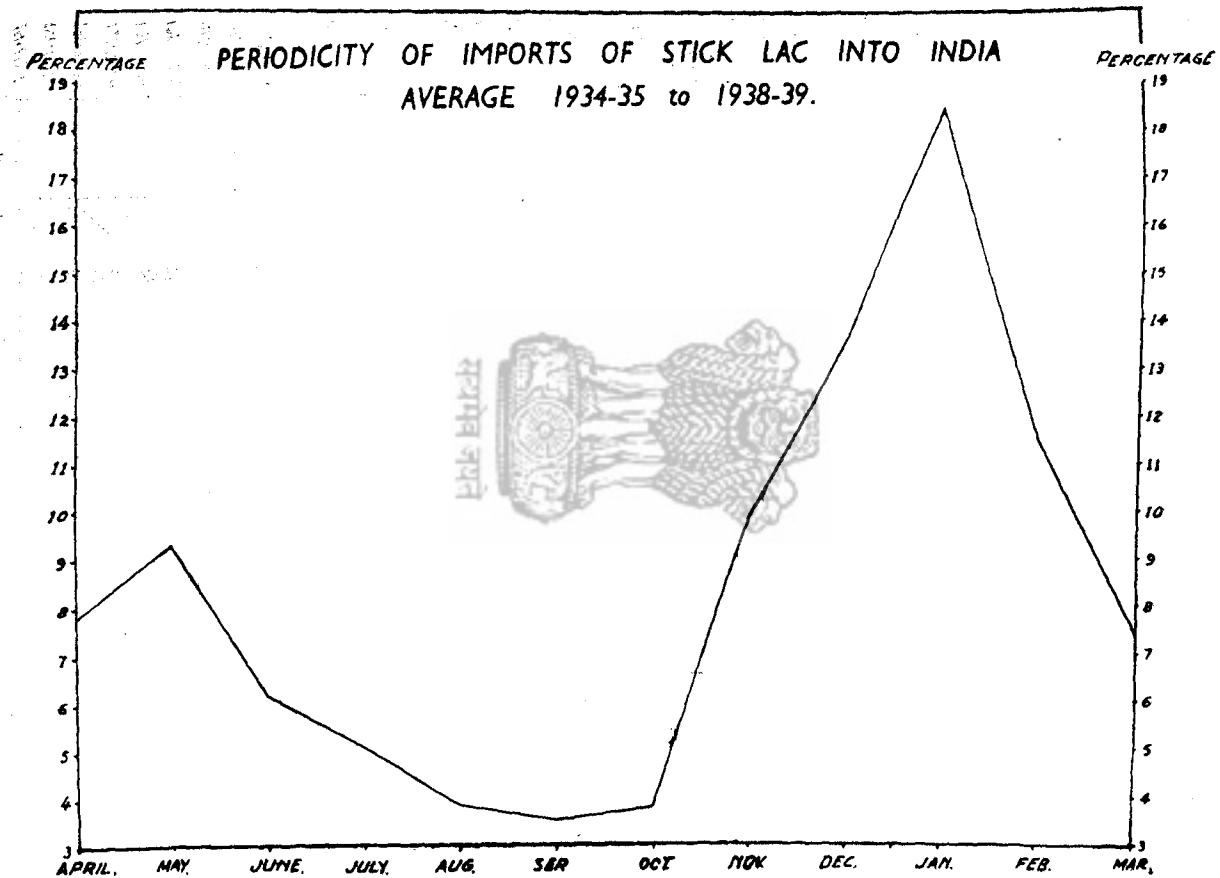
(5) Effect of imports.

As the imports go to swell the total available supplies, they naturally exercise some depressing influence upon the prices. Consequently, the prohibition of imports has been suggested by some persons from time to time. This is, however, attended with the danger that imposition of such restrictions is likely to result in the development of seedlac and shellac manufacturing industries in other lac producing countries, which may be detrimental to the Indian lac manufacturing interests.

D.—Exports.

(1) Quantities.

India is known to have exported lac to Europe as far back as 1607, but for nearly two centuries the traffic remained small and erratic. Besides the resin, appreciable quantities of lac-dye were also exported. In fact, lac was then known more for its dye than for the resin. A large demand for lac-dye sprang up in the days of the East India Company, and the industry received a further impetus by the invention of a method of manufacturing lac-dye in the form of cakes, ready for use. By 1868-69 the exports of lac-dye reached 887 tons valued at about 8 lakhs of rupees. At this time, the aniline dyes appeared on the scene and their discovery struck a death blow to the lac-dye industry so much so that by the end of the nineteenth century the exports had disappeared altogether. On the other hand



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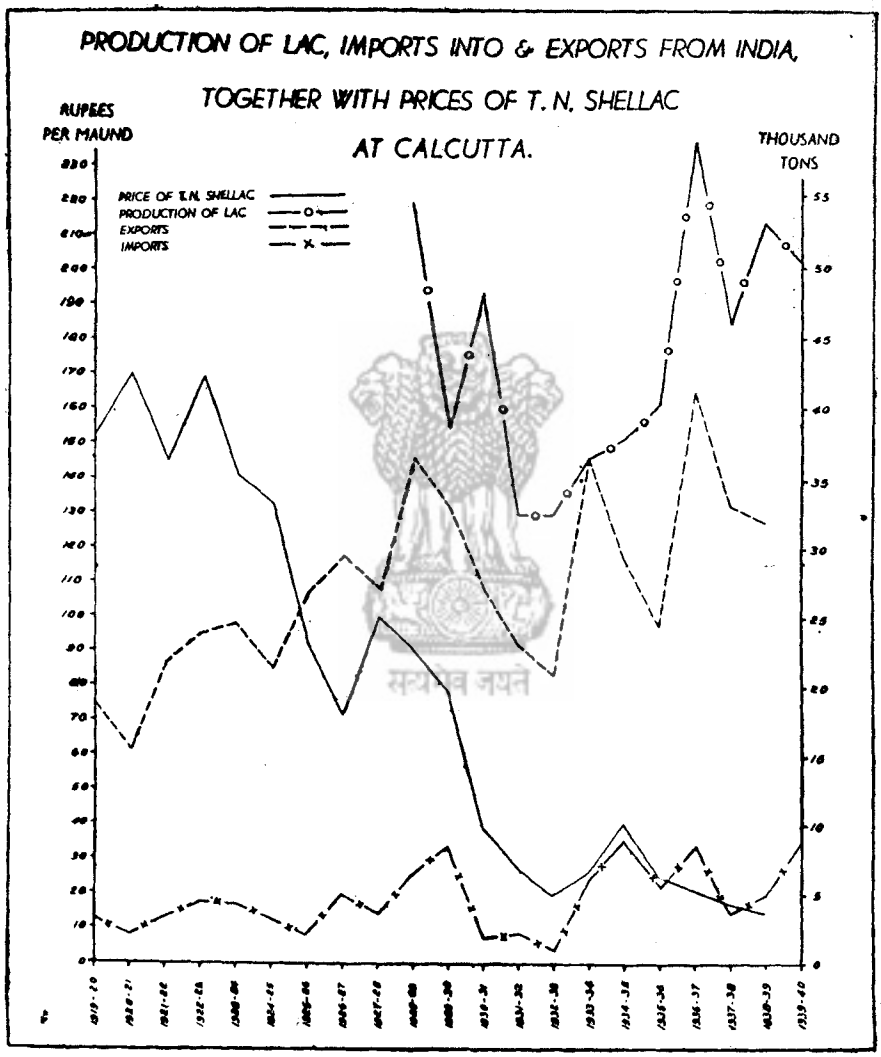

new uses and methods of treating lac had been discovered and the demand for lac resin developed considerably. The loss of export trade in lac-dye, and the increase in shellac exports is clearly shown by the figures given in the following table :—

Exports of lac-dye and shellac from India.*

Year.	Lac-dye.		Shellac.	
	Quantity.	Value. (Thousand rupees.)	Quantity.	Value. (Thousand rupees.)
	(Tons.)		(Tons.)	
1868-69	887	797	219	1,166
1878-79	413	195	3,225	2,225
1888-89	17	8	4,069	3,194
1898-99	..	..	7,320	7,008
1899-1900	..	..	9,762	9,266

Since the loss of lac-dye trade as a result of the competition from synthetic dyes, little attempt appears to have been made to revive it. It might be worth while doing some research work to see whether by modern and cheaper methods of recovery it might not be possible to increase the income of the lac industry by the development again of this by-product.

The exports of various forms of lac since 1900-01 are given in Appendix 9 from which it will be observed that the exports varied from less than 8,000 tons in 1901-02 to more than 41,000 tons in 1936-37, the average for the quinquennium ending 1938-39 being nearly 32,000 tons, *i.e.*, more than five times the imports. The exports were made up largely of shellac and seedlac, stick lac and "other kinds" of lac accounting for comparatively small quantities. Imports on the other hand, as already pointed out, consisted almost entirely of stick lac. The quantities and proportion of shellac, seedlac and stick lac and "other kinds" of lac exported during the different periods may be seen from the following table :—

Exports of lac from India.

(Tons.)

Period.	Shellac.	Button lac.	Seedlac.	Stick lac.	Other kinds.	Total
1909-10—1913-14 ..	17,785	1,728	333	274	1,404	21,524
	(82·6)	(8·0)	(1·6)	(1·3)	(6·5)	(100·0)
1914-15—1918-19 ..	15,011	475	782	156	834	17,258
	(87·0)	(2·8)	(4·5)	(0·9)	(4·8)	(100·0)
1919-20—1923-24 ..	17,784	754	287	97	1,945	20,817
	(85·4)	(3·4)	(1·4)	(0·5)	(9·3)	(100·0)
1924-25—1928-29 ..	21,037	1,067	2,977	599	2,539	28,219
	(74·5)	(3·8)	(10·6)	(2·1)	(9·0)	(100·0)
1929-30—1933-34 ..	19,525	1,025	5,440	240	1,863	28,093
	(69·5)	(3·6)	(19·4)	(0·9)	(6·6)	(100·0)
1934-35—1938-39 ..	20,068	1,224	8,698	182	1,964	32,136
	(62·4)	(3·8)	(27·1)	(0·6)	(6·1)	(100,0)

(*Note.*—The figures in brackets represent percentages.)

*The Commercial products of India : Watt.

During the quinquennium immediately preceding the 1914-18 War, shellac and button lac together formed nearly 91 per cent. of the total exports and seedlac was of little significance. A similar position continued in the next ten years after which there was an appreciable fall in the share of shellac in the exports and seedlac gradually gained ground. In the quinquennium ending 1928-29 seedlac accounted for more than 10 per cent. and shellac and button lac together for about 78 per cent. of the total export. Seedlac gained further ground in the next two quinquennia accounting for a little less than 20 per cent. of the total exports during 1929-30 to 1933-34 and over 27 per cent. during the period 1934-35 to 1938-39. Shellac and button lac exports accounted for only 73 per cent. of the total exports in the five-year period ending 1933-34 and 66 per cent. during the quinquennium 1934-35 to 1938-39. The share of stick lac and other forms of lac in the total exports was comparatively small.

(2) Destinations.

The destinations for the exports of various forms of lac include the United Kingdom, most of the European countries, the United States of America, China, Japan, Straits Settlements, the Union of South Africa, Brazil, Australia and Burma, but almost three-fourths of the total exports from India were shared by three countries, *viz.*, the United Kingdom, the United States of America and Germany. The quantities of stick lac, seedlac, shellac, button lac and "other kinds" of lac as also the total quantities of all forms of lac together, exported to each of these three countries and the balance exported to all other countries are given from 1929-30 to 1940-41 in Appendix 10-A. to 10-F. The relative importance of these countries in the total exports of lac during different periods will be seen from the following table :—

Total exports of all forms of lac to different destinations.*

(Tons.)

Countries.	Average 1909-10 to 1913-14.	Average 1929-30 to 1933-34.	Average 1934-35 to 1938-39.
United Kingdom	5,358 (24·9)	8,156 (29·0)	7,817 (24·3)
United States of America	8,949 (41·6)	10,131 (36·1)	12,518 (39·0)
Germany	4,158 (19·3)	3,863 (13·8)	3,319 (10·3)
Other countries	3,059 (14·2)	5,943 (21·1)	8,482 (26·4)
Total ..	21,524 (100·0)	28,093 (100·0)	32,136 (100·0)

Note.—The figures in brackets represent percentages.

*The figures represent tatals of quantities of stick lac, seedlac, shellac, button lac and other kinds of lac added together. If the totals of exports of seedlac, shellac and button lac in terms of seedlac are considered, the offtake of the United States of America, the United Kingdom and Germany work out to 42 per cent., 26 per cent. and 17 per cent. respectively of the total exports during the 5 years 1909-10 to 1913-14. The shares of these countries in the quinquennium 1929-30 to 1933-34 were 38 per cent., 32 per cent. and 11 per cent. respectively. In the following quinquennium (1934-35 to 1938-39), the United States accounted for 40 per cent. of the exports and the United Kingdom and Germany for 26 per cent. and 9 per cent. respectively

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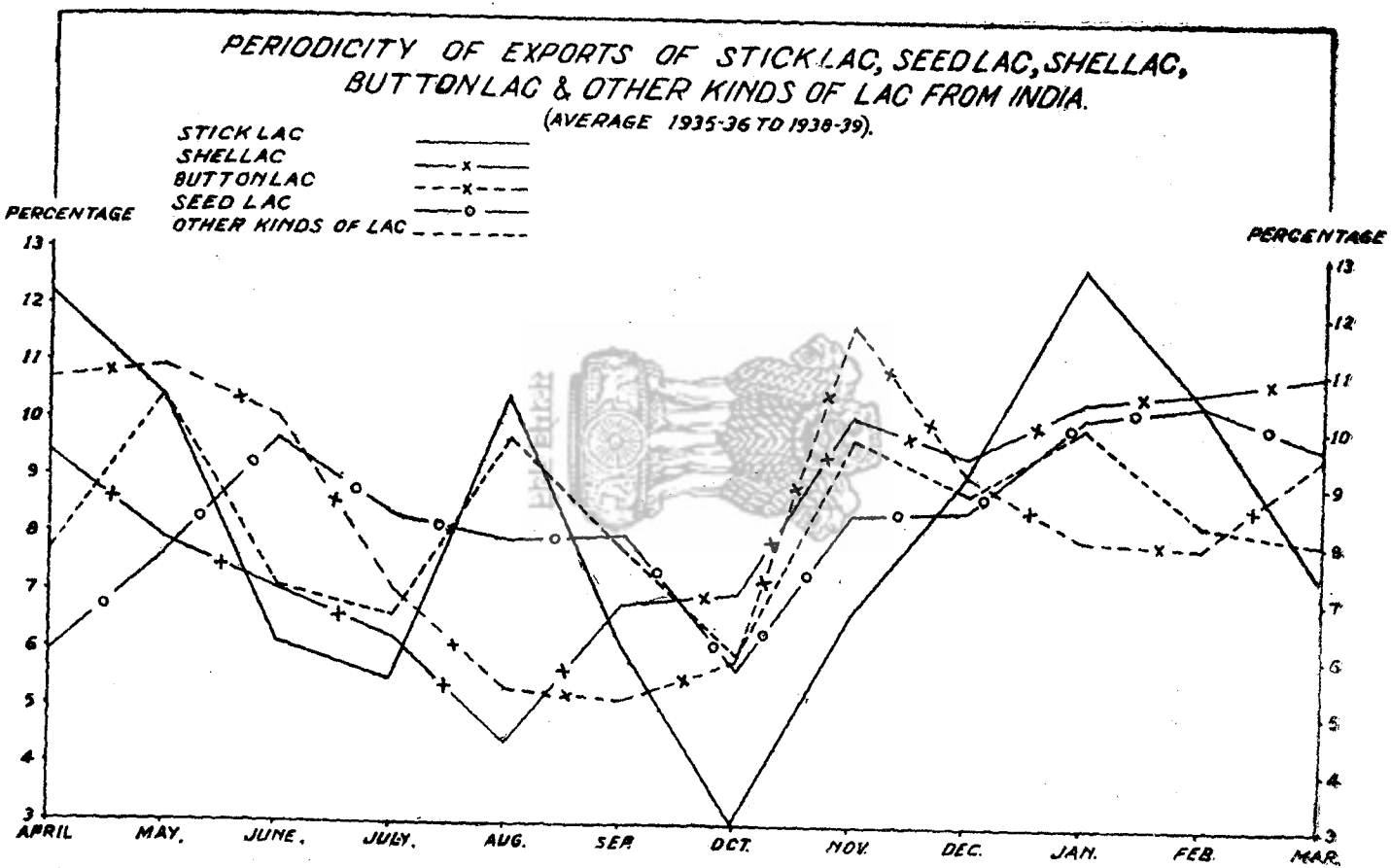

It will be observed that the United States of America occupy the first position among India's customers of lac. Their offtake increased from an average of less than 9,000 tons before the 1914—18 War to over 10,000 tons during the five years 1929-30 to 1933-34 and 12,500 tons during 1934-35 to 1938-39. United Kingdom's* offtake increased from an average of over 5,000 tons in the quinquennium preceding the 1914—18 War to an average of over 8,000 tons in the quinquennium ending 1933-34 but declined by nearly 300 tons, during the next 5 years. Germany's offtake declined from about 4,200 tons to 3,900 tons and further to 3,300 tons in the three quinquennia referred to above.

The position in respect of each of the different forms of lac is indicated below.

(*a*) *Stick lac.*—The United Kingdom accounted for the bulk of stick lac exports during 1909-10 to 1913-14 but during the last decade, as will be seen from the table below, the United Kingdom, as also the United States of America, had a comparatively small share in the exports of stick lac. The two countries together accounted, on an average, for nearly 16 per cent. of the total during the five years 1929-30 to 1933-34 and 14 per cent. during the period 1934-35 to 1938-39.

Exports of stick lac from India.

(Tons.)

Countries.	Average 1909-10 to 1913-14.	Average 1929-30 to 1933-34.	Average 1934-35 to 1938-39.
United Kingdom	202 (73·7)	30 (12·5)	21 (11·5)
United States of America	12 (4·4)	9 (3·7)	5 (2·7)
Germany	19 (6·9)	64 (26·7)	10 (5·5)
Other countries	41 (15·0)	137 (57·1)	146 (80·3)
Total ..	274 (100·0)	240 (100·0)	182 (100·0)

(*Note.*—The figures in brackets represent percentages.)

Germany took on an average 64 tons or nearly 27 per cent. of the total during 1929-30 to 1933-34 but her offtake declined to only 10 tons or less than 6 per cent. of the total during the five years 1934-35 to 1938-39.

Of the other countries, which accounted for more than 80 per cent.

*The United Kingdom re-export considerable quantities of shellac, seedlac, etc. The quantities re-exported from 1934-35 to 1938-39 were as under:—

1934-35	2,508 tons.	1936-37	4,897 tons.	1938-39	**5,817 tons.**
1935-36	7,372 tons.	1937-38	3,784 tons.		

of the total during the quinquennium ending 1938-39, the Netherlands and Burma are of importance, their average offtake during the period being 104 tons and 22 tons respectively and the shares in the total about 57 per cent. and 12 per cent., respectively.

(*b*) *Seedlac.*—The United Kingdom was the biggest customer for seedlac during the period 1909-10 to 1913-14 but the United States of America, as will be seen from the table below, have easily been India's biggest customer for seedlac in recent years.

Exports of seedlac from India.

(Tons.)

Countries.	Average 1909-10 to 1913-14.	Average 1929-30 to 1933-34.	Average 1934-35 to 1938-39.
United Kingdom	180 (54·1)	503 (9·2)	723 (8·3)
United States of America	105 (31·5)	4,102 (75·4)	6,354 (73·1)
Germany	33 (9·9)	254 (4·7)	680 (7·8)
Other countries	15 (4·5)	581 (10·7)	941 (10·8)
Total ..	333 (100·0)	5,440 (100·0)	8,698 (100·0)

(*Note.*—The figures in brackets represent percentages.)

The quantities purchased by the United Kingdom have increased since the 1914—18 War, but her share declined from about 54 per cent. during 1909-10 to 1913-14 to about 9 per cent. in the quinquennium ending 1933-34 and 8 per cent. during the quinquennium ending 1938-39. The share of the United States of America, on the other hand, increased from about 31 per cent. during the period 1909-10 to 1913-14 to over 75 per cent. in the quinquennium ending 1933-34 and 73 per cent. in the following five years. Germany's offtake increased from an average of 33 tons during 1909-10 to 1913-14 to 254 tons in the quinquennium ending 1933-34 and 680 tons during the quinquennium ending 1938-39 but her share declined from nearly 10 per cent. during the quinquennium immediately preceding the 1914—18 War, to less than 5 per cent. during the period 1929-30 to 1933-34. In the next 5 years Germany's share increased to nearly 8 per cent.

(*c*) *Shellac.*—The United States of America were the biggest consumers of shellac during 1909-10 to 1913-14 but during recent years, as will be seen from the following table, the United Kingdom has been the largest individual customer with the United States as a close second.

Exports of shellac from India.

(Tons.)

Countries.	Average 1909-10 to 1913-14.	Average 1929-30 to 1933-34.	Average 1934-35 to 1938-39.
United Kingdom	3,963 (22·3)	6,899 (35·3)	6,303 (31·4)
United States of America	8,194 (46·1)	5,936 (30·4)	5,929 (29·5)
Germany	3,027 (17·0)	2,387 (12·2)	1,825 (9·1)
Other countries	2,601 (14·6)	4,303 (22·1)	6,011 (30·0)
Total ..	17,785 (100·0)	19,525 (100·0)	20,068 (100·0)

(*Note.*—The figures in brackets represent percentages.)

The offtake of the United Kingdom rose from about 4,000 tons or nearly 22 per cent. of the total in the quinquennium ending 1913-14 to nearly 7,000 tons or 35 per cent. of the total in the quinquennium ending 1933-34. This, however, declined somewhat in the quinquennium ending 1938-39 when she took, on an average, about 6,000 tons or 31 per cent. of the total. On the other hand, the quantities taken by the United States of America declined from an average of over 8,000 tons or 46 per cent. before 1914—18 War to less than 6,000 tons or nearly 30 per cent. of the total during the last two quinquennia. Similarly, Germany which absorbed 17 per cent. of the total Indian exports of shellac, before the 1914—18 War took only 12 per cent. and 9 per cent. in the quinquennia ending 1933-34 and 1938-39 respectively. Among other countries, Japan which had a practically negligible share in the India's shellac exports before 1914—18 War steadily increased her purchases so that her offtake during the quinquennium ending 1938-39 averaged about 2,400 tons or over 11 per cent. of the total.

(*d*) *Button lac.*—Shellac in the form of button lac is taken mostly by the United Kingdom as will be seen from the table below :—

Exports of button lac from India.

(Tons.)

Countries.	Average 1909-10 to 1913-14.	Average 1929-30 to 1933-34.	Average 1934-35 to 1938-39.
United Kingdom	1,000 (57·8)	680 (66·3)	732 (59·8)
United States of America	134 (7·8)	84 (8·2)	121 (9·9)
Germany	296 (17·1)	89 (8·7)	102 (8·3)
Other countries	298 (17·3)	172 (16·8)	269 (22·0)
Total ..	1,728 (100·0)	1,025 (100·0)	1,224 (100·0)

(*Note.*—The figures in brackets represent percentages.)

The United States and Germany took almost equal quantities in recent years (although before 1914—18 Germany's offtake was more than double that of the United States of America), while among the other countries, Australia was of some importance.

(*e*) *"Other kinds" of lac.*—As will be seen from the table below, Germany was an important destination for "other kinds" of lac*, although in later years her offtake showed a decline with a simultaneous increase in the offtake of other countries mainly the Netherlands and Belgium†.

Exports of "other kinds" of lac from India.

(Tons.)

Countries.	Average 1909-10 to 1913-14.	Average 1929-30 to 1933-34.	Average 1934-35 to 1938-39.
United Kingdom	13 (0·9)	44 (2·3)	38 (1·9)
United States of America	504 (35·9)	..	109 (5·5)
Germany	783 (55·8)	1,069 (57·4)	702 (35·8)
Others	104 (7·4)	750 (40·3)	1,115 (56·8)
Total ..	1,404 (100·0)	1,863 (100·0)	1,964 (100·0)

(*Note.*—The figures in brackets represent percentages.)

It will be obvious from what has been said about the destinations for the various forms of lac that the United States of America took a larger proportion of their lac requirements in recent years in the shape of seedlac, while the United Kingdom took more in the form of shellac. It will, therefore, be interesting to examine the relative proportion of the different forms of lac taken by these two countries as also Germany and other countries. The following tables will clearly indicate the position.

Exports of lac from India to the United Kingdom.

	Average 1909-10 to 1913-14.		Average 1929-30 to 1933-34.		Average 1934-35 to 1938-39.	
	Quantity.	Percentage.	Quantity.	Percentage.	Quantity.	Percentage.
	(Tons.)		(Tons.)		(Tons.	
Shellac ..	3,963	74·0	6,899	84·6	6,303	80·6
Button lac ..	1,000	18·7	680	8·3	732	9·4
Seedlac ..	180	3·3	503	6·2	723	9·2
Stick lac ..	202	3·8	30	0·4	21	0·3
Other kinds of lac	13	0·2	44	0·5	38	0·5
Total ..	5,358	100·0	8,156	100·0	7,817	100·0

*Mostly *kiri*.

†It is understood that the ports in Belgium and the Netherlands also served as transit ports for supplies of shellac to some Continental countries.

Exports of lac from India to the United States of America.

	Average 1909-10 to 1913-14.		Average 1929-30 to 1933-34.		Average 1934-35 to 1938-39.	
	Quantity.	Percentage.	Quantity.	Percentage.	Quantity.	Percentage.
	(Tons.)		(Tons.)		(Tons.)	
Shellac ..	8,194	91·6	5,936	58·6	5,929	47·4
Button lac ..	134	1·5	84	0·8	121	1·0
Seedlac ..	105	1·2	4,102	40·5	6,354	50·8
Stick lac ..	12	0·1	9	0·1	5	..
Other kinds of lac.	504	5·6	..	..	109	0·8
Total ..	8,949	100·0	10,131	100·0	12,518	100·0

Exports of lac from India to Germany.

	Average 1909-10 to 1913-14.		Average 1929-30 to 1933-34.		Average 1934-35 to 1938-39.	
	Quantity.	Percentage.	Quantity.	Percentage.	Quantity.	Percentage.
	(Tons.)		(Tons.)		(Tons.)	
Shellac ..	3,027	72·8	2,387	61·7	1,825	55·0
Button lac ..	296	7·1	89	2·3	102	3·1
Seedlac ..	33	0·8	254	6·6	680	20·5
Stick lac ..	19	0·5	64	1·7	10	0·3
Other kinds of lac.	783	18·8	1,069	27·7	702	21·1
Total ..	4,158	100·0	3,863	100·0	3,319	100·0

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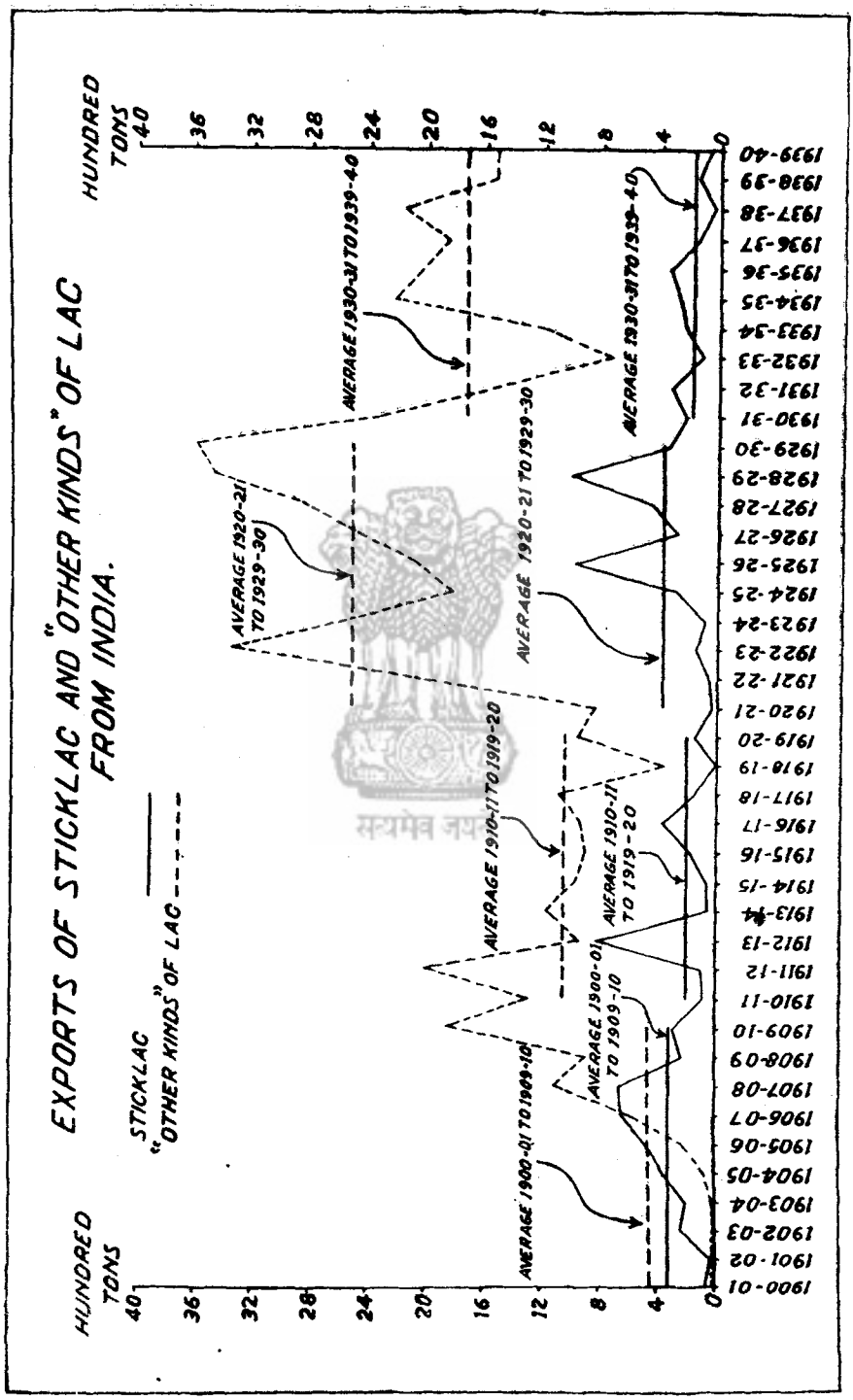

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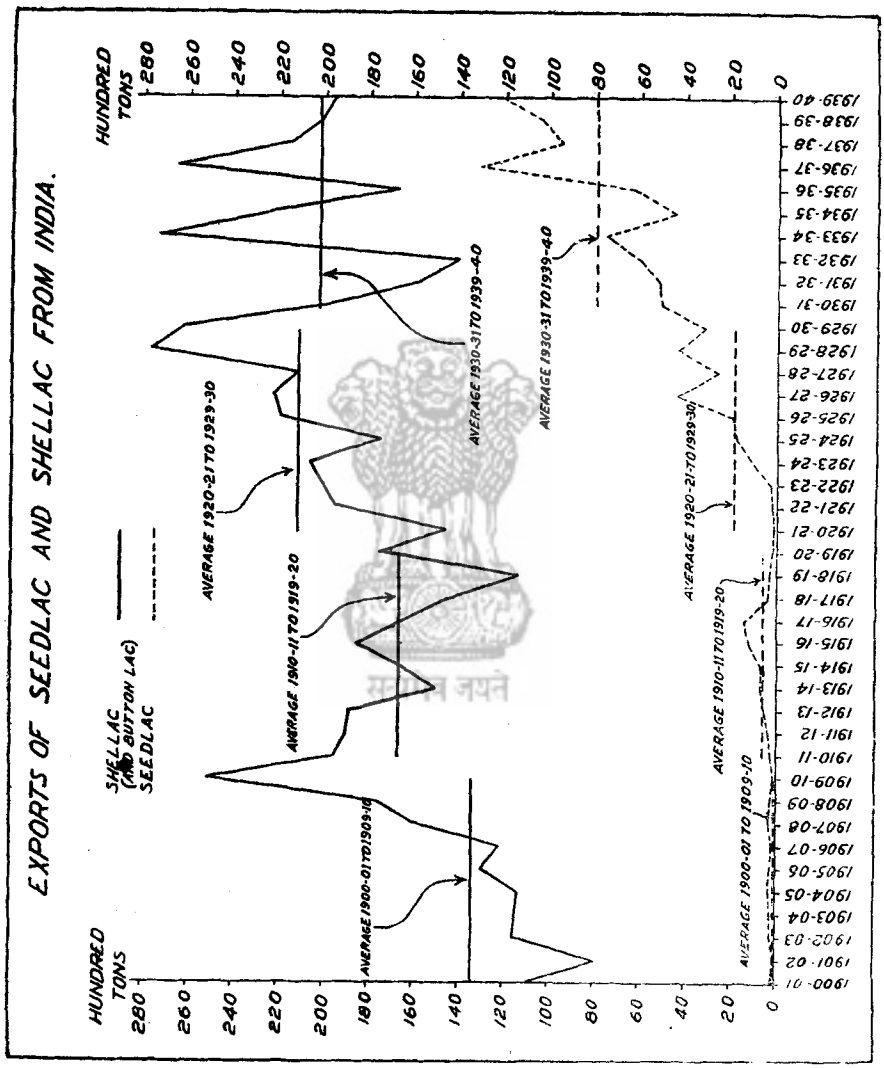

Exports of lac from India to countries other than the United Kingdom, the United States of America and Germany.

	Average 1909-10 to 1913-14.		Average 1929-30 to 1933-34		Average 1934-35 to 1938-39.	
	Quantity.	Percentage.	Quantity.	Percentage.	Quantity.	Percentage.
	(Tons.)		(Tons.)		(Tons.)	
Shellac ..	2,601	85·0	4,303	72·4	6,011	70·9
Button lac ..	298	9·8	172	2·9	269	3·2
Seedlac ..	15	0·5	581	9·8	941	11·1
Stick lac ..	41	1·3	137	2·3	146	·7
Other kinds of lac.	104	3·4	750	12·6	1,115	13·1
Total ..	3,059	100·0	5,943	100·0	8,482	100·0

It will be observed that before the 1914—18 War and in the quinquennium ending 1933-34, the United Kingdom took about 93 per cent. of her requirements in the form of shellac and button lac. In the five-year period 1934-35 to 1938-39, shellac and button lac averaged 90 per cent. of her total offtake of lac, and the proportion of seedlac increased to over 9 per cent. The United States of America also took more than 93 per cent. of her requirements in the form of shellac and button lac before the 1914—18 War but with the growing tendency in favour of seedlac in subsequent years shellac and button lac together accounted for less than 60 per cent. only of her offtake during the quinquennium 1929-30 to 1933-34, the balance being seedlac. During the next five years 1934-35 to 1938-39, her offtake was made up by more than half seedlac and less than half shellac and button lac. Germany's offtake before the 1914—18 War consisted of about 80 per cent. shellac and button lac and 19 per cent. " other kinds " of lac but during the two quinquennia ending 1933-34 and 1938-39 seedlac and " other kinds " of lac gained ground. The exports to other countries before the 1914—18 War consisted mainly of shellac and button lac but in the two quinquennia ending 1933-34 and 1938-39,

the proportion of shellac and button lac declined appreciably with an increase in the proportion of seedlac and " other kinds " of lac.

(3) TREND.

The trend of exports of different forms of lac will be seen from the diagrams facing pages 20 and 21 and the following decennial averages.

Export of lac in India.

(Tons.)

Average.	Stick lac.	Seedlac.	Shellac and button lac.	Other kinds of lac.	Total.
1900-01 to 1909-10	308	173	13,756	470	14,707
1910-11 to 1919-20	201	563	16,703	1,031	18,498
1920-21 to 1929-30	367	1,933	21,152	2,504	25,956
1930-31 to 1939-40	183	8,106	20,592	1,717	30,598

It will be observed that while the exports of stick lac continue to be small, the exports of seedlac have increased from an average of less than 200 tons in the decennium ending 1909-10 to nearly 8,000 tons during the period 1930-31 to 1939-40. The shipments of shellac registered an appreciable increase in the two ten-year periods ending 1919-20 and 1929-30 but there was some decline in the last decennium ending 1939-40. Exports of " other kinds " of lac which consist largely of by-products obtained during the manufacture of shellac show a trend similar to that of shellac. The total exports of all kinds of lac, show a steady upward trend. From an average of about 15,000 tons exported annually in the first decade of the century, the average annual exports during the decennium ending 1919-20 rose to over 18,000 tons which further increased to an average of nearly 26,000 tons in the next 10 years. The exports during the ten years, 1930-31 to 1939-40 averaged over 30,000 tons. During this decade, the exports averaged 27,000 tons in the first 5 years and 34,000 tons in the subsequent 5 years.

(4) PERIODICITY.

The periodicity of the exports of different forms of lac may be seen from the diagram facing page 15 and the table below which gives the average monthly exports during the four years 1935-36 to 1938-39.

Average monthly exports of different forms of lac during the period 1935-36 to 1938-39.

(Tons.)

Months.	Stick lac.	Seedlac.	Shellac.	Button lac.	Other kinds of lac.	Total.
April	20 (12·2)	578 (5·9)	1,852 (9·4)	142 (10·7)	146 (7·7)	2,738 (8·3)
May	17 (10·4)	741 (7·6)	1,555 (7·9)	145 (10·9)	198 (10·4)	2,656 (8·1)
June	10 (6·1)	934 (9·6)	1,383 (7·0)	120 (9·0)	134 (7·1)	2,581 (7·9)
July	9 (5·5)	812 (8·3)	1,225 (6·2)	94 (7·0)	125 (6 6)	2,265 (6·9)
August	17 (10·4)	770 (7·9)	844 (4·3)	71 (5·3)	184 (9·7)	1,886 (5·7)
September	10 (6·1)	781 (8·0)	1,345 (6·8)	68 (5·1)	147 (7·8)	2,351 (7·1)
October	5 (3·0)	558 (5·7)	1,369 (7·0)	77 (5·8)	113 (5·9)	2,122 (6·5)
November	11 (6·7)	817 (8·4)	1,991 (10·1)	156 (11·7)	184 (9·7)	3,159 (9·6)
December	15 (9·1)	831 (8·5)	1,847 (9·4)	122 (9·1)	168 (8·8)	2,983 (9·1)
January	21 (12·8)	990 (10·1)	2,044 (10·4)	106 (8 ·0)	189 (9·9)	3,350 (10·2)
February	17 (10·4)	1,012 (10·4)	2,080 (10·6)	105 (7·9)	158 (8·3)	3,372 (10·3)
March	12 (7·3)	941 (9·6)	2,150 (10·9)	127 (9·5)	155 (8·1)	3,385 (10·3)
Total ..	164 (100·0)	9,765 (100·0)	19·685 (100·0)	1,333 (100·0)	1,901 (100·0)	32,848 (100·0)

(*Note.*—The figures in brackets represent percentages.)

It will be seen that the exports of stick lac were of such small magnitude that the variations in the quantities exported in different months are of little significance.

In the case of seedlac, the exports during the period 1935-36 to 1938-39 were spread throughout the year but were comparatively low in October and high in January and February. In the case of shellac also the exports continued throughout the year but were lowest in August and comparatively brisk between November and April. Button lac exports were at a low level in August and September while the greatest activity was seen in November. Exports of " other kinds " of lac were lowest in October and highest in May. Considering the exports of all forms of lac

together, the export trade was comparatively brisk from November to March and slack from July to October.

(5) Export restrictions.

Apart from a cess on exports,—the rate of which is 7 annas per maund on shellac and seedlac and 5 annas per maund on lac refuse since August 1936—there have been no restrictions on the export of lac from India in normal times. During the period of 1914—18 War, the government exercised control for some time over the exports with a view to securing sufficient supplies of lac for the Ministry of Munitions, whose annual requirements for the United Kingdom and the Allies were reckoned at 2,500 tons. An agreement was entered into with the shellac shippers in Calcutta in January 1917, whereby the shipment of lac was prohibited to all destinations, but licences were freely given on the condition that against every export on private account, 20 per cent. of the quantity exported and of a certain specified quality, was guaranteed to government at a fixed *f.o.b.* price of Rs. 42 per maund. Owing to the difficulty of obtaining sufficient quantities of the government quality, the Ministry of Munitions eventually agreed to take a certain portion of their requirements in commercial T. N. (London Standard) quality. In the matter of export of other qualities of lac, the government percentage was calculated on the assumed percentage of shellac in each variety*. The scheme was quite successful and provided ample supplies to the Ministry of Munitions. These restrictions were removed shortly after the suspension of hostilities in 1918. Certain restrictions became necessary again after the outbreak of the present War.

(6) Factors affecting exports.

India holding a virtual monopoly in lac production, the most important factor affecting her exports of this commodity is the demand for lac in the various consuming countries, which to a great extent is influenced by its price. The fall in the level of lac prices appears to have helped in bringing about an increased demand and consequently bigger exports from India.

The exports are also influenced by the size and quality of the crop collected. Generally, the quality of a crop is better when a big crop is harvested. Small crops are usually of poor quality and consequently do not find favour with the buyers. For instance, during the last decade, when two small crops were harvested in 1931-32 and 1932-33, the exports were low. On the other hand, when a record crop was collected in 1936-37, the exports were very high (see diagram facing page 14).

As regards the exports of different forms of lac it has already been stated that there has been a phenomenal increase in the exports of seedlac, for which the United States of America have been largely responsible. The reason for the United States' preference for seedlac over shellac appears to be that they find seedlac, which is cheaper than shellac, to be suitable for some of their requirements.

E.—Season of marketing.

Unlike most other agricultural commodities, there are four lac crops in a year, the harvesting of which extends over the major part of the year.

*Handbook of Commercial Information of India, Third Edition, pp. 311-12.

The harvesting of *Baisakhi* crop, which is the main commercial crop, continues for a period of nearly 4 months from April to July. The cultivators begin to collect the crop even before it is fully mature and take it to the market immediately after, but in most cases, the whole crop is not collected or marketed all at one time. The marketing season for the *Baisakhi* crop, therefore, extends from April to October but producers get rid of nearly 80 per cent. of their *Baisakhi* lac between April and July.

Baisakhi crop is followed by *Jethua* crop—comparatively a small crop—arriving on the markets in June, *i.e.*, before the arrivals of *Baisakhi* crop ease off. The supplies of this crop are generally over by the end of July. The *Katki* crop appears on the market in October and the marketing season extends till March, the largest arrivals being in November and December in Bihar and from December to February in the Central Provinces. The *Kusmi* crop appears on the market in November, *i.e.*, at a time when the marketing of *Katki* crop also is in full swing, and the arrivals continue upto March. It will be thus obvious that two crops are simultaneously on the market in June-July and again in November.

Data about arrivals in markets in different months are not available but an indication of the seasonal variations is provided by the following figures obtained from the records of a factory in Bihar, giving the quantities of stick lac purchased in each month.

Quantities of stick lac purchased by a factory in Bihar.

Months.	Average 1935-36 to 1938-39.	
	Quantities. (Maunds.)	Percentage.
April	3,195	6·0
May	6,946	13·0
June	4,328	8·1
July	4,214	7·9
August	3,736	7·0
September	3,669	6·8
October	5,389	10·0
November	6,521	12·2
December	6,711	12·5
January	5,579	10·4
February	1,971	3·7
March	1,295	2·4
Total ..	53,554	100·0

It will be observed that the purchases by the factory were highest in May after the arrival of the *Baisakhi* crop and again in November-December after the arrival of the *Katki* and *Kusmi* crops.

The despatches by rail from Bihar and the Central Provinces, although they refer mostly to manufactured products, *viz.*, shellac and seedlac, also indirectly point to the season of marketing of stick lac. It will be observed from the following figures that the despatches from Bihar were comparatively brisk in May-June and in November-December following the arrivals of *Baisakhi-Jethua* and *Katki-Kusmi* crops respectively.

Despatches of lac and shellac by rail (and river) from Bihar and Orissa and Central Provinces.

(Average 1934-35 to 1938-39.)

Months.	From Bihar.		From Central Provinces.	
	Quantities.	Percentage to annual total.	Quantities.	Percentage to annual total.
	(Tons.)		(Tons.)	
April	1,636	7·7	451	6·6
May	2,878	13·5	429	6·3
June	1,963	9·2	457	6·7
July	1,763	8·3	406	6·0
August	1,317	6·2	390	5·8
September	1,719	8·1	504	7·4
October	1,683	7·9	431	6·4
November	2,021	9·5	418	6·2
December	2,030	9·5	729	10·7
January	1,698	8·0	1,144	16·9
February	1,297	6·1	720	10·6
March	1,267	6·0	706	10·4
Total ..	21,272	100·0	6,785	100·0

The despatches from the Central Provinces were brisk from December to March, being heaviest in January, for the reason that *Katki* crop accounts for 61 per cent. of the total production in the Katni-Damoh and 53 per cent. in the Gondia division.

F.—Total and net available supplies of lac.

The estimated total and net available supplies of lac in each of the years in the quinquennium 1934-35 to 1938-39 are given below :—

Total and net available supplies of lac in India.

(Tons).

——	1934-35.	1935-36.	1936-37.	1937-38.	1938-39.	Average.
Production of stick lac.*	38,134	40,686	59,699	46,468	53,765	47,750
Imports of stick lac ..	8,558	5,640	8,656	3,392	5,092	6,268
Imports of shellac and other forms of lac.	..	5	93	..	..	20
Imports of shellac and other forms of lac (in terms of stick lac).‡	..	9	160	..	..	34
Total supplies ..	46,692	46,335	68,515	49,860	58,857	54,052
Exports.						
Stick lac	258	344	141	25	144	182
Seedlac	4,429	6,292	13,091	9,374	10,303	8,698
Seedlac (in terms of stick lac).†	6,711	9,533	19,835	14,203	15,611	13,179
Shellac and button lac	22,383	15,696	26,508	21,662	20,209	21,292
Shellac and button lac‡ (in terms of stick lac).	38,591	27,062	45,703	37,349	34,843	36,710
Total exports of stick lac, shellac and button lac in terms of stick lac.	45,560	36,939	65,679	51,577	50,598	50,071
Net available supplies	1,132	9,396	2,836	(—)1,717	8,259	3,981

It will be observed that on an average, less than 4,000 tons stick lac equivalent to nearly 2,300 tons shellac, are annually retained for use in India, the balance of the crop being exported mainly in the form of seedlac and shellac. After the outbreak of the War, however, the quantities of lac used in India are reported to have considerably increased owing to the use of lac for anti-gas varnish, resinated containers, and moulding powders.

*Lac scraped from sticks.

†On the basis of 100 tons stick lac yielding 66 tons seedlac.

‡On the basis of 100 tons stick lac yielding 66 tons seedlac and 100 tons of seedlac yielding 87 tons shellac (see pages 32 and 34), *i.e.*, 100 tons stick lac yielding 57·42 tons shellac. As some of the shellac exported contains 3 per cent. or more rosin, a rosin content of 1 per cent. has been assumed in the exports of shellac and consequently 58 tons of shellac exported have been taken as equivalent to 100 tons stick lac.

CHAPTER II.—PREPARATION FOR MARKET.

A.—Cultivation.

The cultivation of lac is carried on by (1) introducing the lac insects to lac hosts, the process being called infection or inoculation, and (2) harvesting the crop by cutting the branches on which lac encrustations have been formed.

(1) Infection or inoculation.

The process is carried out in two ways, *viz.*, artificial infection and natural infection.

(*a*) *Artificial infection.*—A few sticks of brood lac, *i.e.*, lac from which larvae are about to emerge are tied to a host tree, which had previously been pruned in time so as to put forth good new shoots. The larvae on emergence crawl about and settle down on succulent shoots. A crude method of "artificial infection" is to fling a few brood sticks on to a tree.

Pruning in the correct way and at the correct time is of great importance from the point of view of quantity of lac obtained from a host. The extent of pruning required by a host depends on its type, age and condition. It is reported that ryots do not always prune their hosts correctly; for example, they often prune their *Kusmi* hosts heavily, which is harmful. Similarly, using the correct amount of brood and infecting the tree in the correct manner is of importance. By using too little brood lac some shoots may be left uninfected while using too much brood lac, besides being a waste, may cause mortality among larvae. The Indian Lac Research Institute, as a result of investigations and observations made, recommends particular times and methods for pruning and correctly infecting different hosts. The Indian Lac Cess Committee has been attempting to enducate the lac growers in these matters through *kamdars* trained at the Institute and a wider adoption of the methods recommended will help in getting better results.

(*b*) *Natural infection.*—All or a part of the lac secreted on a tree is left there and the larvae after swarming out settle down on the new shoots. The larvae may sometimes be carried by wind from one host tree to another or they may crawl over the interlacing branches.

Out of the two, artificial infection is more common in the main lac growing areas at least for one of the two crops harvested in a year from a host. In Bihar, about 70 to 80 per cent. of the total number of host trees are estimated to be infected artificially. Similarly in Assam, artificial infection is carried out to the extent of about 70 per cent. In Orissa and Bengal, the proportion is still higher and is estimated to be as much as 90 per cent. The Central Provinces are the only important lac producing tract where artificial infection is as low as 5 per cent. It is reported that in this tract, artificial infection was practised in the Government forests when the collection of lac was done through the department, but has now been abandoned in favour of natural infection by the contractors to whom the right of collection of lac is leased.

Natural infection, in spite of its simplicity, is inferior to artificial infection, because it tends to favour the multiplication of parasite enemies

and yields brood lac of poor quality on account of its having relatively larger amount of *Phunki* lac from the previous crop. Besides, artificial infection enables uniform infection of the hosts resulting in bigger yields, and allows the trees to get periodical rest which is not possible in the case of natural infection. The practice of natural infection is, therefore, not to be recommended except under special circumstances.

(*c*) *Rotation of host trees and alteration of brood lac.*—The lac insect is essentially a parasite, and the continued cultivation of lac on the same tree season after season is injurious to the health of the host. The hosts, therefore, need periodical rest which can be secured by infecting trees by rotation.

Systematic rotation of host trees, however, does not appear to be a common practice with the producers although schemes of regular rotation have been worked in some Government forests. For instance, a four-year rotation was found suitable for *Ghont* in Saugor Division (Central Provinces) while a three-year rotation was considered better for *Ber* and *Palas*. Such schemes, however, have been found to come to an end when a forest is leased to a contractor.

Apart from the rotation of host trees, alteration of brood lac is often practised. This is particularly done between *Kusum* and *Khair* trees. Brood lac from *Jethwi* crop (*Kusum*) is used for infecting *Khair* trees for *Aghani* crop. The resulting brood lac from *Khair* is then used for infecting *Kusum* and the cycle is repeated. Alteration of brood lac is also practised between *Ber* and *Palas*. The brood lac from these trees is used for some minor hosts also. It has been observed that *Kusmi* brood can be used on hosts other than *Kusum* (the ideal host for this purpose being *Khair*), but reverse is not the case as insects from other hosts do not thrive on *Kusum*. According to some authorities this is due to the fact that lac insects in the two cases belong to two distinct strains. It may be noted that even the *Kusmi* strain, if grown continuously on hosts other than *Kusum* for several crops without being transferred back to *Kusum*, deteriorates and dies.

(2) Harvesting.

The crop is collected by cutting the branches and twigs on which lac encrustations are found to have been formed. These are later cut into smaller pieces. The collection of lac may be done before the swarming, *i.e.*, emergence of larvae, when it is called *ari* lac or after the insects have swarmed, when it is called *phunki* lac.

(*a*) *Ari lac.*—A producer may cut his crop *ari* when he is in need of cash or when he thinks that on account of unfavourable weather conditions leaving it on the tree will result in damaging the crop. *Ari* lac as it is collected before the emergence of larvae contains living insects.

(*b*) *Phunki lac.*—The portion of the crop which is allowed to remain on the tree till after the larvae have swarmed, is collected as *phunki* lac and this, unlike *ari*, does not contain living insects but only the dead bodies of mother insects.

It is difficult to ascertain the proportion of the crop collected *ari* and *phunki* but extensive enquiries made during the course of this survey indicate that the major portion of lac crop is collected *ari*. In Bihar, it is estimated that on an average about 70 per cent. of the total crop is col-

lected *ari*. In Assam, the proportion rises to about 80 per cent. while in the Central Provinces it goes as high as 90 per cent. In Bengal, however, the proportion of *ari* to the total crop falls to about 65 per cent. In the Punjab, *ari* lac forms a smaller proportion while in Madras almost the entire crop is collected *phunki*. Keeping these figures in view it is estimated that about 70 per cent. of the total lac crop in India is collected *ari*, the balance of 30 per cent. being removed as *phunki*. It was also observed that a larger proportion of the *Baisakhi* and *Kusmi* crops is collected *ari* as compared with *Katki* and *Jethua* crops, mainly because a greater percentage of the latter two crops is utilised as brood, which after swarming takes place is collected as *phunki*. According to rough estimates, more than three-fourths of the *Baisakhi* and *Kusmi* crops, half of the *Katki* crop and one-fourth of the *Jethua* crop are collected *ari*.

B.—Stick lac.

Although lac is collected from trees in the form of sticks (pieces cut from branches and twigs of trees) covered with lac encrustation, stick lac, as it is understood by the trade, means lac scraped from the sticks. The lac encrustation is usually removed from twigs either by hand or is scraped with knives or sickles. Lac is not easy to remove from the twigs of *Kusum* trees as the encrustation thickly surrounds the twigs and sticks close to them. In such cases the producers frequently cut the twigs into short pieces of about 1 to 3 inches in length and market these as such. Generally speaking, the scraping of lac is taken up soon after the twigs are cut though sometimes they are stored and the scraping is done later on at leisure.

Scraped lac is spread out in shade in thin layers 4 to 6 inches deep to dry. It is occasionally raked—more frequently in the beginning—to allow uniform aeration. If scraped lac is exposed to the direct action of the sun's rays, the edges of the grains are likely to melt and form into compact "blocks" from which the extraction of dye becomes very difficult. After the lac is dry it is often winnowed to remove large pieces of sticks, stones, wood and other foreign matter.

The collection and scraping of lac is commonly done by small producers themselves with the help of their family members. Landlords, contractors and the Forest Departments engaged in the production of lac get this work done by hired labourers employed either on "piece work" or "daily wages". In the former case, the charges usually vary from Rs. 1-4-0 to Rs. 2-8-0 per maund of scraped lac depending upon the amount of work involved and the local wages and rates. The "daily wages", when paid in cash usually vary from 2 annas to 4 annas per day. When the payment of wages is made in kind, any grain of equivalent value may be given. In certain tracts (for instance in the Hazaribagh district of Bihar), the labourers engaged for harvesting and scraping stick lac are paid one-fourth of the total quantity scraped by them.

C.—Seedlac.

(1) Methods and cost of preparing seedlac.

Stick lac is passed through sieves to separate smaller grains and dust from the bigger pieces. The latter are then either ground in a hand *chakki* (stone-mill) or crushed in roller corn crushers, specially in the case of *Kusmi* stick lac which is often received without being scraped. The

crushers are usually operated by manual power but in some of the large factories they are driven by mechanical power. The space between the rollers is so adjusted that lac is broken from the sticks. Pieces of sticks which pass with the lac are separated by subsequent sifting and winnowing. The crushed and sifted stick lac which is in the form of granular fragments is known as *kachcha chowri*. *Kachcha chowri* is then washed in cup shaped stone or cement pots commonly known as *nands*. They are about 2½ feet in height and diameter. The inside surface of a *nand* is specially made rough to facilitate rubbing of crushed lac against its sides. About 40 lb. of crushed lac is placed in each *nand* and water added. A labourer known as *ghasandar* enters the *nand* and leaning on a support rubs the lac against the rough sides of the *nand* with his feet for nearly half an hour. The rubbing operation crushes the lac cells, releases the lac dye and separates the dirt from the resin. The water is then allowed to stand for a time and the surface scum consisting of pieces of wood and dead bodies of insects is removed. After this, the coloured water is scooped out and filtered through a cloth to recover the suspended lac. The coloured water is allowed to run off and fresh water is again added. The process is repeated three or four times till the lac dye, dirt and other impurities are removed. In the case of inferior and old stick lac, diluted solution of commercial washing soda is used to facilitate the removal of the dye. After the final washing the washed material known as *chowri, i.e.,* the seedlac of commerce is removed from the *nands* and spread out on cement floors for drying. It is stirred by means of rakes to avoid the formation of compact blocks . After it is dry, it is winnowed to separate the lac grains from fine particles of dust and other impurities.

In some of the large factories, large power-driven steel drums fitted with agitating arrangements are used instead of *nands* for washing purposes.

The cost of manufacturing seedlac before the outbreak of War in 1939 reported by 10 manufacturers in different centres, as will be seen from the figures given in Appendix 11, varied from Re. 0-6-6 to 0-12-6 per maund. The average for the 10 factories worked out to Re. 0-8-3 per maund. It is understood that the cost of manufacture has increased in subsequent years.

(2) YIELD OF SEEDLAC FROM STICK LAC.

The yield (as also the quality) of seedlac from stick lac varies depending upon a number of factors, such as the type of host and season, whether collected *ari* or *phunki*, the amount of impurities and the method and extent of washing. As a rule, stick lac from *Kusum* tree gives a higher percentage of seedlac than that from *Ber* and *Palas*. Similarly *Baisakhi* stick lac from *Ber* or *Palas* tree is stated to yield more seedlac than *Katki* stick lac from the same hosts. *Phunki* lac being free from living insects contains less colouring matter and moisture than *ari* lac and, therefore, yields a higher percentage of seedlac than the latter. Accurate comparable figures indicating the effect of all these various factors on the recovery of seedlac from stick lac are not available. Enquiries made from some factory owners in different lac growing tracts, however, show that the average yield of seedlac from *Baisakhi* stick lac varied from about 60 per cent. to about 72 per cent. Similarly the yield from *Katki* stick lac varied from about 55 per cent. to about 68 per cent. The recovery from

Kusmi stick lac varied from about 65 per cent. to about 80 per cent. *phunki* lac is roughly estimated to yield on an average about 10 per cent. more seedlac than the corresponding *ari* lac.

About 70 samples of stick lac were collected during the course of the survey from different kinds of host trees drawn from different localities and analysed at the Indian Lac Research Institute, Namkum. The results indicating the average *chowri* percentage (yield of seedlac from stick lac) for stick lac from different hosts and different crops are set out in the table below :—

Yield of seedlac from stick lac.*

Type of host.	Season.	Average yield.
		Per cent.
Kusum	Kusmi (Aghani)	68
,, ...	Jethua	69
Ber	Baisakhi	59
,, ...	Katki	52
Palas	Baisakhi	57
,, ...	Katki	56

It will be observed from the figures given above that stick lac from *Kusum* trees gives the highest recovery of seedlac. The yield of seedlac from *Baisakhi Ber* stick lac is higher than that obtained from *Baisakhi Palas* stick lac. But in the case of *Katki* crop a larger *chowri* percentage was obtained from *Palas* stick lac as compared with *Ber* stick lac. Further, the *chowri* percentages obtained by the analysis of samples referred to above appeared to be lower than the figures commonly assumed or reported by factories. While one reason for the discrepancies may be the comparatively small quantities of stick lac employed for determining *chowri* percentage, another reason which may have affected the results is that the interval between the collection of a sample and its analysis varied considerably in the case of various samples.

The average yield of seedlac from all types of stick lacs taken together may be taken as 66 per cent.†, and this conversion factor has been adopted in the general calculations involved in this report.

D.—Shellac.

(1) Methods and cost of preparing shellac.

Shellac may be prepared from seedlac either by melting or by extraction with suitable solvents. The former method is most commonly used in India.

Different qualities of seedlac are mixed together according to the trade requirements or the views of the manufacturer and the mixture is filled in cloth bags about 30 feet long and about 2-5 inches in diameter. For the manufacture of high quality shellac double bags are employed. The melting is done over charcoal fire in a Dutch oven-shaped fireplace (locally known as *bhatta*) about 2½ to 4 feet long, 1½ feet high and 12 to 16 inches deep. At one end of this *bhatta* sits the melter known as

*The figures are based on the results obtained from samples referred to above and must be regarded as approximate only.

†The figure appears to be adopted by the Indian Lac Cess Committee in their crop forecast statements.

kariaar holding one end of the long bag just near enough the glowing fire to melt the lac resin. The other end of the bag is fixed on to a wooden wheel which is rotated by a boy known as *phirwaya*. The object of rotating the bag is to apply uniform heat to it and the *karigar* asks the *phirwaya* to rotate the bag slowly or quickly as need be. The *karigar* gives a twist opposite to that given by the *phirwaya*. The lac melts with the heat and begins to ooze out. This is worked up with a large iron spatula to ensure thorough mixing of lac resin and wax. Overheating is prevented by an occasional sprinkling of cold water on the molten lac. When sufficient quantity of such molten lac is collected outside the bag, it is rapidly transferred to the glazed porcelain surface of a horizontal hot water cylinder about 2½ feet long and 10 inches in diameter. An assistant known as *belwaya* spreads the molten mass evenly over the cylinder by means of a palm leaf. After spreading it, he takes the sheet and warms it before the fire to keep it plastic and then stretches it by means of his hands, feet and teeth to form a thin sheet. On cooling, the thick edges and the portions showing hard knots, dirt specks and air bubbles are removed and the remaining sheet is broken up into small pieces (flakes) which form the shellac of commerce.

For the manufacture of button lac, the stretching process is dispensed with and the molten lac is dropped on to the cool flat surface of a stone or commonly on a metallic sheet. The lac spreads into circular button shaped cakes of 3″ to 4″ diameter and 1|8″ to 1|4″ thickness. These are usually stamped with the manufacturer's or shipper's mark before they become hard.

The method of preparing shellac described above is essentially the same throughout the country except for few minor differences in some localities. For instance, in the Punjab the size of cotton bag is much smaller being about 30 inches long and 4½ inches wide. The molten lac is transferred to the cool surface of a tilted stone slab where it solidifies into triangular pieces about 2″ long on each side and about 1|10″ thick or may be thrown on the cool slabs with the sweep of a knife and pressed into thin sheets.

The cost of converting seedlac into shellac by the melting process, before the outbreak of War in 1939, reported by 10 factories, as will be seen from the figures given in Appendix 11, varied from Rs. 2-6-0 to Rs. 3-6-5 per maund. The average for the 10 factories worked out to Rs. 2-13-7 per maund of shellac. The total cost of manufacturing shellac from stick lac in the instances given in Appendix 11 varied from Rs. 2-14-0 to Rs. 3-14-6, averaging Rs. 3-7-7 or roughly Rs. 3-8-0*, per maund of shellac. It may be added that the cost of manufacturing shellac which varies from time to time depending on the prices of cloth, charcoal, etc., and wages of labour, appreciably increased after the outbreak of the War in 1939. It should also be noted that when orpiment is added to shellac, the cost of manufacturing shellac increases to the extent of the cost of orpiment added. This naturally varies with the amount of orpiment added. In 1938, 2 factories reported the cost of orpiment to be about 3 annas to 4 annas per maund of shellac.

*In these calculations, no account has been taken of overhead charges such as interest, depreciation on buildings, etc., and remuneration for supervision on the one hand, and the value of by-products obtained on the other.

The preparation of shellac by extraction with a solvent involves the use of elaborate plant and is being done only at two factories at Calcutta. A large range of types are produced varying from very dark " garnet " lac to very pale shellac. No data about the cost of manufacturing shellac by extraction process are available.

(2) YIELD OF SHELLAC FROM SEEDLAC.

The yield of shellac is greatly influenced by the type and the age of the seedlac used. It is generally recognised that *Kusmi* and *Jethua* seedlac yield more shellac on account of their better melting quality as compared with seedlac obtained from other hosts. *Baisakhi* seedlac is generally considered better than *Katki* in this respect. As a general rule, old seedlac, due to its comparatively low fluidity, yields less shellac than fresh seedlac. In fact the age of seedlac is considered to exercise a greater influence on the yield of shellac than the type of seedlac. Consequently the manufacturers try to convert seedlac (except the quantities disposed of as such) into shellac as early as possible. The method of manufacture also has an appreciable effect on the yield of shellac. For instance, the extraction process gives a higher yield than melting. In the latter case, the yield may further differ depending on whether a double bag or a single bag is used. When double bags are used, the yield is sacrificed for the quality.

Enquiries made from factory owners in several markets in Bihar show that the yield of shellac from *Katki* seedlac varies from about 75 per cent. to about 85 per cent. while that from *Baisakhi* seedlac varies from about 80 per cent. to about 90 per cent. The percentage of shellac obtained from *Kusmi* seedlac was reported to be about 93 per cent. According to Bihar report, the *Kusmi*, *Baisakhi* and *Katki* seedlacs yield, on an average, about 92 per cent., 90 per cent. and 85 per cent. shellac respectively. In Mayurbhanj State, the recovery of shellac from seedlac, which is mostly *Kusmi*, is estimated to be about 87 per cent. The yield of shellac from seedlac in Bengal is reckoned to be about 80 per cent. in the case of *Baisakhi* and somewhat less for *Katki*. In the Central Provinces, the yield of shellac is estimated to be about 85 per cent. and 75 per cent. in the case of *Kusmi* and non-*Kusmi* seedlacs respectively. Leaving aside the high grades, shellac is usually manufactured from a mixture of different qualities of seedlac, the proportion of which is varied from time to time to suit the quality of shellac it is proposed to make. The yield of shellac, therefore, also varies according to quality manufactured. Keeping in view all the factors and figures given above as also the proportion of shellac obtained from the by-products, the yield of shellac from seedlac is estimated, on an average, to be about 87 per cent. (which is equivalent to a yield of 57·42 per cent. from stick lac).

(3) BLENDING AND MIXING ROSIN AND ORPIMENT.

Different seedlacs are generally blended in varying proportions according to the quality of shellac required. The quality of the various types of seedlac being not always consistent, a great deal of skill is required for proper blending. It is only in the case of high quality superfine shellacs that blending is not done and pure *Kusmi* or superior *Baisakhi* seedlac alone is used.

Ordinary colophony or rosin is often added to seedlac prior to melting with the object of lowering the melting point and thus facilitating extraction of the resin. This practice is resorted to in the case of lac difficult to melt or when rosinous shellac is required. Shellac sold in India under the name of T. N. (pure) is manufactured free from rosin. The London T. N. quality, however, indicates shellac with 3 per cent. rosin. This is prepared by mixing pure T. N. (rosin free) with another quality which contains 12 per cent. rosin and is known as 12 per cent. T. N. The superior grades of shellac are invariably free from rosin.

Orpiment, *i.e.*, sulphide of arsenic is sometimes added to seedlac at the rate of $\frac{1}{4}$ lb. to 2 lb. per maund of seedlac with the object of improving the colour of shellac manufactured. Shellac containing orpiment is usually referred to as arsenicated shellac and several manufacturers and shippers have distinct brands for arsenicated and unarsenicated shellacs. Shellac containing orpiment usually has a bright yellow colour which is considered more pleasant and attractive by some buyers. Others however hold the view that orpiment gives shellac a fictitious colour, and serves no useful purpose as being practically insoluble in the melted resin, it is left in the sludge or filtered off when shellac is dissolved in alcohol for use. Among the commercial samples of shellac collected from different centres during the course of survey and analysed at the Indian Lac Research Institute, the presence of orpiment was found mostly in the superior brands of shellac.

E.—Other products.

The following by-products are obtained in the preparation of seedlac and shellac.

(1) *Molamma.*—The finely divided dust like material separated from stick lac and seedlac is termed *molamma*. During the process of crushing stick lac, a small portion of lac is reduced to a finely powdered condition. Similarly during the process of washing and drying of seedlac some material is reduced to the form of dust. These are separated from the bigger grains by winnowing and sieving. The yield varies according to the treatment in crushing and washing but the average may be taken as 1 to 3 seers per maund of seedlac. *Molamma* is a product of very variable composition and may contain upto 70 per cent. of lac.

(2) *Kiri.*—This is a by-product obtained in the preparation of shellac. When seedlac is heated in cloth bags, shellac filters through, leaving behind some resin, dirt and refuse in the bag. When sufficient quantity of this material accumulates, the bag is slit open and the material contained in the bag, which is known as *kiri*, is scooped out and pressed into cakes. *Kiri* contains about 50 to 60 per cent. of lac. The amount of *kiri* obtained per maund of seedlac melted varies from about 2 to 4 seers.

(3) *Passewa.*—After the melting process is over and after *kiri* has been removed, some residue still remains sticking to the cloth bags. This material is recovered by putting the bags in boiling water to which a little sodium carbonate has been added in order to facilitate the separation of the residue from the bags. The loosened material floats on the surface and is collected and pressed into cakes known as *passewa*. The yield of

passewa is estimated at about ½ to 2 seers per maund of shellac. This by-product is rich in lac, of which it may contain as much as 90 per cent. In the manufacture of *passewa,* the bags get washed and after necessary repairs can be used again for melting more seedlac.

F.—Manufacturing establishments.

(1) Number and location of *bhattas* and factories.

The number of *bhattas* and factories in India (as far as could be ascertained during the survey) and their location is given in Appendix 12. It will be seen that there are at least 5,000 *bhattas* in India. Bihar easily leads claiming about 70 per cent. of the total number of *bhattas* in India. The United Provinces, Bengal and the Central Provinces follow at a great distance in the descending order of importance. Apart from the numerous factories manufacturing shellac by the indigenous process on *bhattas,* there are two factories with modern machinery at Calcutta.

(2) Types of *bhatta* factories.

The various lac factories manufacturing shellac by the melting process may be roughly classified into three groups from the point of view of ownership, finance, output and the method of marketing their products.

(*a*) *Cottage factories.*—These are very small establishments equipped with one or two *bhattas* usually set up in living houses. The owner is either a small producer or a village merchant who carries out the various operations connected with the manufacturing process himself with the help of his family members. He does not employ outside labour and his working expenses are low. Being usually a man of small means, he borrows money to keep his factory running, and disposes of his goods as soon as they are turned out. His average output may be about 1 to 2 maunds of shellac per day. Such factories are usually worked for a few months after the arrival of *Baisakhi* and *Katki* crops and remain closed during the rest of the year. Shellac manufactured by such factories is sometimes reported to be of low quality.

(*b*) *Small factories.*—These factories are usually equipped with 3 to 25 *bhattas* each. The various operations are performed by hired labour. Although the owners possess better resources than the cottage factories, their financial position is generally not strong and they also are often not in a position to hold stocks. Their average output is about 3 to 25 maunds of shellac per day and many of them work during *Baisakhi* and *Katki* seasons only. The largest number of lac factories belong to this class. Of the 274 factories reckoned to be manufacturing shellac in Bihar, 20 were reported to have 2 *bhattas* or less while the number of *bhattas* in 230 factories ranged between 3 and 25. The number of factories with more than 25 *bhattas* was only 24 out of which 6 had more than 50 *bhattas.*

(*c*) *Large bhatta factories.*—These factories have more than 25 *bhattas* and are owned by manufacturers with large financial resources, who are not only in a position to purchase and stock large quantities of stick lac when the market is favourable but are also able to hold their seedlac and shellac stocks, if required. Some of them are equipped with mechanical washers, capable of washing from 200 to 500 maunds of seedlac per day.

The outturn of shellac in this type of factories varies from about 25 to 100 maunds per day. Because of the relatively large scale production they are able to effect certain economies in the cost of production and are, therefore, in a position to hold their own in the market in spite of the larger total investment and overhead expenditure. The number of factories having more than 50 *bhattas* is, however, small and hardly exceeds one dozen.

(3) TOTAL CAPACITY AND OUTPUT.

Assuming 35 seers of shellac to be the daily turnout of a *bhatta,* and further that each *bhatta* can conveniently work for about 300 days in a year the potential capacity of the 5,000 *bhattas* in India (Appendix 12) works out at about 48,000 tons of shellac per annum, *i.e.,* about 1½ times of what would be necessary to convert the entire supplies of lac available in India into shellac. It is obvious, therefore, that all the *bhattas* do not work to their full capacity. For instance, it was found in half a dozen manufacturing centres in Bihar that the estimated number of working days per *bhatta* varied from about 110 to 200.

The total output of seedlac and shellac by all the factories in India may be estimated fairly closely from the fact that out of the total supplies (production *plus* imports) of stick lac in India, averaging nearly 54,000 tons during the quinquennium ending 1938-39, about 50,000 tons or 92·5 per cent. were absorbed by export requirements, *i.e.,* exports of stick lac as such and stick lac required for the manufacture of seedlac and shellac exported. Of the quantities utilised in India (which averaged about 4,000 tons during the quinquennium ending 1938-39), it is estimated, on the basis of enquiries made during the survey, that apart from the small quantities used for dyeing skins, the bulk of stick lac consumed in India is utilised in the form of seedlac and shellac in the proportion of 1 and 4 respectively. The utilisation in India is, therefore, reckoned to be as under :—

100 tons of stick lac used as such.
700 tons stick lac used for the manufacture of 450 tons seedlac.
3,200 tons stick lac used for the manufacture of 1,850 tons shellac.

The average exports of seedlac and shellac together with button lac during the quinquennium 1934-35 to 1938-39, being about 8,700 tons and 21,300 tons respectively, their total production is reckoned to be as under :—

Seedlac.	9,150 tons.
& button lac.	23,150 tons.

G.—Note on improved methods of manufacturing.

(1) SEEDLAC.

The manufacturer's object in the preparation of seedlac is to obtain from stick lac a product free from the impurities and colouring matter contained in stick lac. As the lac dye is removable by washing with water, the indigenous process consisting of washing stick lac with water using manual labour for agitating the material being washed is not altogether inefficient. It, however, admits of improvement in the direction of saving in time and labour and a higher degree of efficiency in respect of the

removal of colouring matter and impurities. Mechanical washers now in use in some of the large factories effect saving in time and labour.

A method, to yield a light colour seedlac of greater purity and suitable under the conditions obtaining in the indigenous shellac manufacturing factories, has been evolved by the Indian Lac Research Institute.* In this method lac after being scraped from sticks is first crushed by a stamping mill or by its local equivalent *Dhenki* to a size to pass through a 20-mesh sieve. The crushed material is then put in a ball mill having flint balls and water and triethanolamine added in the proportion of 1 maund of water and 3 ounces of triethanolamine to 36 seers of scraped lac. The ball mill is worked for an hour by which the mechanically adhering impurities are loosened and the soluble dye removed practically completely. The seedlac is then washed with water as long as there is any colour in the wash water. Washing can also be effected in the usual stone vats with water containing the required amount of triethanolamine. This seedlac is then put in a vat containing common salt solution made by dissolving 37 seers of salt in 100 seers of water and vigorously stirred with a wooden pole for about five minutes. The purified seedlac floats on the surface while heavier impurities settle down. The seedlac is then removed by means of wooden laddle and put in another vat containing clean water. Seedlac being heavier than ordinary water settles down and the lighter impurities which float to the surface are removed. Seedlac is then washed free of salt. It is claimed that the price obtainable for seedlac prepared by this process may be expected to be higher by at least 20 per cent. The method does not appear to have been adopted so far by any factory† but in view of the advantages claimed, manufacturers will do well to give the method a trial. Consignments of seedlac prepared by this process should also be sent to the United States to ascertain whether the produce meets with the consumers' requirements.

(2) Shellac.

As with seedlac, the country process of shellac manufacture is not altogether inefficient as it involves the minimum amount of heating and thus retains all the good properties of shellac.

The use of double bags is conducive to better quality and some manufacturers employ double bags for the production of good quality shellacs. The indigenous method, however, suffers from the disadvantage that appreciable quantities of by-products are produced—more so when double bags are used—which fetch comparatively low prices.

In recent years a demand for lacs of specified physical properties has arisen. For instance, the electrical industry needs lac with a higher melting point and with more adhesive and elastic properties. Although a product completely satisfying these requirements has not been produced so far, a process for manufacturing lac more suitable than the ordinary lac has been worked out at the London Shellac Research Bureau. The Indian Lac Research Institute, Namkum, also has devised some new processes to produce lac with modified properties. For instance, it has been shown that

*Details of the work may be seen in the undermentioned publications of the Indian Lac Research Institute :—(1) Bulletin No. 27, Technical process for washing and refining stick lac—A. K. Thakur. (2) Uses of Lac—Sen and Ranganathan.

†Since this was written, one factory at Ranchi is reported to be giving the method a trial.

sulphur treatment of shellac yields a definitely modified product with improved water resistance and hardness. Similarly the addition of small percentages of urea or thiourea improves water resistance of varnishes. It has also been found that treatment of lac with polycarboxy acids like maleic, phthalic and succinic acids improves its elasticity, adhesion and heat resistance. Such modified lacs produce both 'heat and lightfast' varnishes which may be used in the preparation of coloured glasses and bulbs.

Further research* in this direction may lead to other modified lacs which may have properties desirable for other requirements. For instance a modified lac suitable for serving as a filter anti-halation layer on photographic elements (plates or films) is reported to have been discovered recently.

(3) By-products.

Experiments conducted at the Indian Lac Research Institute, Namkum, have shown that *kiri* which is an important by-product, can be utilised in the manufacture of moulded plastics. Shellac is extracted from *kiri* with the use of alcohol and the solution is mixed with finely powdered wood to make a paste, which on being dried and heated in moulds gives strong, polished mouldings. In addition to the preparation of moulding powder, garnet lac and button lac have also been prepared.

As the conversion of by-products into garnet lac involves putting up a plant, individual manufacturers may not feel sufficiently interested in adopting the process. It appears therefore that utilisation of by-products for the production of garnet lac and button lac may be encouraged by running a plant on a co-operative basis at a suitable centre. The demand for garnet lac and the economics of the process should be kept in view in schemes for the conversion of by-products into garnet lac.

*A list of important publications relating to research and scientific work on lac and its cultivation and utilisation issued by

(1) The Indian Lac Research Institute, Namkum,

(2) The London Shellac Research Bureau, London, and

(3) The Shellac Research Bureau of the Polytechnic Institute of Brooklyn, New York, New York.

is given in Appendix 39.

CHAPTER III.—UTILISATION AND DEMAND.

A.—Utilisation.

(1) In India.

Although the total consumption of lac in India is small, it finds a place in the preparation or manufacture of a large variety of articles of common use. The main uses which lac and lac products are put to in India fall under the following heads :—

(*a*) Varnishes, paints and polishes,
(*b*) Gramophone records,
(*c*) Bangles,
(*d*) Wood turning industry,
(*e*) Jewellery,
(*f*) Colouring skins, and
(*g*) Miscellaneous.

With the execution of gramophone records, the other articles enumerated above are produced by establishments widely scattered in numerous towns and villages all over the country. It is, therefore, difficult to arrive at accurate estimates of the quantities used in the various industries. Consequently, the figures given below can at best be regarded as approximations only.

(*a*) *Varnishes, paints and polishes.*—In India, the largest quantity of lac is absorbed in the manufacture of varnishes, paints and polishes. The use of lac dissolved in spirit as "French Polish" has been known since very early times. In recent years, numerous other special preparations such as knotting varnishes, negative varnishes, aluminium paints and colourless polishes have been placed on the market.

Both seedlac and shellac are utilised for this purpose. It has been observed that the former, *i.e.*, seedlac is given preference over shellac in the Punjab, while demand for shellac predominates in other tracts excepting Sind where almost equal quantities of both are consumed. This is probably due to the fact that the bulk of shellac manufactured in the Punjab is heavily adulterated with rosin and is on that account avoided by buyers. The quantity of seedlac and shellac annually used in the manufacture of varnishes, paints and polishes is estimated to be 300 tons and 1,000 tons respectively.

(*b*) *Gramophone records.*—There are at present three factories in India—one in Calcutta and two in Bombay—which utilise shellac in the manufacture of gramophone records. The demand from this industry is roughly placed at about 300 tons of shellac per annum.

(*c*) *Bangles.*—The manufacture of bangles is an old cottage industry which formerly consumed large quantities of lac. The demand for lac bangles has, however, declined in recent years owing to the availability of more attractive and cheaper glass bangles. Lac bangles are mostly used by poor people and are usually sold in village markets in the main lac producing tracts. Lac refuse, particularly *kiri*, seedlac and poor quality shellac are used in the manufacture of bangles. The annual requirements of this industry are estimated as 50 tons seedlac and 300 tons

shellac. Broken bangles are sometimes collected by village hawkers in exchange for spices, etc., and utilised again.

(*d*) *Wood turning industry.*—The wood turner prepares such things as lacquered toys and *charpoy* legs. For colouring these articles, a small quantity of pigment is thoroughly mixed with lac rendered plastic by the application of heat. A small piece of this material is pressed against the article which is to be lacquered as it revolves on a lathe. The portion of the lac touching the article melts with the heat generated by friction and colours the wood. The quantity of shellac annually used in this industry is estimated as 80 tons.

(*e*) *Jewellery.*—Shellac and seedlac are used for stuffing hollow ornaments of gold and silver besides serving as a means of fixing precious stones in the jewellery. About 30 tons of seedlac and 20 tons of shellac are estimated to be utilised annually in this industry.

(*f*) *Colouring skins.*—After the hair and superfluous flesh have been removed from the raw skins, they are further cleaned and washed and then finally passed through the dye solution prepared from stick lac. Stick lac is boiled in water for about an hour after which some bark of *Symplocos cratocgoides* and soda are added. The mixture is allowed to cool and then filtered for use. The residue which is known as *mana* in the Punjab is rich in resin and is bought by bangle makers. This practice seems to be fairly common in the Punjab. The total amount of stick lac used in India for this purpose is roughly placed at about 50 tons per annum.

(*g*) *Miscellaneous.*—The other purposes for which lac is used include the manufacture of sealing wax, the preparation of pyrotechnics, joining handles of walking sticks, painting pottery and medicinal preparations.

The utilisation in India may be summarised as under :—

	Stick lac (Tons.)	Seedlac. (Tons.)	Shellac. (Tons.)
Varnishes, paints and polishes	..	300	1,000
Gramophone records	..	..	300
Bangles	..	50	300
Wood turning industry	..	..	80
Jewellery	..	30	20
Colouring skins	50	..	..
Miscellaneous	50	70	150
Total ..	100	450	1,850

Total in terms of stick lac = 4,000 tons.

(2) In other countries.

As in India, lac is used in other countries for a variety of purposes, the most important of which are the manufacture of varnishes, paints and polishes, and the preparation of gramophone records and electrical goods. Shellac is largely used but in recent years, the use of seedlac has been increasing specially in the United States of America, where large quantities of bleached seedlac are used—over 5,000 tons are reckoned to be used for the preparation of floor varnishes alone.

The gramophone records industry is estimated to consume about 11,000 tons shellac annually. Besides the industries referred to above, lac

is used for giving a glossy nontacky finish to playing cards, for stiffening the fabric in the manufacture of hats, in the preparation of sealing wax and waterproof ink, for plastic mouldings, in the preparation of munitions and for various other purposes.

B.—Demand.

(1) Qualitative.

(*a*) *Factors affecting quality of.*—(*i*) *Stick lac.*—Lac being a natural product, produced under widely varying conditions, large variations in its quality are bound to occur. The physical and chemical properties of stick lac are largely influenced by—

(1) The type of host tree,
(2) The time of the crop,
(3) The locality of production,
(4) The climatic conditions during the growth of the encrustations,
(5) The method of infection,
(6) The stage of maturity, *e.g., ari* or *phunki,* and
(7) Method of preparation (scraping).

All these factors probably affect the colour, constitution of the resin and the amount of wax and impurities present in the stick lac.

Different host trees yield different qualities of lac. For instance, lac produced on *Ber* (*Uizyphuis jujuba*) is generally said to give higher percentage of seedlac of light colour than that obtained from *Palas* (*Butea frondosa*), while *Kusum* (*Schleichera trijuga*) lac is considered the best Qualitative differences also arise due to the season and locality of production. For instance, *Baisakhi* crop from *Palas* is reported to yield more seedlac of paler colour than *Katki* crop from the same tree. Again, *Manbhum Baisakhi* lac is stated to contain less impurities and consequently yields higher percentage of seedlac than Daltonganj *Baisakhi* crop. The climatic conditions vary from year to year and thus affect the quality of lac collected in a particular locality in different years. For instance, hail-storms and dry hot winds reduce the recovery percentage of seedlac from stick lac. On the other hand, rains in March are very helpful to the *Baisakhi* crop. Not only the yield increases on account of ample sap and congenial temperature but the quality is also improved by the washing away of the honey portion of lac.

The method of infection also has a bearing on the quality of lac. Lac formed as a result of natural infection is, as a rule, inferior in quality to that produced as a result of ' artificial ' infection on account of the former containing some old lac of the previous crop. *Phunki* lac contains less colouring matter and is free from living insects. Consequently, it yields higher percentage of seedlac than *ari* lac. By careless scraping more woody matter gets into stick lac which, therefore, yields less percentage of seedlac than a properly scraped lac.

Of the various factors affecting the quality of lac given above, the first three, namely, the type of host tree, the time of the crop and the

locality of production are the most important. Consequently, stick lac is assessed by the trade in India on the basis of these factors.

The collections from different hosts often reach the markets in a mixed form, *e.g.*, it is quite common to find stick lac from *Ber* and *Palas* trees together in the markets of Bihar.

(*ii*) *Seedlac.*—The quality of seedlac depends upon the type and quality of stick lac from which it is made, the number of washings given during the course of manufacture, the impurity content and the size of the grains.

Kusmi stick lac generally produces seedlac of lighter colour than that from other hosts. More washings during the process of manufacture produce seedlac of lighter colour than when only two or three washings are given. The important commercial grades of seedlac manufactured in India are given below :—

Kusmi seedlac.	*Percentage of alcohol insolubles allowed.*
Golden	3
Fine, Ordinary, No. I, No. II	3
Baisakhi seedlac.	
Golden	3
Fine	3
Ordinary	5

(*iii*) *Shellac.*—The quality of shellac depends largely upon the type and quality of seedlac from which it is manufactured, the method of manufacture, mixing, if any, and the proportion, in which materials like rosin and orpiment are added. It has already been stated that the quality of seedlac varies widely. This, coupled with divergent practices of blending and the varied requirements of different industries using shellac has resulted in numerous qualities of shellac being put on the market. Some of them contain orpiment while others are free from it. Again some qualities are free from rosin while others contain varying proportions of this material. Besides, shellac may be in the form of flakes or buttons, the latter being called button lac. The number of trade brands under which shellac is put on the market by the various manufacturers and shippers is estimated to be well over 300 but the following are the grades under which most of the shellac is dealt :—

1. T. N.
2. 8 per cent. T. N.
3. 12 per cent. T. N.
4. I. T. N.
5. Standard I.
6. Ordinary fine.
7. Ordinary superfine.
8. Lemon superfine.
9. Machine-made shellacs :—
   (*a*) Orange brands.
   (*b*) Garnet.

T. N. is the most common standard and the bulk of shellac manufactured by the country process answers to this quality. The prices of stick lac, seedlac and other types of shellac are generally calculated on the T. N. basis. The term T. N. has been in existence for a long time—so long indeed that its origin cannot now be accurately traced.

T. N. pure is rosin-free with a limit of 3 per cent. alcohol insoluble impurities. 12 per cent. T. N. contains rosin at the rate of 12 per cent. Sometimes pure T. N. is mixed with 12 per cent. T. N. in the proportion of 3 to 1 to prepare 3 per cent. T. N., *i.e.*, T. N. having 3 per cent. rosin which is the standard for London T. N. A slightly inferior quality of T. N. goes to America, which because of its main destination has come to be known as U. S. S. A. T. N. This grade also is guaranteed not to contain more than 3 per cent. rosin. The term I. T. N. which originally stood for Imamganj T. N. is now used in a wider sense in respect of poor grade shellac. Superior qualities of T. N. guaranteed free from rosin and orpiment and with a lower percentage of insolubles are also shipped.

Standard I is superior to T. N. being cleaner and of a slightly better colour. It is free from rosin and should not contain more than 2 to 3 per cent. insolubles.

' Fines ' and ' Superfines ' are superior to Standard I and are usually manufactured from the best *Baisakhi* lac with or without a mixture of *Kusmi*, the finest grades being made from pure *Kusmi*. The various qualities of ' fines ' and ' super-fines ' put on the market are distinguished by trade brands and proprietary marks such as, ' G in double Triangle ', ' Ultra ', ' Hyper ', A. S. O., ' B. P. extra ' ' Lemon ', ' Ispa ', ' Hypas ', ' Rhino ', ' B in octagon ', ' Tiger ', ' Elephant ', etc., etc. The percentage of insolubles in these grades usually varies from 0·5 to 1·5.

Button lac is put on the market in both pure and rosinous qualities but the bulk of production usually consists of the former and is made from good quality seedlac. Like shellac, manufarturers have got their own brands of button lac.

Orange Brands.—These are of high quality, and are usually free from rosin, orpiment and insolubles. They are uniform in properties. Some of these are wax-free and decolourised.

Garnet Brands.—These are dark coloured shellac manufactured for specific purposes where colour does not matter. They are orpiment free. Some contain a specified quantity of rosin.

(b) Qualities of lac, seedlac and shellac in demand for export.—Stick lac is exported in very small quantities. The exports of seedlac before the outbreak of War in 1939 consisted of almost all the different types in varying proportions. As regards shellac the demand from different countries varied to some extent in respect of quality.

The United Kingdom took practically all types of shellac except the very inferior ones to cater for the needs of her various industries and for re-shipment to Continental countries. However, there was a special demand for button lac and the bulk of the production of this type of lac was purchased by the United Kingdom.

The demand from America also covered almost all types of shellac. As has been stated earlier a slightly inferior quality of T. N. known as

U. S. S. A. T. N. was shipped to America but in recent years this country has shown some preference for rosin free shellacs and T. N. London quality. Shellac with a yellow colour was in demand from Japan. The cheaper grades of shellac were purchased by Russia.

Taking all the countries together, the proportion of various qualities in the exports of shellac from India are estimated as under by a member of the trade :—

Proportion of various qualities of shellac in the exports.

——	1936 & 37.	1938 & 39.
	Per cent.	Per cent.
T. N. Pure	20	50
T. N. 3 per cent.	40	10
T. N. 12 per cent.	5	*Negligible.*
Standard I	17	25
Fine and Superfine	18	15
Total ..	100	100

The proportions of T. N. Pure and Standard I appear to have appreciably increased in 1938 and 1939 while those of T. N. 3 per cent. and T. N. 12 per cent. have fallen to a marked extent.

The " other forms " of lac which mostly consist of *kiri* were chiefly in demand from Germany.

As regards the qualitative demand for particular industries, special characteristics are looked for in most cases. For instance, for gramophone records it is essential to have a clean lac. Dirt and gritty impurities cause flaws on the playing surface and spoil the delicate plated surface of the dies. Good and uniform " fluidity " and uniform distribution of wax in its composition are also desirable.

Similarly for varnishes, polishes and wood finishes, cleanliness and colour are of great importance. Dust and impurities result in scratched surfaces. The presence of orpiment may apparently improve the colour but is said to have deleterious effect on the varnish film. In recent years dewaxed shellacs have been put on the market and they are specially used when a transparent solution is required.

For electrical goods, while colour is of little importance, freedom from rosin and orpiment is essential because they reduce the insulating properties. Freedom from excessive moisture is another important factor for materials used for insulation purposes. When shellac is applied after heating to a plastic state, uniform " fluidity " is essential, so much so that the larger electrical companies have developed their own " fluidity " tests to meet their special requirements.

(*c*) *Qualities in demand for internal markets.*—The internal demand for lac in India is very limited as compared with exports. Generally, the local consuming industries are comparatively small in size and being mostly primitive in character are not very fastidious in their demand. Nevertheless, certain qualities do find favour for special requirements.

(*i*) *Stick lac.*—By far the largest proportion of stick lac is converted into seedlac which may either be used as such or further worked up into

shellac. Stick lac that gives larger outturn of seedlac of good quality is naturally preferred.

Small quantities of stick lac are used for dyeing goat and sheep skins, and as lac-dye is valued for this purpose, preference is invariably given to *ari* stick lac.

(*ii*) *Seedlac.*—Apart from export requirements, seedlac is mostly converted into shellac. A certain portion, however, is utilised directly in the manufacture of spirit varnishes. For this purpose, preference is given to seedlac with large grains. Small quantities of seedlac are used by gold-smiths also, but for this no special quality is in demand.

(*iii*) *Shellac.*—For the manufacture of gramophone records the buyers in India look for the same quality factors as are demanded by the gramophone record industry in other countries. Fine and superfine grades are reported to be generally used for this purpose in India, although owing to climatic advantages cheaper shellacs are also sometimes used in other countries for gramophone records.

For ordinary varnishes, low grade shellacs such as T. N. are used, while for high grade varnishes, fine and superfine shellacs are needed. Button lac is also largely used for varnish making. For polishing handles of hand fans and similar purposes the very inferior grades are utilised.

Ordinary button lac is used by goldsmiths while in the manufacture of sealing wax, superior shellacs are usually employed. In the wood turning industry, superior qualities are in demand and preference is given to pure shellac on account of its ability to take up colours homogeneously. Inferior types of shellac together with by-products such as *kiri* and *molamma* are used for making bangles.

(2) QUANTITATIVE.

(*a*) *Export trade.*—The quantities exported have already been discussed in Chapter I.

(*b*) *Internal trade.*—The quantities utilised for internal consumption as pointed out in an earlier section are estimated as 100 tons stick lac, 450 tons seedlac and 1,850 tons shellac. The areas of surplus production export the extra quantities, while the deficit tracts supplement the local production with imports to meet their internal demand. This necessitates the movement of lac from one area to another. For purpose of export also, lac has to be transported from the upcountry markets to Calcutta which is the only important shipping centre for lac. The internal trade, therefore, covers both types of movements—the one originating from the demand from various tracts to satisfy their local requirements and the other occasioned by the export to foreign countries. A major portion of the inter-provincial import and export trade takes place directly between the deficit and surplus areas but a part of it is carried on in a circuitous manner. For instance, stick lac from Assam is first sent to Calcutta from where it is re-exported to manufacturing centres in Bihar and the United Provinces and may return to Calcutta for export abroad. Similarly stick lac may be exported from one surplus area to another for purposes of manufacture into seedlac and shellac to be re-exported to deficit areas or to Calcutta for shipment abroad. Apart from the use of bullock carts and pack animals for short distance transport, the major portion of the traffic in lac is carried by rail, which may, therefore, be taken as a fair

index of the movement of lac between various provinces and States. In recent years, however, considerable quantities of shellac and seedlac have moved by motor lorries from the manufacturing centres in Bihar to Calcutta.

The average imports and exports of lac (by rail and river) into and from different provinces and States during the quinquennium ending 1938-39 are given in Appendix 13. It will be seen that Bengal received the largest quantities absorbing as much as nearly 78 per cent.* of the total quantities despatched from the various provinces and States. The largest bulk of the arrivals into Bengal were received at Calcutta in the form of seedlac or shellac, mostly intended for export to foreign countries. It will further be observed that about 75 per cent. of the total receipts in Bengal originated from Bihar and Orissa. Central Provinces and Berar, the United Provinces, and Assam contributed 11 per cent., 9 per cent., and 4 per cent. respectively of the supplies received into Bengal. Thus about 99 per cent. of the quantities received into Bengal were derived from these four provinces.

The United Provinces ranked next to Bengal in respect of arrivals of lac. The offtake of the province, however, amounted to only about 10 per cent. of the total quantities received into the various provinces and States. The lac industry in Mirzapur depends mainly upon these imports but the volume of lac trade in the province has contracted appreciably during recent years. The imports were drawn chiefly from the Central Provinces and Central India besides comparatively small quantities from Bengal, Bombay and Bihar.

The United Provinces were closely followed by Bihar and Orissa with a share of about 9 per cent. in the total quantities received into the various provinces and States. Appreciable quantities of stick lac were received from the adjoining provinces of Bengal and from the Central Provinces for manufacturing purposes.

The quantities received by other provinces and States were comparatively insignificant.

As regards the quantities despatched from the various provinces and States, Bihar and Orissa easily took the first place, being responsible for as much as 59 per cent. of the total quantities despatched from the various provinces and States. The despatches from Bihar and Orissa were mainly directed to Bengal, the other destinations being of negligible importance.

The Central Provinces and Berar ranked next with a contribution of about 19 per cent. Here again the main destination was Bengal which absorbed about 45 per cent. of the despatches from the Central Provinces. The United Provinces took another 27 per cent. while Bihar and Orissa accounted for about a further 23 per cent., so that about 95 per cent. of the despatches from the Central Provinces were directed to the three provinces of Bengal, the United Provinces and Bihar.

The United Provinces came third in respect of despatches of lac, accounting for about 8 per cent. of the total despatches from all the provinces and States. The main destination for lac despatched from the

*The percentages given in this section should be regarded as approximate only as they are calculated only on the basis of traffic moving by railways and do not take into account the quantities handled by motor lorries.

United Provinces was Bengal which absorbed as much as 86 per cent. of the quantities despatched.

Although Bengal is overwhelmingly an importing province, yet it contributed about 6 per cent. of the total despatches. As already stated, some stick lac leaves Bengal for the manufacturing centres in the adjacent provinces of Bihar and the United Provinces. The bulk of stick lac from Assam was, in the absence of any manufacturing centres in the province, despatched to Calcutta from where a portion was sent out to the manufacturing centres in the United Provinces and Bihar.

Stick lac produced in Central India found its way to the United Provinces, Bengal and the Central Provinces for manufacturing purposes. The six tracts mentioned above accounted for as much as about 98 per cent. of the total inter-provincial despatches, other territories being of little significance.

Briefly speaking, the main feature of the inter-provincial movement of lac during the period 1934-35 to 1938-39 was that Bengal was the chief importer from other areas while Bihar and the Central Provinces were the most important exporters to other areas. The bulk of arrivals from other areas into Bengal, being for export abroad, it is obvious, that the internal movement of lac in India was influenced by the export demand, although the local production in the various tracts also had a bearing on the movement of the crop.

(3) SEASONAL VARIATIONS IN DEMAND.

The periodicity of exports has already been discussed in Chapter I. As regards the internal consumption, enquiries show that demand for stick lac for dyeing of skins is practically *nil* during the rainy season, as the operations cannot be carried out in such a weather. Similarly, seedlac and shellac are in less demand during rainy weather for varnish and polish. For bangle making, more lac is reported to be utilised in winter than in any other season. As the wood turning industry is said to be more brisk in winter than in summer, demand for shellac for this purpose is affected accordingly. The demand from goldsmiths is active on the occasion of marriages, which, though solemnised throughout the year, are more common from April to the middle of June and from December to February.

(4) DEMAND FOR BY-PRODUCTS (*kiri, passewa, molamma*).

(*a*) *For export.*—The by-products mentioned above contain some lac resin in their composition and being cheap were in demand in certain foreign countries, particularly Germany, where they were utilized in various industries. They are shipped under the name of "Lac refuse" or "Other kinds of lac" and no separate statistics regarding the exports of each are available. Enquiries, however, show that the bulk of "Lac refuse" consisted of *kiri*, the export of *passewa* and *molamma* being negligible.

(*b*) *For internal market.*—In India, *kiri* is largely used for bangle-making. Small quantities are utilised by carpenters for filling up cracks and crevices in wooden articles. *Molamma* and *passewa* are utilised along with seedlac for the manufacture of shellac, especially of inferior qualities.

C.—Lac in relation to synthetic resins.*

Lac is an invaluable ingredient of French polish, gramophone records, nitrocellulose lacquers, sealing-waxes, etc. Due to its marked electrical insulating property, it also finds a limited application in the electrical industry, the chief limiting factor being its low resistance to heat. It is also used to a certain extent in the manufacture of hats, grinding wheels, leather finishes, playing cards, etc. As a resin, it is unequalled in its versatility although for a few specific applications there are synthetic resins which surpass it in performance.

In the wood-finishing industry, shellac is used for floors, furniture and small wood articles, as a sealer coat, as a brushing varnish and as a rubbing varnish or French Polish. Nitrocellulose lacquers are costlier and have not interfered seriously with the use of shellac in this field. Recent experiments in America have shown that shellac is the most durable wood finishing material.

Shellac gramophone records possess a more durable surface and give a better reproduction of sound than most of the synthetic resin records, although some of the latter are very much less brittle. The competition from such synthetic resins is not likely to be keen unless the price of shellac goes up to more than Rs. 50 per maund under normal conditions.

Shellac is often used in the formulation of nitrocellulose lacquers and its competitors in this field are other natural resins like kauri, dammar, etc., and also a few synthetic resins.

Although the manufacture of sealing-waxes absorbs only an inconsiderable amount of lac, there are no synthetic resins that can be substituted for it.

In the sphere of electrical insulation, the chief uses of lac are in the manufacture of varnishes, micanite, laminated paper boards and tubes of special types of moulded insulators. Synthetic resins of the bakelite type are fast replacing shellac in all these fields excepting in the manufacture of micanite as bakelite has poor adhesion on mica. Glyptal resins, are, however, replacing shellac in the manufacture of micanite. Shellac is still used in preference to synthetics in some of the above applications when resistance to ' tracking ' is necessary. Tracking is the breakdown of the insulating property in the carbonaceous track resulting from occasional sparking or arcing. If shellac could be modified to give more heat-resistant moulded articles, it can not only recover its lost ground but can actually capture some of the markets opened up by synthetic resin moulded articles.

The Indian Lac Research Institute has developed such a modification and a considerable expansion of the market for shellac in the plastics and electrical insulation spheres may be expected in course of time. Electric switches moulded from such shellac compositions stand up to Indian Stores Department Specifications.

In the minor industries it can maintain its own against synthetics solely on a price basis, as the latter are available for every application but are usually much costlier.

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*Note received from Dr. H. K. Sen, Director, Indian Lac Research Institute.

Lac can be replaced by synthetic resins only if the latter are cheaper but past experience shows that in the face of competition, the price of lac can be brought down to an exceedingly low level—say Rs. 12 to Rs. 15 per maund until the threat of synthetic resins again passes over. The lower the ruling prices of lac, the greater would be its consumption, despite the existence of synthetic resins. Synthetic resins are generally used in industrial products in which shellac, in its chemically unmodified form cannot be used. The chief characteristics of synthetic resins where they differ from shellac are transparency, toughness and heat-resistance, and there are special resins which excel in each or all these qualities.

The most important synthetic resins are phenolic resins, urea resins, alkyd resins, cellulose nitrate, cellulose acetate, acrylates, styrol resins and vinyl resins. The total world production of synthetic resins is estimated at 120,000—160,000 tons per annum. Detailed figures of production are available only for U. S. A. and are as follows for the year 1939.

	Production.	Unit value cents/lb.
	Tons.	
Phenolic resins (As cast resins and moulding powders) ..	29,572	13 to 38
Alkyd resins	34,148	19 to 21
Urea resins (As moulding powders)	7,397	36
Cellulose nitrate (sheets, rods, etc.)	5,970	80
Cellulose acetate (sheets, rods, etc.)	9,507	80
Others	8,507	..
Total for all resins	95,101	24

All the synthetic resins mentioned above are mostly used for plastic moulding, except alkyd resins which are chiefly used in baking enamels and adhesives.

Styrol, acrylate and vinyl resins are very costly synthetic resins used only for special purposes where high transparency and toughness are required. There are many other synthetic resins which have not yet found wide application.

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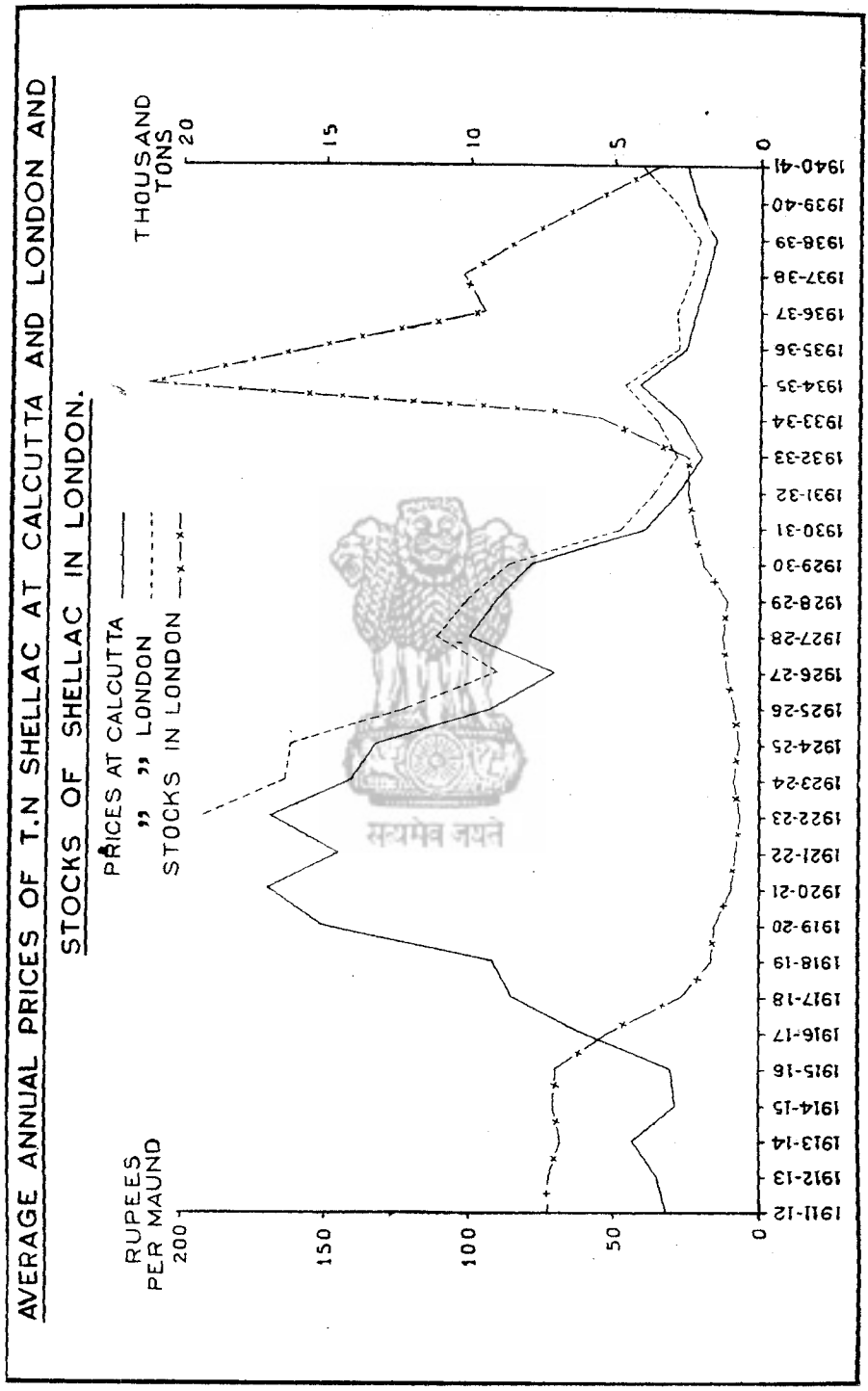
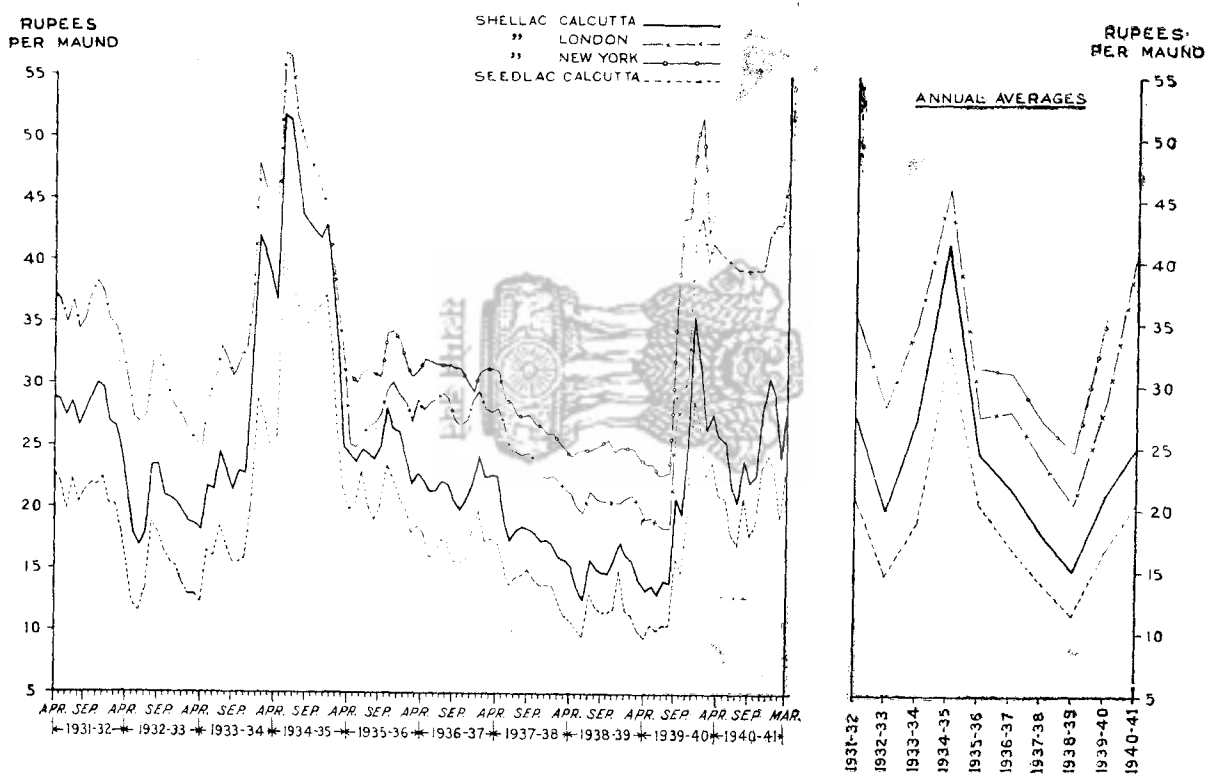


AVERAGE MONTHLY PRICES OF T.N SHELLAC AT CALCUTTA, LONDON AND NEW YORK AND OF SEEDLAC AT CALCUTTA.



CHAPTER IV.—PRICES.

A.—Comparison of Indian and world prices.

The prices of T. N. shellac at Calcutta provide an index of Indian values while those at London and New York indicate the price levels in the lac consuming countries of the world. The average annual prices of T. N. shellac at Calcutta and London, based on data given in Appendices 14 and 15, together with the average annual stocks at London given in Appendix 23 are illustrated on the diagram facing page 50. It should be noted that although the quotations at Calcutta and London are both for T. N. shellac, they do not represent the same quality. The Calcutta quotations are for pure T. N. quality while those at London are for T. N. with 3 per cent. rosin. The London prices have been converted into Indian currency to facilitate comparison.

It will be seen from the diagram that the Calcutta prices generally moved parallel to and in sympathy with London prices up to 1933-34, but as a result of an attempted corner by a syndicate in the London shellac market in 1934, the stocks at London rose to a very high level in 1934-35 and the normal relationship between Calcutta and London markets was not maintained in 1934-35 and 1935-36. During this period, the difference between the London and Calcutta prices narrowed down, so much so that it did not always cover the freight and other charges involved in the movement of the commodity from Calcutta to London which it normally does. This anomaly disappeared by 1936-37, after which the normal relationship between London and Calcutta prices is seen once again.

The prices, both at Calcutta and London declined almost continuously since 1922-23 except for a slight recovery in 1927-28 and 1934-35. A crash in prices followed the failure of the London syndicate and the prices remained at a very low level in subsequent years. It was only after the outbreak of hostilities in Europe in 1939 that shellac prices again showed an upward trend. The extent of fall in the prices at London and Calcutta from 1928-29 will be seen from the following table.

Average annual prices of T. N. Shellac at Calcutta and London.
(Per maund.)

Year.	Calcutta average annual price.	Percentage of 1928-29 price.	London average annual price.	Percentage of 1928-29 price.
	Rs. A.		Rs. A.	
1928-29	91 7	100	100 15	100
1929-30	78 12	86	85 12	85
1930-31	38 15	43	47 6	47
1931-32	27 13	30	35 13	35
1932-33	19 14	22	28 5	28
1933-34	27 3	30	34 15	35
1934-35	41 7	45	46 1	46
1935-36	24 8	27	27 7	27
1936-37	21 12	24	28 1	28
1937-38	17 15	20	23 15	24
1938-39	15 0	16	20 9	20
1939-40	21 3	23	28 13	29
1940-41	25 2	27	41 0	41

The stocks at London, on the other hand progressively increased from 1928-29 till 1934-35, when as a result of the operations of the Syndicate already referred to huge stocks accumulated in London in 1934-35. In subsequent years the stocks tended to decrease and by 1940-41 they had come down below the level of stocks in 1933-34. The stocks at London appear to have affected the course of prices at London and Calcutta, as will be clearly seen from the diagram facing page 50, already referred to.

The course of monthly prices at Calcutta and London from 1931-32 to 1939-40 and at New York from 1935-36 to 1938-39 (see Appendix 16) may be seen on the diagram facing page 51, from which it will be apparent that although the prices at the three centres generally had the same trend, the margin between them constantly changed from month to month indicating that the prices at the three markets did not consistently move in close harmony. This may be due to one or more factors such as speculation, stocks, shipping facilities, demand for seedlac, etc., independently affecting the prices at one or other of the markets. The following table shows the extent of variation in the difference between the average monthly prices at Calcutta and London.

Difference between the average monthly prices of T. N. shellac at London and Calcutta.

(Per maund).

Year.	Excess of average annual price at London over average annual price at Calcutta.	Minimum difference between average monthly prices at London and Calcutta in any month.	Maximum difference between average monthly prices at London and Calcutta in any month.
	Rs. A. P.	Rs. A. P.	Rs. A. P.
1931-32	8 0 0	7 8 0 (Sep.)	8 6 0 (Oct.)
1932-33	8 7 0	6 8 0 (Mar.)	9 15 0 (June)
1933-34	7 12 0	5 3 0 (Feb.)	10 2 0 (Nov.)
1934-35	4 10 0	1 3 0 (Dec.)	8 10 0 (April)
1935-36	2 15 0	0 14 0 (April)	5 15 0 (March)
1936-37		5 2 0 (Jan.)	7 6 0 (June)
1937-38	6 0 0	5 0 0 (Dec.)	7 6 0 (May)
1938-39	5 9 0	3 3 0 (Dec.)	7 0 0 (June)
939-40	7 10 0	4 4 0 (July)	13 12 0 (March)
1940-41	15 14 0	11 5 0 (Dec.)	19 0 0 (Feb.)

B.—Prices at Calcutta

(1) Trend.

The trend of prices at Calcutta already briefly referred to in the preceding section is indicated by the prices of T. N. shellac at Calcutta during the last 30 years given in Appendix 14 and illustrated in the diagram facing page 50. It will be seen that the prices of shellac after having ruled at over Rs. 40 per maund between February 1913 and January 1914 began to take a downward course which continued till the outbreak of 1914—18 War, when the prices ruled about Rs. 25 per maund. The dislocation of trade consequent to the outbreak of War brought about a pronounced effect on shellac prices only towards the end of 1915 when the prices began to rise and the average for 1916-17 rose to over Rs. 60 per maund. The upward tendency continued in the immediate post-war period till a peak was reached in 1920-21, when the price of T. N. shellac averaged about Rs. 170 per maund. The prices depreciated in 1921-22 but recovered again in 1922-23, after which the fall continued upto 1926-27 when the prices averaged Rs. 71 per maund. There was some recovery in 1927-28, after which the prices again declined continuously so much so that the average for 1932-33 worked out to less than Rs. 20 per maund. In 1934, an attempt was made in London to corner the shellac market by the formation of a pool. As a result of this, prices mounted up and averaged Rs. 41-7-0 per maund in 1934-35. The attempted corner, however, failed in 1935 and the prices sank to an average of Rs. 24-8-0 in 1935-36. The decline continued in subsequent years and the lowest average of Rs. 15-0-0 per maund was reached in 1938-39. During 1939-40, the prices recorded a further fall in the beginning but with the outbreak of hostilities in Europe in September 1939, they started to improve. The rise was, however, short-lived and the prices after reaching an average of Rs. 35-8-0 in December 1939 began to recede and came down to an average of Rs. 27-10-0 per maund in March 1940. The annual average for 1939-40 worked out to Rs. 21-3-0. The prices declined in the earlier months of 1940-41, the average for July 1940 being Rs. 20-8-0 per maund only. There was some improvement in the price during subsequent months and the average for December 1940 rose to Rs. 30-10-0 per maund. This improvement was, however, largely as a result of speculative activity and was not maintained in subsequent months so that the average for 1940-41 worked out to Rs. 25-2-0 per maund. The trend of prices in recent years may, therefore, be summarised in short as a continuous fall from 1934-35 to 1938-39 with some recovery in subsequent years.

(2) Relation between shellac and seedlac prices.

The average monthly prices of *Baisakhi* seedlac at Calcutta are given in Appendix 18 and illustrated on the diagram facing page 51 along with those of T. N. shellac discussed in a previous section. It will be seen that the prices of seedlac generally followed the shellac prices and had a similar trend but a closer comparison of the prices of shellac and seedlac shows that the prices of shellac and seedlac were at times out of parity. For instance, the difference between the average monthly prices of T. N. shellac and *Baisakhi* seedlac between 1929-30 and 1940-41

varied from as little as Rs. 1-14-0 per maund in June 1935 to as much as Rs. 15-7-0 per maund in October 1929. The general relationship between the prices of seedlac and shellac will be clearly seen from the table below :—

Average annual prices of T. N. shellac and Baisakhi seedlac at Calcutta.

(Per maund.)

Year.	Average annual prices of T. N. Shellac.	Average annual prices of Baisakhi seedlac.	Difference—T. N. Shellac over Baisakhi seedlac.	Prices of Baisakhi seedlac expressed as percentages of shellac prices.
	Rs. A.	Rs. A.	Rs. A.	
1929-30	78 12	66 3	12 9	84·0
1930-31	38 15	30 3	8 12	77·5
1931-32	27 13	21 1	6 12	75·7
1932-33	19 14	14 10	5 4	73·6
1933-34	27 3	19 0	8 3	69·9
1934-35	41 7	33 6	8 1	80·5
1935-36	24 8	20 6	4 2	83·2
1936-37	21 12	17 0	4 12	78·2
1937-38	17 15	14 1	3 14	78·4
1938-39	15 0	11 8	3 8	76·7
1939-40	21 3	16 14	4 5	79·6
1940-41	25 2	20 10	4 8	82·1

(3) VARIATIONS DUE TO QUALITY.

(*a*) *Shellac.*—The prices of different grades and qualities of shellac vary considerably. The average monthly wholesale prices of five grades of shellac at Calcutta from 1931-32 to 1939-40 are given in Appendix 17 from which the annual average prices of the different grades are summarised in the following table. The course of prices of three of the grades are also illustrated on the diagram facing this page. It will be seen that the prices of different grades generally had a similar trend but the margins between the prices of different grades varied from time to time.

Average annual prices of various grades of shellac at Calcutta.

(Per maund).

Year.	I. T. N.	T. N.	Standard I.	Fine.	Superfine.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1931-32	26 3 0	27 13 0	28 13 0	29 10 0	32 7 0
1932-33	18 4 0	19 14 0	20 12 0	21 14 0	24 2 0
1933-34	24 15 0	27 3 0	27 12 0	28 6 0	30 15 0
1934-35	37 8 0	41 7 0	43 8 0	45 2 0	49 2 0
1935-36	22 12 0	24 8 0	26 3 0	27 0 0	29 6 0
1936-37	20 15 0	21 12 0	22 4 0	22 13 0	24 3 0
1937-38	17 3 0	17 15 0	18 13 0	19 10 0	21 9 0
1938-39	14 1 0	15 0 0	15 14 0	16 8 0	17 4 0
1939-40	19 13 0	21 3 0	23 1 0	24 5 0	26 0 0
Average ..	22 6 5	24 1 2	25 3 7	26 2 3	28 5 4

The premium which T. N. obtained over I. T. N. varied from an average of Re. 0-12-0 per maund in 1937-38 to Rs. 3-15-0 per maund in 1934-35 the average for the nine years working out to Rs. 1-10-9 per maund. The variations in the premium obtained in different months were much wider being as low as Re. 0-5-0 per maund in September 1937 and Rs. 4-15-0 per maund in February 1934.

Standard I, which is superior to T. N. fetched a premium as low as Re. 0-1-0 per maund in September 1932 and as high as Rs. 4-7-0 per maund in March 1935. The premiums obtained in different years varied from Re. 0-8-0 per maund in 1936-37 to Rs. 2-1-0 per maund in 1934-35. The average for the nine years worked out to Rs. 1-2-5 per maund.

The difference between the prices of "Fine" and "Standard I" during the nine-year period averaged only Re. 0-14-8 per maund, having varied from Re. 0-9-0 per maund in 1936-37 to Rs. 1-10-0 per maund in 1934-35. The maximum and minimum premiums obtained in any month during this period respectively amounted to Rs. 3-14-0 per maund in March 1935 and Re. 0-4-0 per maund in August 1933.

The difference between the prices of "Superfine" and "Fine" during the same period averaged Rs. 2-3-1 per maund, the average annual premiums having fluctuated from Re. 0-12-0 per maund in 1938-39 to Rs. 4-0-0 per maund in 1934-35. The maximum difference of Rs. 6-3-0 per maund occurred in July 1934 and the minimum of Re. 0-6-0 per maund in May 1939. It may be stated, therefore, that the prices of different grades of shellac even at an important terminal market like Calcutta

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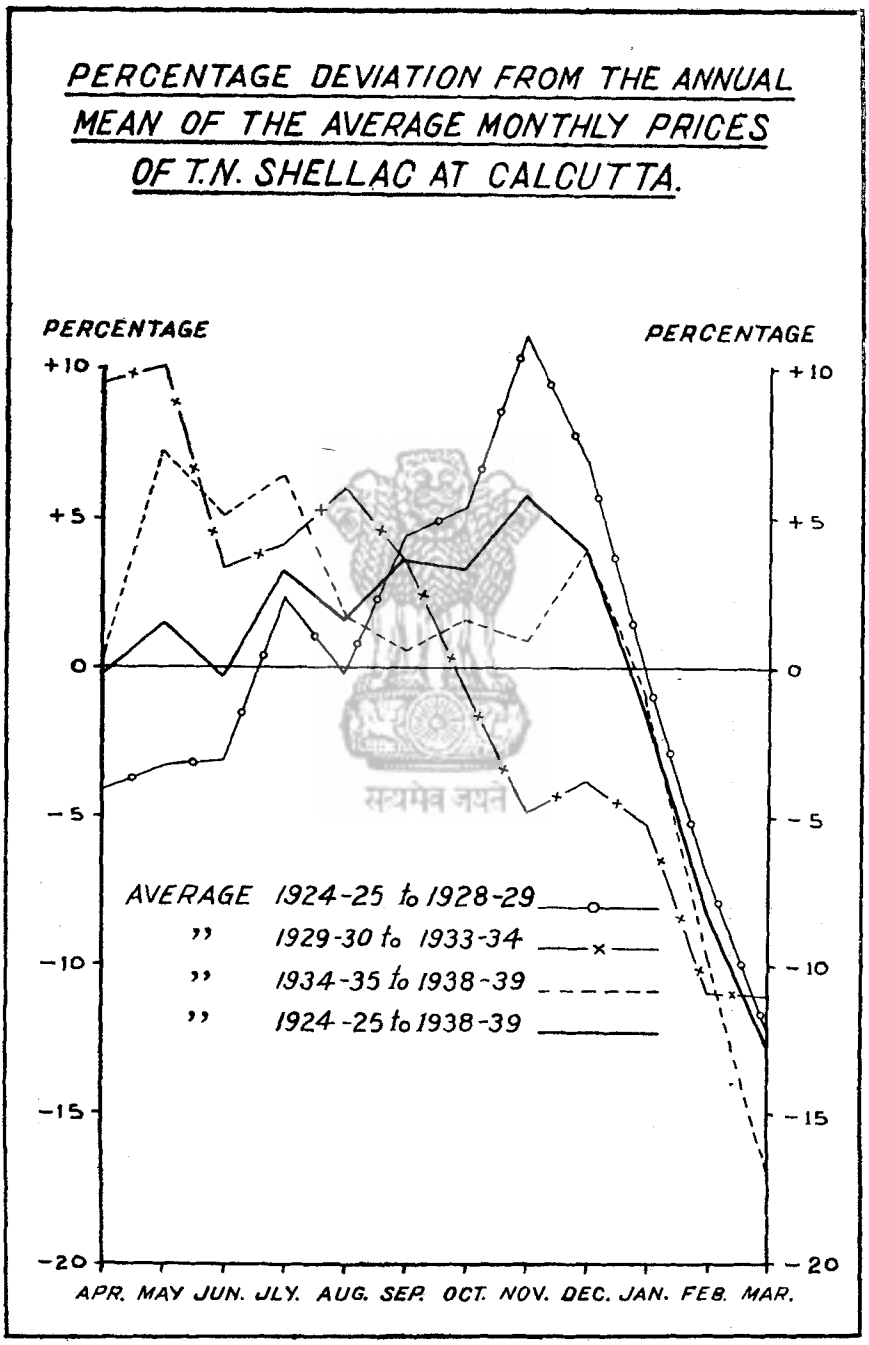


did not always move in consonance with their respective quality and were influenced by other factors such as demand for and stocks of particular grades.

(*b*) *Seedlac.*—The prices of seedlac also vary according to type and quality. *Kusmi* seedlac generally fetches a premium over *Baisakhi* seedlac. The different grades of *Baisakhi* seedlac in turn command a premium over one another in the order Golden *Baisakhi,* Fine *Baisakhi* and Ordinary *Baisakhi.* The differences between the prices of various grades, however, vary from time to time as will be seen from a few instances of quotations for different grades on certain dates given in the table below :—

Prices of different grades of seedlac.
(Per maund).

Date.	Kusmi No. 1.	Kusmi No. 2.	Fine Baisakhi.	Ordinary Baisakhi.	Difference Kusmi No. 1 over ordinary Baisakhi.	Difference Kusmi No. 2 over ordinary Baisakhi.	Difference Fine Baisakhi over ordinary Baisakhi.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
13-6-32	17 0 0	15 12 0	..	11 0 0	6 0 0	4 12 0	..
2-8-32	21 0 0	..	..	15 0 0	6 0 0	..	..
9-9-32	24 0 0	22 0 0	..	20 0 0	4 0 0	2 0 0	..
16-9-32	..	21 0 0	..	18 0 0	..	3 0 0	..
24-3-33	..	16 8 0	..	13 8 0	..	3 0 0	..
7-10-33	..	18 8 0	..	16 0 0	..	2 8 0	..
30-10-36	..	16 0 0	..	15 8 0	..	0 8 0	..
21-11-36	..	17 0 0	..	16 0 0	..	1 0 0	..
30-1-37	..	19 0 0	..	17 0 0	..	2 0 0	..
23-6-37	..	16 8 0	..	13 0 0	..	3 8 0	..
31-1-38	..	15 8 0	..	12 8 0	..	3 0 0	..
7-3-38	..	15 8 0	..	11 12 0	..	3 12 0	..
17-1-41	..	..	26 8 0	23 12 0	..	..	2 12 0
6-2-41	..	..	23 0 0	20 8 0	..	..	2 8 0
14-5-41	..	28 0 0	26 0 0	24 0 0	..	4 0 0	2 0 0
11-6-41	..	..	36 8 0	32 8 0	..	..	4 0 0
19-6-41	..	46 0 0	44 0 0	41 0 0	..	5 0 0	3 0 0
22-7-41	..	53 0 0	48 0 0	46 0 0	..	7 0 0	2 0 0

It will be seen that in the 14 quotations taken on stray dates given above, the difference between the prices of *Kusmi* No. 2 and Ordinary *Baisakhi* seedlac varied from as little as Re. 0-8-0 to as much as Rs. 7 per maund. The difference between the price of *Kusmi* No. 1 and Ordinary *Baisakhi* was Rs. 4 per maund in one case and Rs. 6 per maund in the other two. Similarly, the difference between the prices of Fine *Baisakhi* and Ordinary *Baiskhi* in the 6 quotations given above varied from Rs. 2 to Rs. 4 per maund. Another feature about the relative prices of different grades of seedlac brought out by the quotations given above is that the differences did not always rise or fall with the rise or fall in values. For instance, the difference between the price of *Kusmi* No. 2 and Ordinary *Baisakhi* was Rs. 3 per maund on 24th March 1933, when the price of Ordinary *Baisakhi* seedlac was Rs. 13-8-0 per maund while on 7th October 1933, when the price of ordinary *Baisakhi* seedlac was Rs. 16, the difference between *Kusmi* No. 2 and Ordinary *Baisakhi* seedlac was Rs. 2-8-0 per maund only.

(4) Seasonal variations.

(*a*) *Shellac.*—The seasonal variations in the prices of shellac at Calcutta will be clearly seen from the diagram facing page 55, which shows the percentage deviation of the average monthly prices of T. N. shellac from the annual mean during three different quinquennia, *viz.*, 1924-25 to 1928-29, 1929-30 to 1933-34 and 1934-35 to 1938-39 as well as the fifteen-year period 1924-25 to 1938-39. It will be at once apparent that the position during different periods was not altogether similar, except one common feature of a downward trend from December to March.

During the five-year period ending 1928-29, prices remained below the annual mean in April, May and June. They rose in July being higher than the annual mean by about 2 per cent. After a slight dip in August, the prices showed a continuous rise upto November when they stood higher than the annual mean by over 11 per cent. Thenceforward the prices receded and reached the lowest level in March when they were lower than the annual mean by 12 per cent. The range of fluctuation between November and March, therefore, amounted to 23 per cent.

During the next quinquennium (1929-30 to 1933-34), the prices from April to September were higher than the annual mean, the highest level having been attained in May when the prices were higher than the annual mean by 10 per cent. From October onwards the prices fell continuously (with the exception of a slight recovery in December) and as in the preceding quinquennium touched the lowest point in March when they were lower than the annual mean by 11 per cent. The maximum range of fluctuation in prices during this period was 21 per cent.

During the period 1934-35 to 1938-39 prices ruled above the annual mean from April upto December the highest point being attained in May when the prices were higher than the annual mean by over 7 per cent. In subsequent months the prices, registered a heavy fall, the lowest limit being reached in March as in the case of the preceding two quinquennia. The maximum range of fluctuation amounted to 24 per cent. between May and March.

Considering the entire fifteen-year period, the prices were slightly below the annual mean in April after which, with the exception of June (when they were again below the annual mean) the prices remained over the annual mean upto December, rising and falling in alternate months. The highest point was reached in November when the prices were nearly 6 per cent. higher than the annual mean. From December onwards, there was a continuous fall, the lowest point being reached in March when the prices were lower than the annual mean by nearly 12 per cent. The maximum fluctuation, between November and March, amounted to over 18 per cent. A number of factors appear to be responsible for bringing about this dissimilarity in position over different periods.

The level of prices in different years varied very considerably. The fluctuations during 1934 and 1935 were influenced by the operations of the Syndicate and cannot be considered as normal. The course of prices was affected at times by speculative activity. The shipping position from time to time and the stocks in consuming countries influenced the prices. Again unlike most other agricultural commodities, four crops arrive on the market in a year and the relative production of these four crops varied in different years.

(*b*) *Seedlac.*—The percentage deviations of the average monthly prices from the annual mean during two quinquennia, *viz.*, 1929-30 to 1933-34 and 1934-35 to 1938-39 are illustrated in the diagram facing this page.

It will be seen that during both the quinquennia 1929-30 to 1933-34 and 1934-35 to 1938-39, the seasonal variations in seedlac prices were strikingly similar to those shown by shellac prices during the corresponding periods. The main points of difference were that during the quinquennium ending 1933-34 the lowest point in seedlac prices was reached in February instead of March in the case of shellac. The maximum fluctuation between May and February was nearly 29 per cent. as against 21 per cent. between May and March in the case of shellac. During the period 1934-35|1938-39 the highest prices for seedlac, were recorded in December when they stood about 9 per cent. over the annual mean. The lowest level was, however, reached as in the case of shellac in March after a precipitous fall in February and March. The maximum variation amounting to 27 per cent. occurred in a period of four months from December to March.

It may be stated, therefore, that seedlac experienced greater seasonal fluctuations in prices than shellac. This appears to be due to the fact that the keeping qualities of seedlac are poorer than those of shellac and on account of the difference in the nature of process adopted for manufacturing seedlac and shellac, the production of seedlac from a particular factory is subject to greater variation than shellac.

C.—Prices in other markets.

(1) Relation between prices in markets in producing areas and Calcutta.

The monthly wholesale prices of *Baisakhi* stick lac at Jhalda and Daltonganj and of T. N. shellac at Mirzapur are given in Appendices 19 and 20 respectively and illustrated along with T. N. prices at Calcutta in the diagram facing page 59. It will be seen that the shellac prices at Mirzapur usually followed the Calcutta prices. It was only

once in June 1938 that the average monthly price at Mirzapur worked higher than that at Calcutta. The stick lac prices at Jhalda and Daltonganj showed a similarity of movement with the Calcutta shellac quotations but not to the same extent as exhibited by the Mirzapur shellac prices. This is explained by the fact that shellac prices referred to T. N. quality both at Calcutta and Mirzapur while the stick lac quotations did not relate to any strictly constant or comparable quality.

(2) SEASONAL VARIATIONS IN STICK LAC PRICES.

The seasonal variations in the prices of stick lac at Jhalda, Daltonganj and Mirzapur during three years 1936-37 to 1938-39 are illustrated in the diagram facing page 60. It will be seen that the prices at Jhalda showed a pronounced harvest dip in June, being about 13 per cent. below the annual mean. They remained over the annual mean from July to September and again from November to January, the highest point being reached in the last mentioned month. The range of variation between June and January was as much as 26 per cent.

At Daltonganj, the prices showed a downward course from April to June, after which they rose and remained over the annual mean from July to October. November and December showed a fall in values and although there was some improvement in January the prices remained below the annual mean up to March. At Mirzapur also, the prices showed a downward trend from April to June and a subsequent rise in July. The prices declined further from August to October after which there was a rise, the highest point being reached in January.

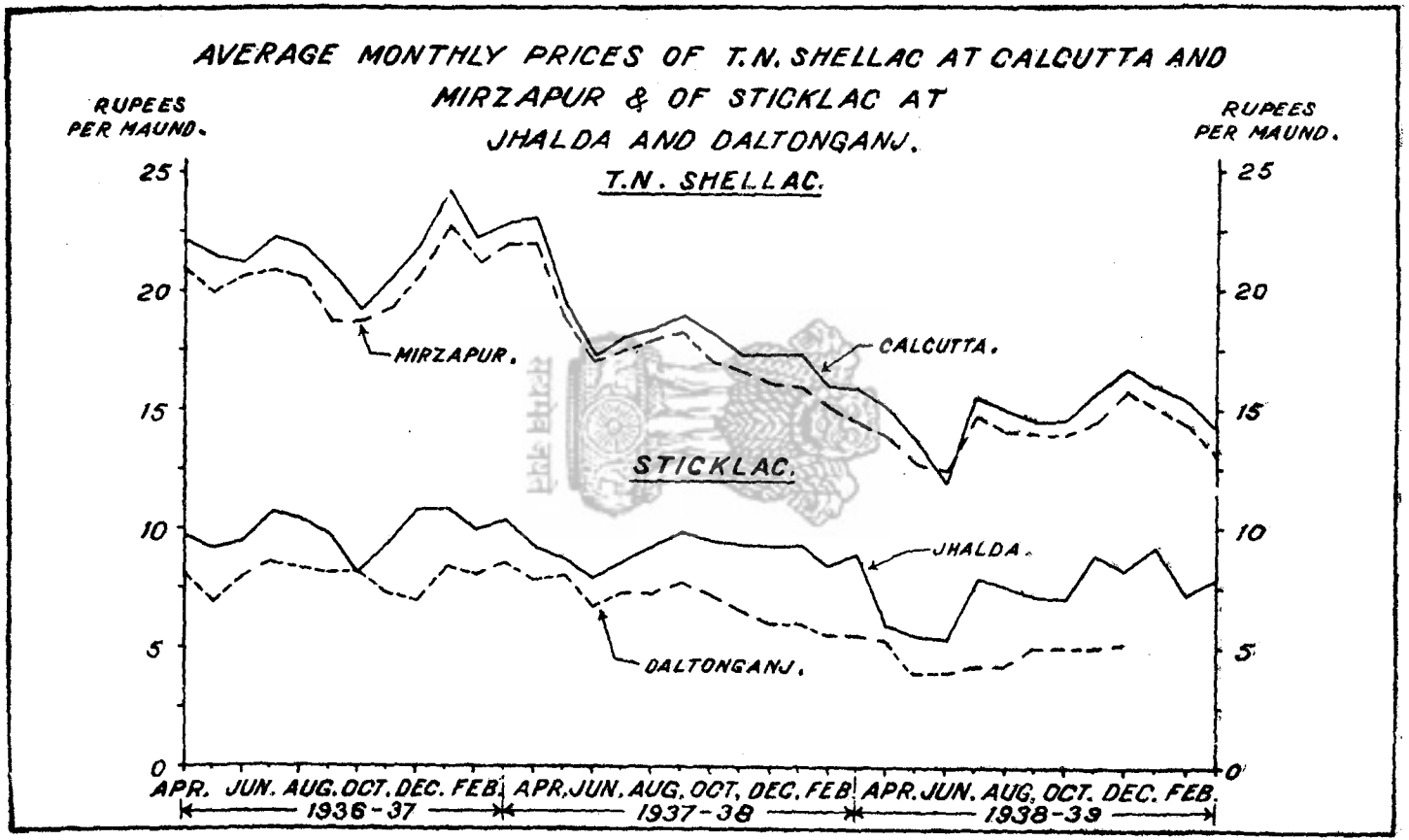
It may be said, therefore, that generally speaking the prices of stick lac sag appreciably with the arrival of crops, particularly the *Baisakhi* crop.

(3) VARIATIONS IN STICK LAC PRICES DUE TO QUALITY.

It has already been stated that the season of collection and the type of host exercise a good deal of influence on the quality of stick lac and that *Kusmi, Baisakhi* and *Katki* crops rank in descending order in respect of quality.

The prices fetched by these lacs also vary accordingly, as the following comparative figures obtained from a factory will indicate :—

Months.	Price per maund of stick lac.		
	Kusmi.	Baisakhi.	Katki.
	Rs. A. P.	Rs. A. P.	Rs. A. P.
December 1938	11 2 7	9 6 9	6 9 6
January 1939	9 13 1	9 0 2	6 13 0
February 1939	10 3 7	7 5 11	6 8 9
Average	10 6 5	8 9 7	6 10 5



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It will be seen from the figures given above that taking an average of the three quotations, *Kusmi* crop fetched a premium of about Rs. 1-13-0 per maund over the *Baisakhi* crop, while *Baisakhi* crop claimed a premium of nearly Rs. 2 per maund over the *Katki* crop. These premia, of course, vary from time to time.

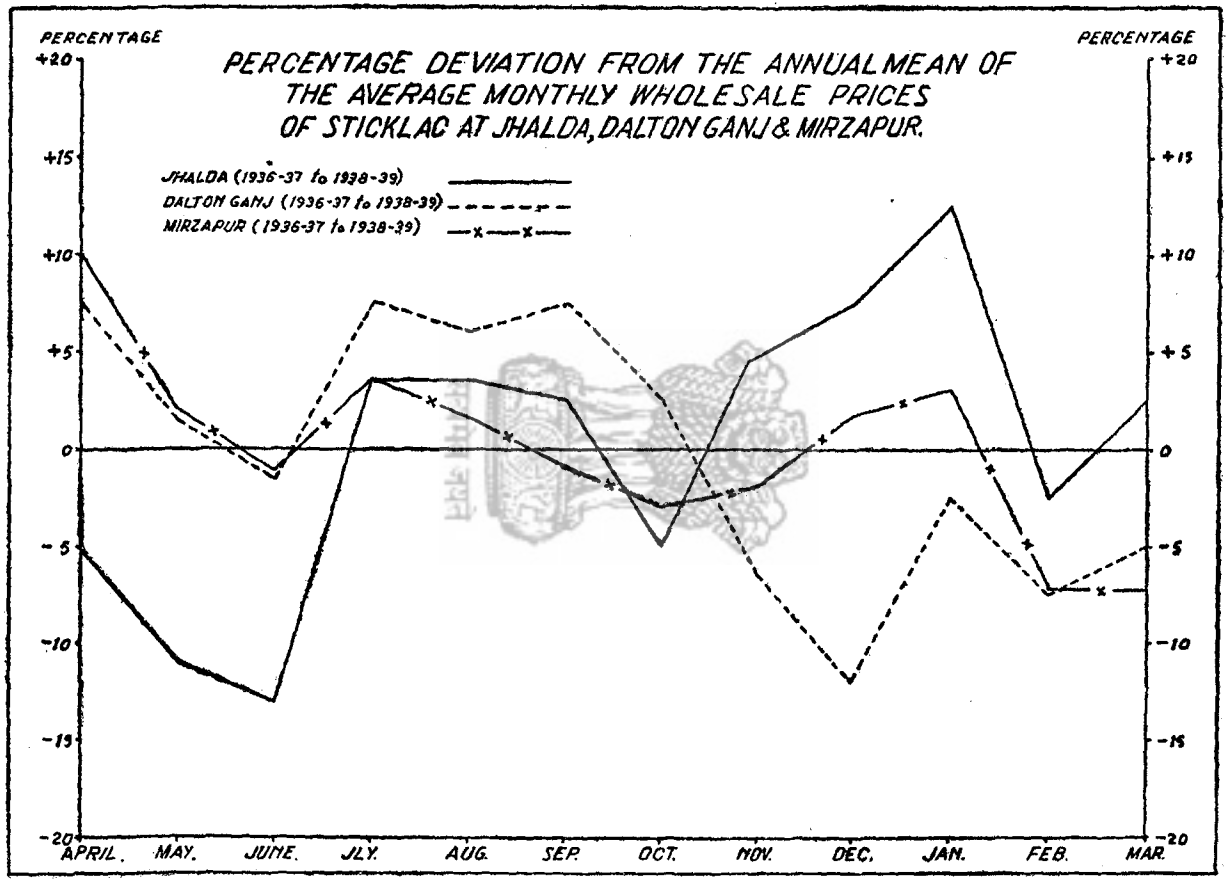
The price of each type of stick lac further varies according to the yield and quality of seedlac that is likely to be obtained from it. The following figures of prices paid for different lots of *Baisakhi* stick lac on a date in April 1938 by a factory owner in Bihar will give some idea about such variations in prices :—

Date.	Type.	Yield of seed-lac obtained.	Price paid per maund.
	Lot.	Per cent.	Rs. A. P.
1st April, 1938	1	40·0	4 0 0
	2	52·5	5 10 0
	3	56·3	6 4 0
	4	60·0	6 12 0

Kusmi stick lac fetches the highest price. Stick lac from *Ber* trees is reported to sell at a premium of about 8 annas to 10 annas per maund over that produced from *Palas* in Bihar. More than this, the quality of stick lac obtained from the same type of host tree during the same season may vary from one consignment to another and consequently there may be a fairly wide difference in the prices of these various lots. As an illustration, particulars of actual purchases of *Katki-Ber* lac made by a factory owner in Bihar on a single day in December 1937 are given below :—

——	Quantity purchased.	Rate per maund.
	Md. Sr.	Rs. A. P.
Lot 1	1 24	7 2 0
„ 2	0 20	6 4 0
„ 3	0 30	6 0 0
„ 4	2 20	5 0 0

A clean, dry consignment fetches a better price than a dirty moist one. Similarly, *ari* lac generally sells at a discount as compared with *phunki* lac. The figures given in the table on the next page will further indicate the extent of variations in prices due to differences in quality.



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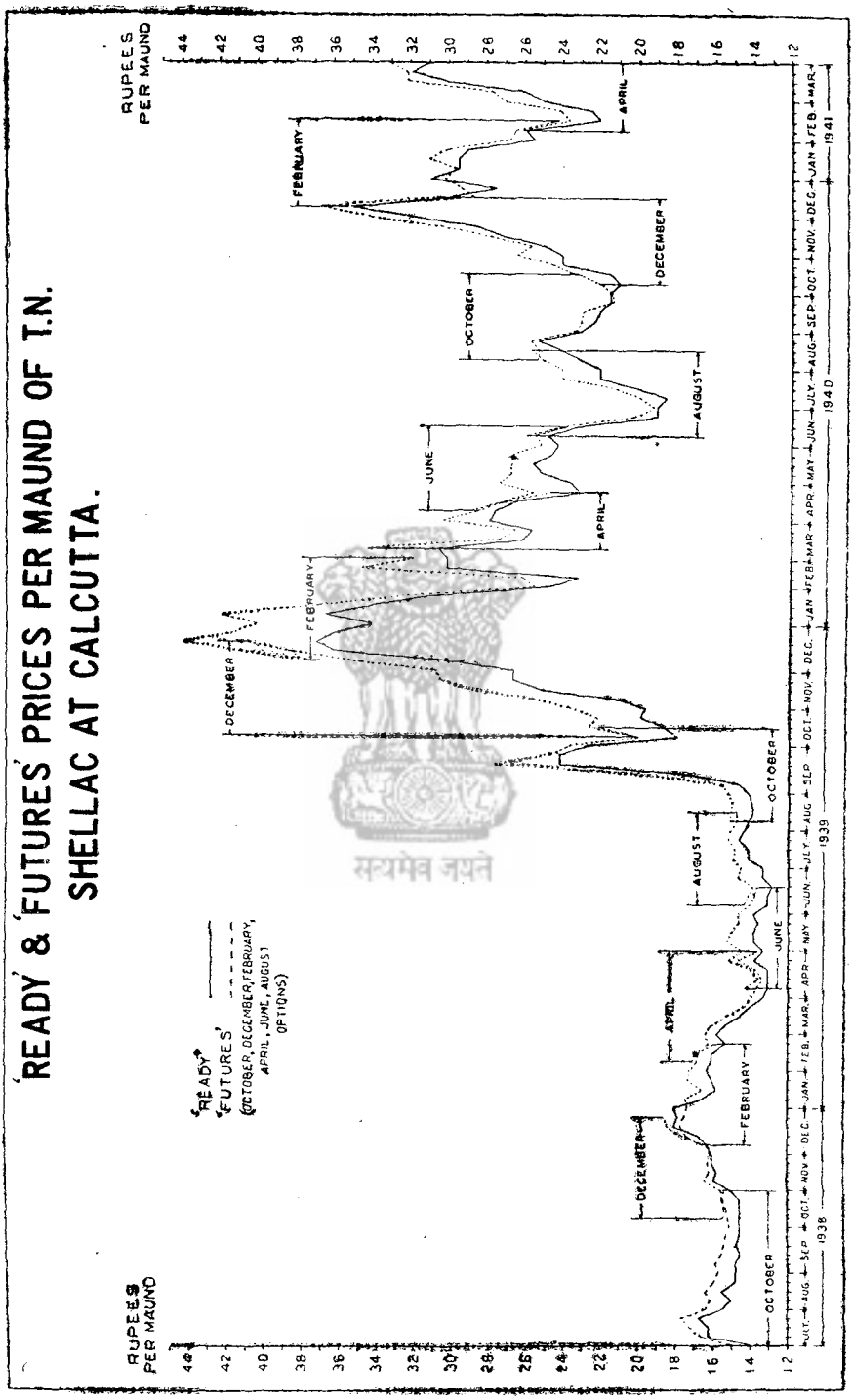


Price variations on the same day due to differences in quality in Dhamtari market (Central Provinces).

Quality of stick lac.	Auction sale prices per maund of stick lac of Government forests on.			
	17-3-31.		14-3-32.	29-10-33.
	Rain crop.	Winter crop.		
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Kusmi ari I	23 4 0	26 8 0	14 4 0	11 2 0
„ „ II	20 0 0	25 4 0	13 8 0	9 11 0
„ phunki I ..	23 4 0	29 0 0	15 12 0	11 6 0
„ „ II ..	20 8 0	26 8 0	14 0 0	10 8 0
Palas ari I	16 8 0	18 8 0	10 0 0	8 12 0
„ „ II	16 8 0	16 12 0	9 0 0	8 2 0
„ phunki I	17 8 0	17 4 0	9 12 0	9 0 0
„ „ II ..	16 8 0	..	9 4 0	..
Ber ari I	..	..	13 0 0	..
„ „ II	..	..	11 8 0	..
„ phunki I ..	..	..	14 8 0	..
„ „ II ..	..	..	12 0 0	..

(4) VARIATIONS IN STICK LAC PRICES IN DIFFERENT MARKETS.

It has already been stated before that prices in the upcountry markets in the producing areas generally follow the Calcutta market. Theoretically, the prices in various markets should, therefore, differ to the extent of the total of the marketing costs and transportation charges incurred in each case. But certain other factors such as quality considerations or the degree of competition among the local buyers, etc., intervene and influence the level of prices. For instance, the price of *Baisakhi* stick lac in Jhalda was on an average higher than that at Daltonganj by about Rs. 2-4-0 per maund in 1937-38, although the difference between the railway freight and other marketing costs from the two markets to Calcutta amounted to about 6 annas only per maund of shellac. This is accounted for by two factors. Firstly, the quality of stick lac produced in Jhalda tract is reported to be superior to that produced in the Daltonganj area. Secondly, Jhalda is a much bigger manufacturing centre and has a much larger number of factories and *bhattas* than Daltonganj. Factories at Jhalda have to import stick lac from outside to meet their demands. The average net imports of stick lac during the three-year period 1936-37 to 1938-39 from outside the division were about 2,000 tons by rail. On the other hand, Daltonganj market is a net exporter of stick lac, the

average net exports by rail to stations outside the division being about 700 tons during the three-year period 1936-37 to 1938-39. This probably leads to keener competition among the buyers in Jhalda than in Daltonganj, resulting in better prices in the former.

It will be clear from what has been said in the preceding sections that in the absence of any comparable standards of quality the prices of stick lac vary from lot to lot and market to market. As the system of offering prices for stick lac on the basis of yield of seedlac (*chowri*) to some extent assures a price consistent with quality, it is desirable that the system of buying and selling stick lac on *Beoli* basis, which is a rough method of ascertaining the yield of seedlac by eliminating impurities (see page 71), should be encouraged. The system could be first adopted and tried in regulated markets. A wider adoption of this system in the primary markets will help to bring about a closer relationship between stick lac and seedlac prices.

D.—Comparison between "ready" and "futures" prices.

Besides the contracts entered into by shippers and manufacturers for the purchase and sale of shellac, seedlac, etc., under which the goods specified are received or delivered, a certain amount of trading is done with a view to speculate on prices. This is referred to as trading in "futures" (*Fatka*). "Futures" contracts are usually liquidated at Calcutta by adjustment of price differences. This type of trading is done only in the case of shellac under the auspices of the Calcutta Shellac Exchange Ltd., and to a smaller extent at Mirzapur.

At Calcutta six alternate months beginning with February are traded in. Each position is opened for trading on the 1st of the month of the preceding contract and is closed at the end of the contract month. For instance, the trading in April option is open on 1st February and is closed in the last week of April. Thus trading for each option remains open for a period of about three months.

Trading in "futures" was given up from June 1936 but was resumed in July 1938.

The weekly closing "futures" prices for all positions since July 1938 together with the corresponding "ready" prices at Calcutta are given in Appendix 21 and illustrated on the diagram facing page 61. It will be seen that the "ready" and "futures" prices generally moved close to each other upto the first week of October 1939 after which the margin between the two became wider and more erratic and in December the "futures" prices were several rupees higher than the "ready", the maximum difference being Rs. 7-4-0 per maund during the first week of December, as compared with the maximum difference of 13 annas and Rs. 1-3-0 per maund in July and August respectively. In July and August 1939 the maximum fluctuation on any day was 5 annas per maund only but in September the difference between the highest and the lowest quotations on a day went up to as much as Rs. 3-8-0 per maund. In November, the maximum fluctuation on any day was Rs. 2-8-0 per maund but in December it went up to as much as Rs. 8-6-0 per maund. This was largely due to the activities of outside speculators, *i.e.*, those who did not usually trade in this commodity. The prices were kept up for some

time but by the middle of January 1940 they registered a sharp decline. After this the " ready " and " futures " prices again moved closely for sometime, but a position similar to December, 1939 recurred in December, 1940.

It will also be seen from the diagram referred to above that the " futures " prices generally remained higher than the " ready " prices. Out of the 179 weekly quotations for all options from July 1938 to March 1941, the " futures " quotations were below the " ready " quotations, only in seven instances showing that the " futures " market generally displayed a ' bullish ' tendency and thus helped the prices from sagging. In view of the violent and erratic course of prices at times, however, it hardly had any stabilising effect on the course of " ready " prices. There is clearly a need for reorganising " futures " trading in shellac.

E.—Market Intelligence.

As the market conditions in London and America exercise a good deal of influence upon the Indian prices, the shippers and some of the important brokers at Calcutta keep themselves in touch with this information. And as the prices at Calcutta in their turn influence prices in the upcountry markets, manufacturers and merchants in producing areas remain in touch with their Calcutta brokers. From them this information passes on to the commission agents operating in the upcountry market and finally to the itinerant merchants.

The prices of principal grades of shellac, seedlac and also *kiri* are published in some of the daily English and vernacular newspapers issued from Calcutta. There are some firms in Calcutta which issue bulletins giving the prevailing rates, exports of shellac, seedlac and *kiri** and the tone of the market. The Calcutta quotations are broadcast by the local Radio Station also.

In addition to the above, there are certain government and semi-government publications containing some useful information for the trade. The Indian Trade Journal publishes weekly prices of T. N. shellac both at London and Calcutta, besides giving weekly despatches to and arrivals from certain railway stations.* It may, however, be mentioned that with the exception of Calcutta these centres have practically no importance in the lac trade and have been selected on account of their general importance.

Figures showing the inter-provincial movement of lac are published monthly in the " Accounts Relating to the Inland (Rail and River-borne) Trade of India ". They, however, refer to all kinds of lac, *i.e.*, stick lac, seedlac, shellac, etc., the figures being simply added together. The exports to and imports from foreign countries appear monthly in the " Accounts relating to the Sea-borne Trade and Navigations of British India " and are later consolidated into an " Annual Statement."

The Indian Lac Cess Committee has established a crop statistical section which issues crop reports for all the crops every year. The method of estimation and the reports issued have been described in some detail in Chapter I. The number of reports issued for different divisions and the dates of issue, however, appear to vary in different years.

*The publication of some of the information has been suspended for the duration of the War.

The merchants try as far as possible to keep themselves informed about the market conditions and trend through newspapers, bulletins, letters and on occasions through telegram and telephone. The cultivator on the other hand is often unaware of the prevailing wholesale prices and whatever information reaches him is not only out-of-date but in most cases inaccurate also, because it filters through either a neighbour who may have lately visited the market or the village merchant who being himself interested in the purchases is likely to impart information of doubtful accuracy. In the absence of any reliable information, the cultivator is in a poor position to bargain. He has to accept whatever price is offered to him. It is highly desirable, therefore, that some suitable arrangements for the dissemination of reliable market prices in the rural areas be made to aid the lac-grower to obtain a better return for his produce.

For instance the practicability of posting lac prices in the *hats* and markets of lac growing areas in collaboration with Provincial Marketing Officers may be explored.

Mayurbhanj State is reported to have introduced a system of communication of market intelligence since 1935. The important markets within its territory have been linked with telephone and the rates of stick lac corresponding to the ruling prices of T. N. Shellac in Calcutta are relayed every day through the Development Department for being declared in the markets. It is reported that the system has helped the producers to secure substantially higher prices than what they used to get before.

F.—Note on prices of synthetic resins as compared with shellac.

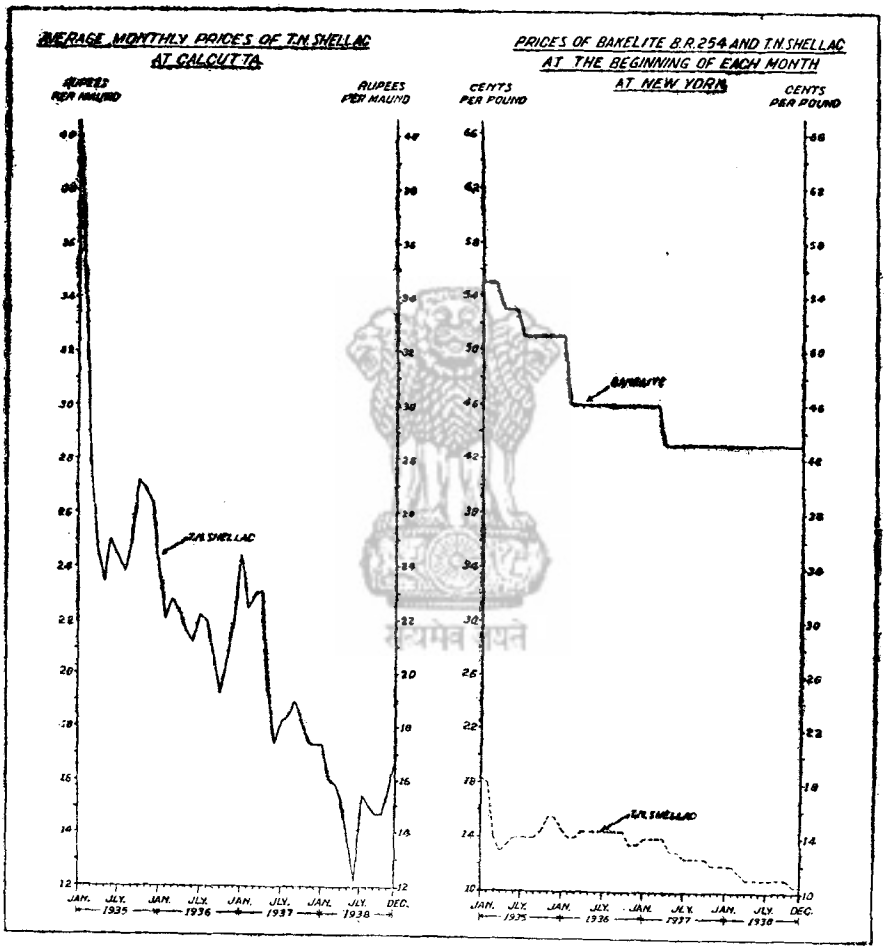
Synthetic resins are produced in a number of countries, the most notable among them being the United States of America, the United Kingdom, and Germany. As the largest production of synthetic resins is in the United States, the prices in that country may be taken as an indication of world values. Many types and qualities of synthetic resins are made. Their prices differ considerably. An indication of the range of prices of various types and qualities of synthetic resins is provided by the following table which gives the quotations of a number of synthetic resins on one day :—

Prices of a few types and qualities of synthetic resins at New York in April 1940.

(Cents per lb.).

Bakelite alkyd BR. 10025	32	Beckosol, phenol, pure alkyd ..	12½
" phenolic BR. 254	45	*Durite 1301*	25
Beckamine 3440	22½	Paranol resin, LN	13½
Beckolin No. 17 Dark	16½	Vinylite, AYAA	40

The trend of prices will be seen from Appendix 22 which gives the prices of one type of synthetic resin—Bakelite BR. 254—at New York in the beginning of each month from 1935 to 1940. The prices of T. N. shellac have also been given for comparison. It will be observed that the prices of this synthetic resin averaged 54·5 cents. per lb. in 1935, but successively came down to 48·4, 45·8 and 45·0 cents. per lb. in 1936, 1937 and 1938 respectively. Similarly, the price of shellac (T. N.) came down from an average of 14·9 cents per lb. in 1935 to 14·3 cents in 1936, 13·0


AVERAGE MONTHLY PRICES OF T.N. SHELLAC AT CALCUTTA
RUPEES PER MAUND
RUPEES PER MAUND
T.N. SHELLAC
JAN. JLY. JAN. JLY. JAN. JLY. JAN. JLY. DEC.
1935 1936 1937 1938
PRICES OF BAKELITE B.R.254 AND T.N. SHELLAC AT THE BEGINNING OF EACH MONTH AT NEW YORK
CENTS PER POUND
CENTS PER POUND
BAKELITE
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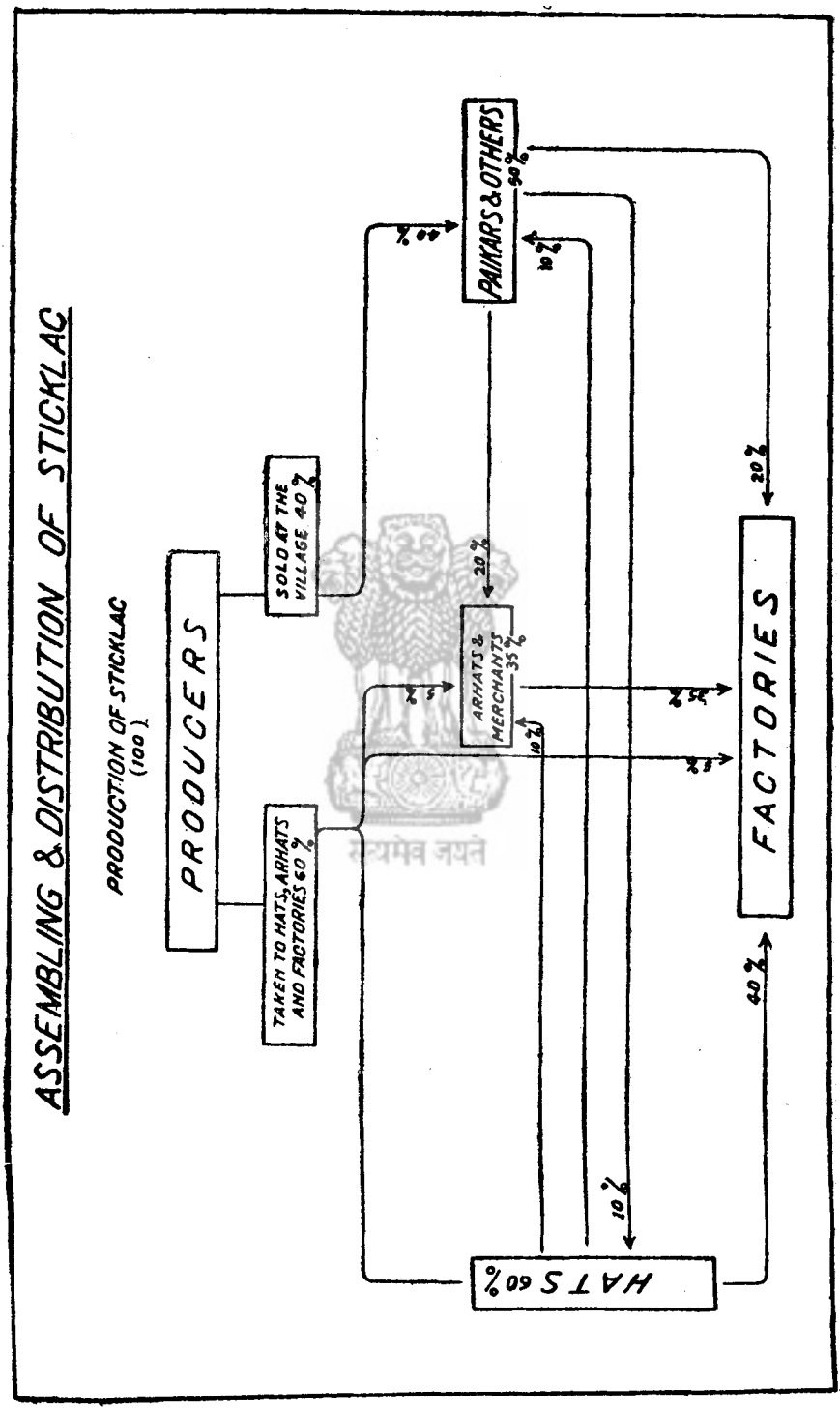


cents. in 1937 and 11·1 cents. in 1938. The fluctuations in the prices of shellac, however, were considerably greater than those in the case of synthetic resins. This will be clearly seen from the diagram facing page 64. The prices of T. N. shellac at Calcutta have also been incorporated in this diagram. It is at once seen that the prices of shellac not only changed more frequently but were also subject to greater fluctuations as compared with the prices of this synthetic resin. The range of fluctuations in T. N. prices, considering average monthly prices only, amounted to 36 per cent., 8 per cent., 17 per cent., 14 per cent. and 68 per cent. in 1935, 1936, 1937, 1938 and 1939 respectively compared with 7 per cent., 10 per cent. and 7 per cent. only in 1935, 1936 and 1937 respectively in the case of the synthetic resin. The prices of the resin were unchanged in 1938 and 1939. The fluctuations in the prices of shellac at Calcutta, as will be clear from the diagram, were liable to more frequent and violent fluctuations.

G.—Note on measures proposed for stabilisation of prices and improving the lac trade.

It is clear from what has been stated in earlier sections that the prices of shellac experienced violent fluctuations during the last thirty years, and were not the same in any two years. The unstability of lac price has been considered as one of the causes which have stood in the way of producers getting a proper return for their lac and the industry being threatened of losing its importance in the world markets, and has received the attention of the Indian Lac Cess Committee and the governments of the lac producing provinces and States from time to time.

The Government of Bihar convened a joint Lac Conference in 1938, to examine ways and means to put the lac industry on a sound footing and rationalise it in the interest of growers. It was attended by representatives of the Governments of the United Provinces, the Central Provinces, Rewa Darbar, Mayurbhanj State, the Central Government and the Indian Lac Cess Committee and some selected growers and manufacturers. The Conference recommended that (*i*) dealers and manufacturers should be licensed and an association formed under the supervision of the Government, (*ii*) a joint Control Board, consisting of representatives of growers, manufacturers, dealers, shippers, the Governments of lac producing provinces and States and the Lac Cess Committee, established to deal with the problems of the industry, (*iii*) the Government of Bihar, the United Provinces and the Central Provinces should establish moulding, paints and varnishes and other industries with a view to increase the home consumption, (*iv*) the Government of India should intensify research work in the industrial uses of lac and establish demonstration factories, (*v*) the Government of India should take steps to establish grades and standards for Indian shellac and introduce legislation for the standardisation of weights, (*vi*) the Government of India should increase the activities of the Lac Cess Committee in the direction of demonstration of improved methods of cultivation and manufacture of lac, (*vii*) the possibility of organising lac producers' co-operative societies should be investigated, (*viii*) arrangements should be made in consuming countries for ascertaining their requirements in respect of the quantity and quality of shellac and supplying information on the progress of synthetic substitutes,

(*ix*) the Government of India should provide necessary finance for constructing air conditioned godowns at a suitable place and make suitable contributions to the Governments concerned for the improvement of lac industry and (*x*) a small committee should be appointed to draw up details of the scheme outlined at the Conference.

The Committee set up in pursuance of the last recommendation of the Conference, after examining all aspects of the problem, made some recommendations as a result of which the Government of Bihar introduced the Bihar Lac Control Bill before the legislature in 1939. This bill having as its object the better regulation of the purchase, manufacture and sale of lac in the province of Bihar provided that

(*i*) the Government may exercise control over markets, fairs and *hats*, over purchase and sale of lac and over lac manufacturers and factories in such areas as may be notified, and require shopkeepers, traders, brokers, commission agents, weighmen, measurers, warehousemen and other intermediaries to obtain licences ;

(*ii*) the markets, fairs and *hats* in such areas should be registered ;

(*iii*) the shops, premises and places to be used for the purchase of lac and the factories for the manufacture of lac in such areas should be licensed ; and

(*iv*) that the Government may make rules for the grant of licences and such rules may provide for or regulate the place and hours of business, the weights and measures used, the trade allowances that may be paid or received and the taxes and fees which may be charged at markets, as also the prices at which or the agencies to or through which lac may be sold by factories, and the manner in which lac produced should be graded.

The bill aimed at improving the industry and the position of the producers by better organisation of the marketing of lac and the setting up of a sales organisation, making it compulsory for all lac to be sold through this organisation. The bill, however, was dropped.

The Indian Lac Cess Committee appointed a Sub-Committee to consider the steps that could be taken to improve the position of the shellac market. The Sub-Committee reported in February 1939 that after going into the subject in all its details, it had come to the conclusion that unless old stocks in London were cleared there was little chance for judging the trend of the market. They felt that an average price of Rs. 22 to Rs. 24 or a very conservative figure of Rs. 20 per maund of shellac was practically certain to operate as soon as the heavy stocks in London were reduced.

Towards the end of 1939, when following the outbreak of hostilities in Europe the prices of shellac in India rose abruptly, the American Bleached Shellac Manufacturers' Association represented that consumers were unwilling to follow price advances due to speculative activities and that use of shellac as a purely speculative medium threatened the existence of the entire industry. The subject was discussed at the meeting of the Indian Lac Cess Committee in February 1940, when it was agreed that the Com-

mittee considered Rs. 30 to Rs. 40 per maund as the fair and safe price for T. N. shellac at Calcutta under the conditions then prevailing. The Committee further expressed an opinion that Rs. 30 per maund was necessary to give a fair return to the producer and the manufacturer and Rs. 25 should be the minimum.

The level of prices considered as giving a fair return to the lac grower in 1939 may not hold good in 1941 but in view of the wide variations in shellac prices, and the alarm caused to buyers abroad by the violent fluctuations in shellac prices, it is clear that such steps are necessary as will keep the lac prices at a suitable level.

CHAPTER V.—ASSEMBLING.

A.—Methods and agencies of assembling.

The producer either takes his lac to a *hat* or *arhat* or sells it at the village to a *paikar,* village merchant, contractor or an agent of a factory or wholesale merchant. At times he takes his produce direct to a factory. The following agencies, therefore, figure in the assembling of stick lac :—

(1) Producers,
(2) *Paikars* (itinerant dealers),
(3) Village merchants, contractors, landlords and *mahajans,*
(4) *Arhats,* wholesale merchants and factories.

The share of different agencies in the assembling will be seen from the diagram facing page 65.

(1) *Producers.*—The producers sell their stick lac in the neighbouring periodical *hats* (which abound in the main lac producing areas in India), or to an *arhat* in the nearest market except when they dispose of it at the village to *paikars* or other collecting agencies either on account of their being in need of cash or their financial obligations or their being engaged in agricultural operations. It is estimated that nearly 2|5th of the crop is sold at the village and the balance 3|5th taken to *hats, arhats* or factories for sale.

At *hats,* lac is not the only commodity to be sold ; rice, spices, salt, tobacco and such other daily requirements of rural life are also brought to *hats.* The sales are for cash or by barter. Besides producers, *paikars* and village merchants also bring lac to *hats.* Some producers purchase stick lac from other producers and take it to the *hats* along with their own produce. The bigger producers either auction the right of collecting lac from their trees to the village merchants and contractors or auction the scraped lac locally or sell to factories usually through commission agents.

(2) *Paikars (itinerant dealers).*—The *paikars* wander from village to village with a few pack bullocks or a cart. They either barter stick lac with salt and other articles of daily use or purchase it for cash. The barter system is reported to be common in places adjoining forest areas. Lac collected by the *paikars* is sold at *hats* or to *arhats,* wholesale merchants and factories.

(3) *Village merchants, contractors, landlords and mahajans.*—Supplies also reach the markets through the medium of village merchants and contractors who purchase stick lac from the producers. Formerly, when prices of stick lac ruled high, the village merchants used to buy fairly large quantities of stick lac, but with the slump in the lac market the practice has become less common. Some merchants purchase lac at the auctions held by big producers or forest authorities. The village *mahajans* and merchants also receive some quantities in repayment of debts. The village shopkeepers also receive stick lac in barter for salt, spices and other ordinary household requirements of the producers. These *mahajans,* village merchants and contractors sell their lac either in the *hats* and markets or dispose of it to the factories.

Landlords also collect some lac by receiving payments from their tenants in kind for the host trees leased to them. With the fall in prices the practice has now been abandoned to a great extent, though its vestiges still remain in Hazaribagh and Palamau districts in Bihar.

(4) *Arhats, wholesale merchants and factories.*—The *arhatiyas,* wholesale merchants and factories, as a rule, do not buy in the villages, although some factories send out buying agents to collect lac in villages also. They make their purchases in the *hats,* or from *paikars* and other agents collecting lac from producers. Only about 5 per cent. of the purchases of stick lac by the factories are estimated to be made direct from producers.

B.—Markets.

(1) DESCRIPTION, OWNERSHIP AND CONSTITUTION.

There are no markets for assembling lac on the lines that they exist for the assembling of grains, oilseeds and most other agricultural produce. The *hats* and *arhatiya's* shops at manufacturing centres constitute the primary and secondary markets while the seedlac and shellac factories provide the terminal markets for stick lac.

(*a*) *Primary markets.*—The periodical village markets known as *hats* which are common in the main lac producing areas constitute the primary markets for lac and play an important role in the marketing of stick lac. In some cases, factories also serve as primary markets, lac being taken there for sale direct by producers. At *hats,* besides lac, other commodities like rice, vegetables, salt, cloth, tobacco, etc., are brought for sale. The *hats,* thus, not only provide a market for the producer's lac but enable him to secure his household requirements either in exchange of his produce or for cash. They are usually held once a week, sometimes twice a week and last for one day only. The site is generally an open piece of land in close vicinity of the village. In the majority of cases there are no permanent stalls. In some *hats,* there are thatched sheds but, as a rule, improvised structures are set up for the day as a protection against sun and rain.

The majority of these *hats* are owned by the landlords or *zamindars* on whose lands they are held. They are either supervised by the owner himself or by a contractor who pays yearly rent to the owner. In *Khas mahal* areas the village markets are owned by the Government. In the Central Provinces, the village markets are generally owned and controlled by district councils. The owner of a *hat* or the contractor (if the *hat* has been leased out) levies taxes or tolls on the commodities handled and also realises some fee from each shopkeeper. The market charges in the *hats* vary from place to place.

(*b*) *Secondary markets.*—Lac is brought to *arhatiyas'* shops by producers and *paikars.* The shops may be situated on the road side and scattered over the town or may be concentrated in one locality.

The factories also serve as secondary markets in as much as some sellers take stick lac direct to the factories for sale.

(*c*) *Terminal markets.*—The seedlac and shellac manufacturing factories serve as terminal markets for stick lac. Calcutta is the main terminal market for lac products, seedlac and shellac. Stick lac reaches this market in comparatively small quantities either to be manufactured into

seedlac and shellac locally or to be exported to foreign countries. The manufacturers get their supplies through their commission agents functioning in the various upcountry markets. The Calcutta brokers also receive some quantities for sale but they mainly deal in seedlac and shellac. They visit the prospective buyers, show them the samples and arrange the bargains. The quantities of stick lac handled in Calcutta are small as compared with seedlac and shellac.

(2) MARKET FUNCTIONARIES.

In the *hats* (village markets), the sales are generally effected without the help of any intermediaries. The prospective buyers examine the stick lac offered for sale and negotiate the transactions themselves. The payment is made on the spot. In the secondary markets the principal functionaries are (*a*) *arhatiyas* (commission agents), (*b*) *dalals* (brokers), (*c*) *tolas* (weighmen) and (*d*) *palledars* (labourers).

(*a*) *Arhatiyas or commission agents.*—There are two types of *arhatiyas*—*kachha* and *pakka*. A *kachha arhatiya* acts on behalf of the seller who brings the produce to his shop for sale. The *arhatiya* invites the prospective buyers to examine the produce and make their offers. In this he sometimes takes the help of a *dalal*. After the sale is completed and the produce is weighed over he makes cash payment to the seller and realises the money from the buyer later on. The village merchants and *paikars* some times deposit their produce in the *arhatiya's* godowns with a view to sell it at some future date. On such stocks the *arhatiya* advances up to 75 per cent. of the value of the produce and charges interest usually at the rate of 6 to 12 per cent. per annum. The account is cleared after the produce has been finally disposed of.

The *pakka arhatiya* acts on behalf of the out-station buyer and seller. He makes all the necessary arrangements connected with the purchase and sale of goods and acts as a principal on behalf of his clients.

The same firm often combines the functions of both the *kachha* as well as *pakka arhatiyas*. Some *arhatiyas* act as wholesale merchants also, *i.e.*, they buy and sell on their own account.

(*b*) *Dalals or brokers.*—*Dalals* are intermediaries who help in bringing together the seller and the buyer. In the upcountry markets, they are concerned only with the arranging of transactions for others and do not actually handle the goods. The charges paid for their services are known as *dalali*. The Calcutta brokers, on the other hand, play the role of *arhatiyas* and financiers also. More will be said about them in the Distribution Chapter.

(*c*) *Tolas or weighmen.*—The function of a *tola* is to weigh over the produce. He may either be an employee of the *arhatiya* doing other odd jobs also or he may be pursuing his calling as a separate entity. In some cases the *kachha arhatiya* may weigh the produce himself.

In some markets, for instance, Wyndhamganj market (United Provinces), weighmen are appointed by the local authorities to whom cases of defective weighment can be reported.

(*d*) *Palledars or market labourers.*—*Palledars* are the market labourers who perform various functions relating to the handling of pro-

duce in the markets such as heaping, assisting in weighing and bagging. In some markets, *e.g.*, Balrampur, the *palledars* are the permanent employees of the *arhatiya*, while in others as at Pakur they work independently and are employed as and when their services are needed. In some markets, as at Purulia, the *palledars* are paid entirely by the seller, in others, as at Pakur, they are paid by the buyer ; in some others, as at Gondia (Central Provinces), the *palledars* are paid both by the seller and the buyer. The charges paid to the *palledars* are known as *palledari* or *hammali*.

(*c*) *Others.*—In some markets, *e.g.*, Katni in the Central Provinces and Latehar in Bihar, a small charge—2 annas per Rs. 100 in the former and 3 pies per consignment in the latter—is levied on the seller for the services rendered by the shop assistant (*munim*), in making out the sale account. This charge is known as *munimi*.

(3) MARKET PRACTICES AND METHODS OF SALE.

(*a*) *General.*—The various market practices have the sanction of long usage and they vary not only from one tract to another, but sometimes in different markets in the same tract also. There are no regulated markets for lac in India. It is only in a few *hats* owned by the Government (*Khas mahal*) that market charges have been fixed. Beyond this there is no State control.

(*b*) *Procedure of sale.*—In *hats* the producers bring small quantities of stick lac for sale. Small quantities are often set apart for bartering with such articles as salt, spices, *gur*, etc. The sales take place either, by the *paikars* and factory agents going round the market place or by the producers going round to the buyers' stalls. The produce is generally sold to the person offering the highest rate. The various buyers in the smaller *hats* are occasionally reported to form a ring and reach an agreement about the prices to be paid. This eliminates an element of competition and is detrimental to the interests of the seller. A major portion of the lac collected by the small *paikars* is purchased by the big *paikars*, factory agents and wholesale merchants, or small *bhatta* owners. Weighment is done by handscales. Weights show enormous variation and malpractices in the process of weighment are also prevalent. For instance, in Ranchi district, the small *paikars* put some additional weight (a small quantity of stick lac at the rate of about ½ to 1 tola per seer) along with the actual weights at the time of weighing the seller's produce. This is done to get an excess weight of lac to cover for impurities, etc. The unscrupulous buyers are reported to take one or two *chhatanks* per seer more by deceitful methods in weighing. A system of licensing of buyers will provide a check on the malpractices found in markets.

In the secondary markets stick lac is either heaped or the bags are stacked in the *arhatiya's* premises. The buyers visually examine the quality of stick lac and make their offers usually according to their estimates of outturn of seedlac, *i.e.*, on *Chowri partha* basis. If during weighment a buyer thinks that the impurities exceed what he expected, he asks for an allowance. Sometimes purchases are made on *Beoli* basis, *i.e.*, after making a rough and ready determination of the amount of impurities present. A small quantity is weighed out from the stick

lac brought for sale and the impurities are separated by hand. The cleaned material is weighed again and the amount of impurities determined to serve as a guide for the evaluation of the consignment. This is done only in the case of comparatively big consignments.

The buyers indicate their offers (*i*) under cover, (*ii*) openly or (*iii*) by bids in auction according to the practice in each individual market. For instance, in Jhalda, Ranchi and Balrampur, offers are made under cover ; in Daltonganj and Latehar markets, sales are effected by auction while in the *hats,* open sales are in vogue. The highest offer is communicated by the commission agent to the seller and after he has given his consent the bargain is closed in favour of the highest bidder. The weighman weighs over the produce by means of handscales or beamscales. The bags are stitched and removed to the buyers' godown. In the case of stick lac lying in bags in the *arhatiya's* premises, the buyer may either examine the contents of one or two bags out of a consignment to form his judgment regarding the quality or he may insist upon all the bags being heaped. In the former case the bags are directly weighed on the beamscale. In case the seller is not satisfied with the price offered he deposits his produce with the *arhatiya,* to be sold at some future date either at the discretion of the latter or at a rate not below the limit stipulated by the seller. At the completion of weighment the value of the produce after deducting the marketing charges, etc., is paid to the seller by the *arhatiya* who subsequently recovers the money from the buyer.

(*c*) *Methods of sale.*—(*i*) *Cover system.*—According to this system the assembled buyers indicate their rates to the commission agent or the broker by clasping the latter's right hand under cover of a cloth and pressing the required number of fingers. The value given to a finger varies according to the prevailing price and is commonly understood by all the dealers in the market. The bid of each buyer is kept secret from others and when the last bid has been given, the *arhatiya* conveys the highest bid to the seller and on his agreeing to sell at that rate, closes the bargain in the name of the highest bidder.

(*ii*) *Open system.*—In this system the individual buyers examine the produce and offer their bids. The *arhatiya* keeps the seller informed about the various offers. After waiting for some reasonable time the bargain is closed with the highest bidder.

(*iii*) *Auction system.*—The buyers gather round the produce and declare their offers to the auctioneer who is either the *arhatiya* or the *dalal.* The auctioneer keeps on shouting the latest bid and inviting higher offers. Thus both the buyers and sellers know the rates offered. When the highest bid is reached the deal is closed.

(*iv*) *Comparison between different methods of sale.*—The cover system of bidding appears to be more common in the important lac markets, and its advocates aver that since each buyer is ignorant of the bids made by his competitors he offers the maximum possible price in order to secure the produce. Against this, bids in the auction system are gradually raised and a buyer may be able to purchase the produce at a rate lower than his maximum limit. The supporters of auction system, however, contend

that the cover system does not stimulate that rivalry and competition amongst the buyers which are essential for the sellers to secure the best values. Another advantage in favour of the auction system is that the seller is able to follow the course of bidding and takes some interest in the sale of his produce. The auction system thus inspires confidence in the minds of the sellers in place of suspicion engendered by the cover system especially if final rates are not openly announced.

(4) Market charges.

In the village *hats,* seller and buyer come into direct contact with each other and the marketing charges consist of only the tax levied by the owner or the lessee of the *hat* for the use of the *hat.* The method of levying the tax and its incidence vary considerably from one *hat* to another. For instance, in some *hats, e.g.,* Badam and Danga (Manbhum district) no charge is levied on the seller, but in most others a charge is made either in kind or in cash at varying rates. For example, at Barabazar (Manbhum) the seller pays just a handful, at Dhangar (Palamau) he pays about $\frac{1}{2}$ seer per maund, at Latehar in the same district he pays $\frac{3}{4}$ seer per maund, while at Satbarwa (Palamau) the charge is as high as $2\frac{1}{2}$ seers per maund. Similar variation is noticed in the charges realised in cash in Nawadih (Palamau district) the seller pays 1 anna per maund whereas in Gamaria (Singbhum) he has to pay double that amount. In Tori *hat* a charge of 2 annas per cart is levied. In some *hats,* tax is levied per seller, a distinction being usually made between a producer-seller and a *paikar*-seller. For instance, in Tatisilva and Taiwara *hats* (Ranchi) the producer-seller pays 3 pies per head while the *paikar* has to pay 1 anna per head. This distinction is obviously due to the fact that a *paikar* generally handles larger quantities than a producer.

The charges from the buyer are mostly realised in cash but the manner of levying and the incidence of the charges vary in different *hats.* For instance, the buyer has to pay 1 anna per maund at Gamaria (Singbhum) and 2 annas per maund in several other *hats, e.g.,* Latehar, Nawadih and Tarhasi (Palamau). In some *hats* like Taiwara and Tatisilva (Ranchi), charges are levied per head instead of on the quantity, being 1 anna per head in both cases.

In the secondary markets where transactions take place usually through the commission agents a variety of market charges are incurred both by the seller and the buyer. These charges may broadly be grouped under the following main heads :—

(*a*) Taxes and tolls,
(*b*) Commission,
(*c*) Brokerage,
(*d*) Handling and weighment charges,
(*e*) Charges for other services,
(*f*) Charities,
(*g*) Quality and weighment allowances,
(*h*) Miscellaneous.

The assembling charges mentioned above in respect of twelve markets in the main lac growing tracts are given in Appendix 24.

The different charges are levied variously in kind or in cash, per maund, per bag or per cent. As such, the incidence of market charges varies depending on the value of the produce. In order to compare the market charges in different markets, it is, however, necessary to consider all the charges in terms of a common unit. All the charges given in Appendix 24 have accordingly been calculated per Rs. 100, taking the value of stick lac at a uniform rate of Rs. 8 per maund. Transport costs incurred by the seller to bring stick lac to the market and by the buyer to remove it to his godown have not been included as those vary with different sellers and buyers according to the distances involved.

(*a*) *Taxes and tolls.*—These include octroi or terminal taxes levied by municipal committees and tolls, etc., levied by the local bodies or the owners of the markets. Generally speaking, the municipalities in Bihar and Bengal do not levy any taxes in the assembling markets. In the markets taken on lease by contractors, a toll is usually collected on the arrivals. For instance, in Ranchi market, the toll is realised at the rate of 9 pies per cart, 6 pies per bullock and 3 pies per headload or a *bahangi* load. In the Central Provinces, no octroi, terminal tax or toll is levied on arrivals in the important lac assembling centres except at Kota where the Sanitation Committee, which controls the market, charges a market toll of 2 annas per cart. In the United Provinces, Mirzapur and Wyndhamganj are the two main lac markets and there is no tax or toll levied in either of these. The taxes and tolls are invariably payable in cash.

(*b*) *Commission.*—The charge levied by the *arhatiya* (commission agent) for the services rendered by him in the sale or purchase of produce is known as *arhat* or commission. It is mostly paid by the seller though in some cases it is paid by the buyer also. It is usually payable in cash but in certain markets, *e.g.*, Latehar (Bihar), some additional deduction is made in kind from the seller. In some markets, *e.g.*, Jhalda (Bihar) and Gondia (Central Provinces), *arhat* is charged per maund of produce while in others, *e.g.*, Kota (Central Provinces), it is charged per rupee, in still others, *e.g.*, *Ranchi* (Bihar), *arhat* is charged per Rs. 100 worth of produce. A reference to Appendix 24 referred to above will show that the rate of commission payable by seller varies from 8 annas to Rs. 3-2-0 per cent., while that by buyer varies from *nil* to Rs. 2-11-9 per cent. The total commission charged from both seller and buyer varies from 12 annas to Rs. 4-11-0 per cent.

(*c*) *Brokerage.*—Brokerage or *dalali* represents the remuneration of the broker or *dalal* for the services rendered by him in bringing together the seller and the buyer. It is not a common charge in the assembling markets, being payable only in three markets out of the twelve markets dealt with in Appendix 24 referred to above. It is payable in cash.

(*d*) *Handling and weighment charges.*—These charges include payments made to the market labourers and weighmen for the unloading of produce, its weighment and the filling and sewing of bags. They are paid both in kind and cash. For instance, at Daltonganj the seller pays 3 *chhatanks* of stick lac per maund and the buyer pays Rs. 2-0-0 per

100 bags for handling and weighment. At Dhamtari, the seller pays 3 pies per bag and the buyer 6 pies per bag for these operations. The seller usually pays for the unloading of the produce while the sewing of bags is invariably paid for by the buyer. The charges for weighment, etc., are variously borne by the seller and the buyer. For instance, at Balrampur, the buyer pays for the sewing of bags only, all other charges being borne by the seller while at Latehar charges for weighment, etc., are shared both by the seller and the buyer. In Mirzapur and Wyndhamganj, the entire cost is borne by the seller. The handling and weighment charges paid by the seller work out from 1 anna to Re. 0-9-8 per cent. while those borne by the buyer vary from *nil* to Re. 0-11-3 per cent. The charges paid by both the seller and the buyer range from Re. 0-3-1 to Rs. 1-0-3 per cent.

(*e*) *Charges for other services.*—These include deductions on account of the services rendered by *arhatiya's* clerks and apprentices, etc. It is not unusual for the deductions to be retained by the commission agent who pays monthly wages to these persons.

(*f*) *Charities.*—*Dharmada* and *gaushala* are the most common charges made under this head. The former may be spent by the *arhatiya* for any charitable purpose, *e.g.*, financial help to a temple while the latter is specifically meant for the maintenance of cows in the local *gaushala* (*pinjrapole*). Deduction may be made for other local institutions such as *pathshalas* (schools) or hospitals. These deductions are made by the commission agent and there is no check to ensure that the collections are actually utilized for the purposes for which they are made. Moreover, these deductions have no connection with the marketing of lac and the seller derives no benefit from most of the institutions for which he has to pay. The total incidence of these charges in the instances examined varies from Re. 0-1-10 to Re. 0-12-6 per cent.

(*g*) *Quality and weighment allowances.*—Stick lac arriving in the markets usually contains such impurities as sticks, pieces of wood, etc. The buyer makes an estimate of these impurities and offers prices accordingly. Ordinarily, no allowance for quality is paid by the seller, but in some cases when the buyer subsequently finds that a portion of the produce contains more impurities than estimated, he asks for some allowance. The amount of deduction varies with each case.

In Bihar and the United Provinces, it is customary for the seller to pay some weighment allowance known as *dhalta*, to the buyer. *Dhalta* varies from $\frac{1}{4}$ seer to $\frac{1}{2}$ seer per maund, the latter being more common.

(*h*) *Miscellaneous.*—Deductions other than those discussed above fall under this head. Instances of such charges are "*note batta**" and *muddat*†. The former charge came into prominence during the 1914—18 War, when payment was usually demanded in silver coins instead of currency notes. It has now become a customary allowance in some markets. *Muddat* is a deduction made by the *arhatiya*, from the seller to cover himself against the loss of interest accruing due to the fact that he makes immediate payment to the seller and recovers the money

Batta = Discount or exchange fee.

†Literally means period.

from the buyer usually after some days. In certain markets, *e.g.*, Balrampur, the seller pays some rebate known as *dasturi** to the buyer.

(*i*) *Total market charges.*—It will be seen from the figures in Appendix 24 that the total charges payable by the seller in the instances given vary from about 1 anna to over 9 annas per maund of stick lac and those payable by buyer vary from practically nothing to nearly 4 annas per maund of stick lac. The figures show that the charges payable by the buyer are much lower than those payable by the seller, except in Katni, where reverse is the case. This apparent difference in the amount of market charges payable by the seller and the buyer, however, has not much significance as all of them indirectly fall upon the produce. The total charges payable by both seller and buyer vary from about 2 annas per maund to over 9 annas per maund of stick lac in the 12 markets for which the charges have been examined. In Chaibasa, the high costs are due mainly to high commission charges while in Balrampur the increase is mainly due to *dasturi* paid to the buyer and the *muddat* and "*note batta*" charges combined. It seems desirable that the marketing charges should not only be reduced to a reasonable limit, but should also be standardised as far as possible in order to simplify the system and to make a comparison of prices ruling in different markets possible. As "regulated markets" provide facilities for orderly marketing, early steps should be taken to establish regulated markets at important centres.

C.—Finance of assembling.

(1) *Village baniya (merchant), mahajan or sahukar.*—Generally speaking, lac cultivation is followed as a subsidiary occupation by the producers, and does not usually involve cash expenditure except when a producer runs short of brood lac. The amount required for this purpose is not large and is usually provided by the producer, either from his personal savings or by the sale of his other agricultural produce like rice and vegetables. The producer, however, needs financial help for other necessities and for this he seeks the assistance of the village *baniya* or the *mahajan.* Loans are taken on personal security at rates of interest generally varying from 12 to 36 per cent. depending upon the status of the borrower and his relations with the lender. In Assam the small producers get short term loans from the village merchants at the time of infecting their trees. The loans are repaid at the next harvest time, the amount repaid being 1½ times the loan taken. When a producer is so indebted he generally makes over his produce to his creditor, who takes full advantage of the situation and evaluates the produce at rates favourable to himself.

The village merchants sometimes seek financial accommodation from the village *mahajan* or *sahukar* to supplement their own capital, for making purchases of stick lac. These loans are repaid after the disposal of the lac. The rate of interest usually varies from 9 to 12 per cent. per annum.

(2) *Arhatiyas.*—Some village merchants and *paikars* receive financial assistance from the commission agents invariably on the understanding that they will sell their collections through their creditors. The *arhatiyas* also advance money on the produce deposited with them for sale at some subsequent period up to the extent of 75 per cent. of its current value. The interest charged usually varies from 6 per cent. to 12 per cent.

*Literally meaning a customary charge.

(3) *Factory owners.*—Some factories engage agents for the purchase of stick lac from *hats* and *arhats*. They are provided with necessary funds by the factories concerned. Factories sometimes give advances to *paikars* for collecting stick lac in villages.

(4) *Co-operative societies.*—Co-operative societies play an insignificant part in the financing of assembling of stick lac. They mostly confine themselves to the provision of agricultural credit in general. Loans are advanced on the personal security of at least three other members, and are recovered in convenient instalments. The rates of interest charged are invariably lower than those charged by the village merchants and *mahajans*, being 6 to 12 per cent.

CHAPTER VI.—DISTRIBUTION.

A.—Wholesale.

(1) METHODS AND AGENCIES.

(*a*) *Stick lac.*—The following agencies are engaged in the distribution of stick lac :—

Producers ;
Itinerant dealers ;
Village merchants ;
Contractors buying lac on trees ;
Wholesale merchants and factory agents ; and
Arhatiyas.

Producers generally do not take any active part in the distribution of stick lac. The quantity of stick lac sold to factories direct by producers does not exceed five per cent. of the total production. There are no co-operative societies connected with the marketing of lac.

The small itinerant dealers, village merchants and contractors buying lac distribute a part of their collections direct to the factories and it is roughly estimated that about 20 per cent. of the total crop finds its way to the factories in this manner.

The bulk of the crop is taken to *hats* and markets. In the *hats,* stick lac is purchased by big *paikars,* wholesale merchants, factories or their agents. In markets, the produce passes into the hands of *arhatiyas* and wholesale merchants and from them to factories.

The *arhatiyas* act on behalf of the outside buyers also. They arrange purchases for their clients and take upon themselves the responsibility of discharging all obligations on behalf of the actual buyer. They get the produce weighed, packed and despatched to their clients. Conversely, they arrange the sale of stick lac received from other markets on commission basis.

The wholesale merchants purchase stick lac during the season and gradually distribute it to the factories.

The shippers and Calcutta brokers are connected with the distribution of stick lac only to a small extent.

(*b*) *Seedlac and shellac.*—The internal distribution of seedlac and shellac is done mainly by the manufacturers and the commission agents. The factory owners sometimes receive indents direct from the outstation wholesalers and retailers, while at others, the services of commission agents working in the manufacturing centres are sought for and the goods are secured through them. The big consumers like the gramophone companies usually purchase direct from the manufacturers.

As regards the export trade, it is estimated that the bulk of the total quantities shipped pass through the brokers at Calcutta, the balance being obtained by the shippers direct from factories.

The Calcutta brokers receive seedlac and shellac mostly from the manufacturers and to a smaller extent from the wholesale merchants. The brokers also purchase on their own account. The goods received by the

brokers are stored in their godowns and small samples are taken out. The brokers go round to different shippers, show them the various samples and invite offers. The bargain is closed with the shipper who is interested in the quality offered and offers the best price. On the other hand, they obtain supplies to suit shippers' requirements from their clients. The goods may be sold immediately on arrival or remain lying in broker's godown for sometime before their disposal, in which case about 70 to 80 per cent. of the value is advanced. The brokers usually keep their regular customers informed of the market quotations and tendencies.

(2) FINANCE.

(*a*) *Landlords and village merchants.*—The landlords and village merchants generally do not advance money to any of the agencies (except producers) engaged in wholesale distribution. On the other hand, some of the village merchants are financed by the *arhatiyas* either against personal security or when goods are left with the *arhatiyas* for sale.

(*b*) *Arhatiyas* (*commission agents*) *and wholesale merchants.*—*Arhatiyas* and wholesale merchants are usually concerns with substantial capital. They finance the small *bhatta* owners by supplying stick lac on short term credit. They also advance loans to their clients on the security of goods deposited with them for sale at a subsequent period. The *arhatiya* makes payment for purchases made by him on behalf of his outstation clients. This payment is in the nature of an advance to the client from whom it is realised subsequently with interest varying from 6 to 9 per cent. per annum. Conversely, a wholesale merchant who sends his goods for sale through an *arhatiya* can obtain an advance of about 70 to 80 per cent. of the value of the consignment, the account being finally adjusted after the disposal of the goods. The rate of interest varies from 6 to 9 per cent. depending upon the financial status of the client and the market. Some of the bigger firms of *arhatiyas* function as bankers and *shroffs* drawing and discounting *hundis* (drafts and bills of exchange). Primarily they depend upon their own capital, but on occasions they seek financial accommodation from banks or bigger *shroffs*.

(*c*) *Brokers.*—The brokers at Calcutta constitute an important financing agency in the distribution of lac. The manufacturers or the wholesale merchants functioning in upcountry markets usually send their goods to their brokers at Calcutta and receive an advance to the extent of about 70 to 80 per cent. of the value of the consignment, the balance being paid after the deduction of costs and incidental charges incurred for the disposal of the goods. The rate of interest charged by them is usually 6 per cent. per annum.

(*d*) *Shippers.*—The shippers buy the bulk of their requirements through local brokers. The upcountry agents of the shippers provide themselves with funds either by the sale of drafts on their principals at Calcutta or the shippers remit money by insured post or bank drafts.

(*e*) *Shroffs.*—The *shroffs* are indigenous bankers of the country. They advance loans both against stocks of produce and on personal security and arrange the transfer of money from one market to another usually by means of *hundis*. As they come into closer contact with their clients and also know their financial position and status more intimately, they advance

money on personal security to sound parties more readily and with less formalities than the banks.

(*f*) *Banks.*—Banks finance approved merchants and business firms by allowing them cash credits. Such loans can be recalled by the banks at short notice. Besides giving advances and loans, banks discount *hundis*, and remit money from one market to another.

(3) Cost of distribution.

Cost of distribution includes charges of handling and transportation from the market to the consumer's premises, cost of containers, twine, commissions paid, if any, and other incidental charges connected with the movement of the produce.

The bulk of stick lac usually does not travel long distances. It is mostly manufactured into seedlac or shellac in the factories working in the tract. It may be sold by the producer directly to the factory or as is more common, it may pass through one or more of the agencies referred to earlier.

The cost of distribution depends upon the agencies engaged in distribution and the distance travelled by the produce. In the case of stick lac brought by producers direct to factories, the cost of distribution consists of the cost of handling and transport to the factory and the *dhalta* (which usually varies from $\frac{1}{4}$ to $\frac{1}{2}$ seer per maund). The quantities distributed in this manner are, however, small.

Seedlac, shellac and by-products are mostly despatched to Calcutta, for export. The manufacturers send their goods to their Calcutta brokers who arrange sales to the shippers. The small manufacturers sometimes dispose of their products to the local wholesale merchants or buying agencies of the shippers who in turn despatch the goods to Calcutta. The major part of production of seedlac and shellac is, however, consigned by the manufacturers to their Calcutta brokers and the distribution costs fall under the following 3 heads :—

(*i*) Expenses incurred at the manufacturing centres upto the point the goods are put on rail. These usually include the cost of bags, charges for bagging, carting to railway station and the station expenses.

(*ii*) Railway freight to destination.

(*iii*) Expenses at destination which usually consist of handling and transportation to brokers' godowns, brokerage and small sundry market charges.

Expenses under item (*i*) are paid by the consignor while those under items (*ii*) and (*iii*) are paid by the broker at Calcutta who subsequently deducts the amount from the sale proceeds. The charges at Calcutta are almost uniform with all brokers and the main item causing variation in the cost of distribution from different manufacturing centres to Calcutta is the railway freight.

The various charges referred to above are illustrated by three examples (taken from invoices obtained from the trade) given below :—

Account relating to a consignment of 25 bags of seedlac weighing 49 maunds 30 seers net sent by a manufacturer from Jhalda (Bihar) to Calcutta for commission sale (in September 1939).

(*a*) Expenses at Jhalda—

	Rs.	A.	P.	Rs.	A.	P.
Cost of 25 bags @ 3 annas per bag	4	11	0			
Labour charges @ 3 pies per maund ..	0	12	6			
Cartage to station @ 6 pies per bag ..	0	12	6			
Twine	0	1	6			
Booking charges	0	6	3			
				6	11	9
(*b*) Railway freight from Jhalda to Calcutta				18	15	0
(*c*) Expenses at Calcutta—						
Cartage from the railway station @ Re. 0-1-6 per maund ..	4	11	0			
Godown charges @ Re. 0-1-6 per maund	4	11	0			
Piling @ 1 anna per maund ..	3	2	0			
Brokerage @ Re. 0-8-0 per maund	24	14	0			
Jalpani (Tiffin charges) @ Rs. 2 per 100 maunds	1	0	0			
Loss in weight	2	12	0			
				41	2	0
Total ..				66	12	9

The consignment weighed 49 maunds 30 seers net and was sold at the rate of Rs. 11 per maund for Rs. 547-4-0 which sum was shared by the various agencies as follows :—

	Rs.	A.	P.
Expenses at Calcutta	41	2	0
Railway freight	18	15	0
Expenses at Jhalda	6	11	9
Net price obtained by consignor ..	480	7	3
Total ..	547	4	0

The total distribution costs between Jhalda and Calcutta amounted to Rs. 66-12-9 which works out at Rs. 1-5-5 per maund of seedlac.

NOTE.—Besides the charges included in the above invoice, interest is charged on the money. This charge is not included in every sale account but adjusted periodically.

An instance showing the distribution costs on shellac from Jhalda to Calcutta is given below :—

Account relating to a consignment of 40 bags of shellac weighing 49 maunds 27 seers and 8 chhatanks net sent by a manufacturer from Jhalda (Bihar) to Calcutta for commission sale (in September 1939).

	Rs.	A.	P.	Rs.	A.	P.
(*a*) Expenses at Jhalda—						
Cost of 40 bags @ 3 annas per bag	7	8	0			
Labour @ 3 pies per maund ..	0	12	6			
Cartage to station @ 6 pies per bag ..	1	4	0			
Twine	0	2	6			
Booking expenses	0	10	0			
				10	5	0
(*b*) Railway freight from Jhalda to Calcutta				19	0	6
(*c*) Expenses at Calcutta—						
Cartage to godown @ Re. 0-1-6 per maund	4	11	0			
Godown charges @ Re. 0-1-6 per maund	4	11	0			
Piling @ 1 anna per maund ..	3	2	0			
Brokerage @ 8 annas per maund ..	24	13	6			
Jalpani (tiffin charges) @ Rs. 2 per 100 maunds	1	0	0			
Loss in weight	4	8	6			
				42	14	0
Total ..				72	3	6

The consignment weighed 49 maunds 27 seers 8 *chhatanks* net and was sold at Rs. 14-8-0 per maund for Rs. 720-7-6. The position is summarised below :—

	Rs.	A.	P.
Expenses at Calcutta	42	14	0
Railway freight	19	0	6
Expenses at Jhalda	10	5	0
Net price received by consignor ..	648	4	0
Total ..	720	7	6

The total cost of distribution amounted to Rs. 72-3-6, *i.e.*, Rs. 1-7-3 per maund, which is Re. 0-1-10 per maund higher than the cost of distribution for seedlac. This is mainly due to the fact that a smaller weight of shellac is packed in each bag so that the cost of bags is higher than in the case of seedlac.

Actual expenses incurred on a consignment of *kiri* purchased at Mirzapur by a Cawnpore merchant and imported into Cawnpore on his own account is given below :—

Account relating to a consignment of 14 bags of kiri weighing 20 maunds 20 seers net sold by a manufacturer at Mirzapur to a merchant at Cawnpore.

	Rs.	A.	P.	Rs.	A.	P.
Cost of 20 maunds 20 seers of *kiri* contained in 14 bags—9 bags (13½ maunds) @ Rs. 3-12-0 and 5 bags (7 maunds) @ Rs. 4 per maund				78	10	0
Expenses at Mirzapur :						
(*a*) 14 bags @ 4 annas per bag ..	3	8	0			
(*b*) Twine and sewing charges @ 6 pies per bag ..	0	7	0			
(*c*) Cartage from godown to Mirzapur Station @ 1 anna per bag ..	0	14	0			
(*d*) Station charges	0	4	0			
(*e*) *Dharmada*	0	1	0			
(*f*) *Arhat* @ Re. 1 per Rs. 100 ..	0	13	0			
				5	15	0
Railway freight				10	0	0
Expenses at Cawnpore :						
(*a*) Octroi	2	10	0			
(*b*) Station charges	0	3	0			
(*c*) Cartage from railway station ..	0	7	0			
				3	4	0
Total ..				97	13	0

It will be seen from the figures given above that the cost of distribution amounted to 15 annas per maund.

Cost of distribution of seedlac, shellac and *kiri* from some important manufacturing centres to Calcutta is given in Appendices 25 and 26.

(4) Export costs.

The exporters purchase the bulk of their requirements through the Calcutta brokers. After the bargain is struck, the goods are transported from the brokers' godowns to the shippers' godowns. Shellacs of different qualities are often mixed together according to the shippers' formulae. The prepared goods are repacked in bags or boxes and transported to the harbour on lorries or carts for shipment. The various items included in the export costs are loading at brokers' godown, transport charges to shippers' godown and unloading there, piling charges, cost of transportation to port, export cess, shippers' commission, charges by the port authorities, *e.g.*, river dues, etc., insurance, steamer freight, superintendence and selling brokerage. The proportion which each item forms of the

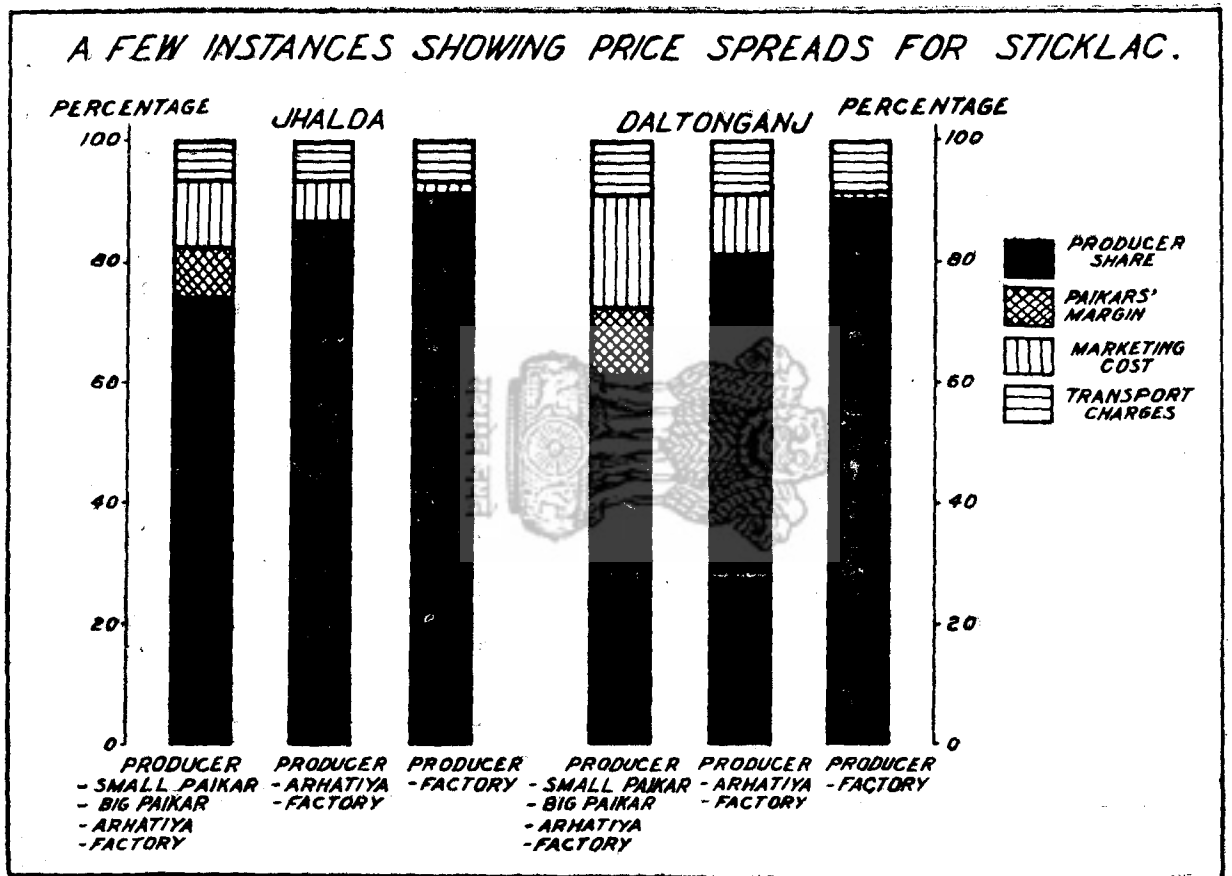
total export costs will be shown by the following statement giving a comparison of price at Calcutta with that at London :—

Comparison of prices of T. N. shellac at Calcutta and London on a date in August 1937.

	Per ton. Rs. A. P.	Per ton. Rs. A. P.
Price at Calcutta @ Rs. 19 per maund ..		517 2 11
Add—		
Charges at Calcutta—		
Loading at brokers' godown ..	0 3 5	
Transport from broker's godown to shippers' godown and unloading there	0 13 7	
Piling at shippers'godown ..	1 12 0	
Cost of additional gunnies used ..	3 2 1	
Lorry charges from godown to port	2 8 0	
Unloading at port	0 4 0	
River dues..	1 4 0	
Surcharge	0 2 6	
Shipping charge	0 12 0	
Ad valorem toll @ 4 annas per cent. ..	1 8 6	
Cess	11 14 6	
Shippers' commission	12 4 3	
Miscellaneous	3 6 5	
		39 15 3
Total ..		557 2 2
		Shillings.
Equivalent price in sterling @ 1*s.* 6*d.*		835·70
Insurance ½ per cent. = 4·60		
Superintendence = 0·50		
Freight = 60·94		
Selling brokerage = 9·20		
Interest @ 5 per cent. for 2 months = 7·67		82·91
Calculated price, *c. i. f., London*		918·61
		= £45-18-7

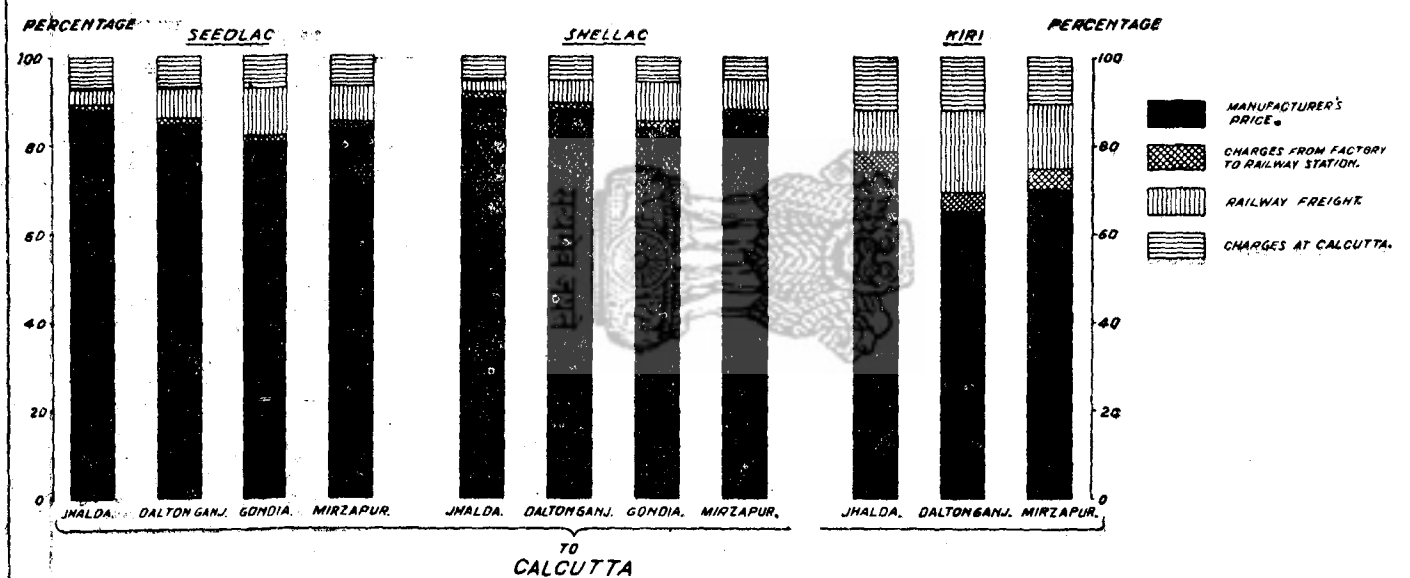
The price at London on the same day was £45 per ton.

It should be noted here that the Calcutta price is for pure T. N. while that at London is for T. N. with 3 per cent. rosin. The price of pure T. N. at London equivalent to a price of £45 per ton for 3 per cent. T. N. works out to over £46 per ton so that the Calcutta price on that date was below the parity of London price on the same date. The cost incurred in exporting to London, *i.e.*, the difference between the *c.i.f.* London price and Calcutta price in the above instance amounted to £7-2-10 per ton. It will be seen from the figures given above that the sea freight was the biggest indi-



[Facing page 84.

A FEW INSTANCES OF PRICE SPREADS FOR SEEDLAC, SHELLAC & KIRI.



vidual item in the cost of distribution, shipper's commission and cess being two other important items.

(5) Price spreads.

(*a*) *Stick lac.*—The price spread from producer to consumer in the case of stick lac depends mainly upon the agencies through which it passes and the distance covered by it in its journey from the place of production to the factory. With an increase in the number of times it changes hands the price spread widens, not only on account of the profit which each intermediary makes, but also due to the higher handling and marketing costs. The total assembling and distribution costs incurred on stick lac reaching the factories at Jhalda and Daltonganj in three different ways during June 1938 are given in Appendix 27 and illustrated on diagram facing page 84. In the first case, the price spread has been worked out for stick lac passing from producer to the small *paikar*, then to big *paikar* and finally to the factory owner through the *arhatiya*. It will be seen that at Jhalda the producer got Rs. 4-0-2 per maund out of Rs. 5-6-9 per maund paid by the factory, while at Daltonganj he got Rs. 2-7-10 per maund out of Rs. 4-1-0 per maund paid by the factory. In the second instance, the producer sold stick lac to a factory through an *arhatiya* while the third instance shows the position regarding a direct transaction between the producer and the factory owner. It will be observed that in the second case the producer received Rs. 4-11-6 per maund and Rs. 3-5-0 per maund out of the prices paid by the factories at Jhalda and Daltonganj respectively. The amount received by the producer was still higher in the third case, *i.e.*, when he disposed of his stick lac direct to the factory, the price obtained by him being Rs. 4-15-5 and Rs. 3-10-9 per maund at Jhalda and Daltonganj respectively. This was due to the elimination of the profit of the *paikars* and to the saving in the marketing costs.

There are, however, certain obstacles in the way of producers selling directly. Firstly, the producers have generally small quantities for sale. Secondly, money for their immediate need can be obtained by sale to village merchants and itinerant dealers or in the local *hats*. Thirdly, the producers being disorganised have poor bargaining capacity and the general impression is that they do not get as good prices from the factories as the big merchants or *arhatiyas* do. In order to remove these disabilities it seems desirable that the lac producers should be organised into co-operative sale societies for the disposal of their scraped lac especially in places where regulated markets may be established.

(*b*) *Seedlac.*—Price spreads in the case of seedlac despatched by manufacturers from two important markets in Bihar and one market each in the Central Provinces and the United Provinces to Calcutta are given in Appendix 25 and illustrated on diagram facing this page. It will be seen that out of a price of Rs. 11 per maund obtained at Calcutta the manufacturer's share in different markets varied from Rs. 8-14-4 to Rs. 9-11-4 per maund, the difference being mainly due to the difference in the railway freight from the different markets to Calcutta.

(*c*) *Shellac.*—Price spreads for shellac between the same markets as in the case of seedlac are also given in Appendix 25 and illustrated on the diagram facing page 85. The share of manufacturers at the different centres in the price of Rs. 14-8-0 per maund paid by the shipper at Calcutta, varied from Rs. 12-3-2 to Rs. 13-2-2 per maund. As in the case of seedlac, the main cause of the difference was the railway freight.

(*d*) *By-products.*—The most important by-product which enters into the trade is *kiri*. The price spreads in respect of *kiri* between three important manufacturing centres and Calcutta are shown in Appendix 26 (see diagram facing page 85). It will be seen that the manufacturer's share in the shipper's price of Rs. 4 per maund varied from Rs. 2-9-9 per maund to Rs. 2-15-7 per maund. The main items of distribution costs are the railway freight and the charges at Calcutta. Of these two, the railway freight in the instances given in the Appendix referred to above is already charged at reduced rates. The selling brokerage at Calcutta is, also, charged at half the rate as levied in the case of seedlac and shellac. But as *kiri* is a very cheap product as compared with the other two, the cost of distribution forms a relatively high proportion of the price.

B.—Retail distribution.

Retail distribution of lac is mostly done by (*i*) bangle makers and merchants, (*ii*) hardware merchants and (*iii*) the grocers. Some of the bigger bangle makers and merchants import shellac, button lac, *kiri*, etc., either from the manufacturing centres or from Calcutta. After allowing for their own requirements, they sell small quantities to the petty bangle makers. The hardware merchants also retail shellac mostly for varnish purposes. The grocers deal in a large variety of goods including lac. They import their requirements through their commission agents in the manufacturing centres.

C.—" Futures " trading.

(1) Number and location of " futures " associations.

The " futures " trading in shellac at Calcutta is done in a room in Stephen House, Dalhousie Square under the auspices of the Calcutta Shellac Exchange Ltd., and at Mirzapur in accordance with the rules and regulations of the Chapra Beopar Vardhini Sabha.

(2) Objects, constitution and methods of business.

(*a*) *The Calcutta Shellac Exchange, Ltd., Calcutta.*—The main objects of the Exchange are to regulate the trade in shellac, seedlac, *kiri*, lac and stick lac and to provide facilities for " futures " trading in shellac. The Exchange is registered under Section 13 of the Indian Companies Act as a profit sharing " private company " with limited liability.

Any individual or a firm which intends to become a member of the Exchange must obtain one fully paid up share of Rs. 200. The admission fee is Rs. 51 and the monthly subscription amounts to Rs. 10.

Every member is required to cover himself by a guarantor. Only members can trade with other members. Non-members can do business through members on payment of 2 annas per 10 maunds as brokerage on sales or purchases.

The management is vested in an Executive Committee consisting of a President, a Secretary and five members. The Board of Directors appoints a Survey Committee of 5 members for the settlement of disputes relating to the delivery of goods and an Arbitration Committee consisting of 2 members for the settlement of other disputes connected with the business. When the two arbitrators differ in their judgment, a member of the Executive Committee is appointed as an umpire and his decision is final.

The unit of transaction for " futures " contract is 10 maunds, and these are six delivery months, namely, February, April, June, August, October and December. Business for each delivery month commences on the first of the second month preceding it and continues up to the last week of the delivery month so that each option runs for about three months. On every Monday (and in the event of Monday being a public holiday on the following business day) subsequent to the date of the contract up to the due date either party is required to pay to the other (as the case may be) the difference between the contract price and the rate announced by the Exchange, the contract to continue at the latter rate.

The hours of business are from 11 A.M. to 5-30 P.M on all week days (excepting Saturdays) in summer and 11 A.M. to 5 P.M. in winter. On Saturdays the market remains open from 11 A.M. to 2 P.M. No business is transacted on Sundays and public holidays.

(*b*) *Chapra Beopar Vardhini Sabha, Mirzapur.*—The main objects of the *Sabha* are (*i*) the promotion of lac trade in general and (*ii*) the provision of arbitration facilities for the settlement of disputes amongst the sellers, buyers and brokers. The admission fee is Rs. 5 and a monthly subscription of Re. 1 is charged for membership. The management of the ordinary affairs of the *Sabha* is vested in the Executive Committee which is appointed by the General Committee. Amongst other duties the Executive Committee is responsible for conducting the survey of the samples received in the office regarding the quality and the arbitration for the settlement of disputes connected with the delivery of goods, etc. The decision of the Executive Committee regarding the quality of samples is final but for other decisions, the aggrieved party can appeal to the General Committee. Only members can transact " futures " business amongst themselves. The usual hours of working are from 10 A.M. to 8 P.M. but when the market is unsettled the time limit is extended upto midnight. The unit of transaction is 25 maunds. There is an " option " every month. The opening date for each contract month is the first of the month in which the " option " starts and the closing date is the 20th of the contract month.

(3) Periodicity and volume of trading.

The Calcutta Shellac Exchange, Ltd., was opened in 1933 and six delivery months were traded in during that year. In 1934, the number of

delivery months was reduced to 4, while from 1935 it was further curtailed to 3. After June 1936, the Exchange suspended work and was reopened in July 1938. The figures showing the volume of trading done in each month since July 1938 are given below.

Volume of futures trading in T. N. shellac at Calcutta.

(Tons.)

Months.	1938-39.	1939-40.	1940-41.
April	..	739	441
May	..	441	312
June	..	441	..
July	110	331	..
August	331	459	..
September	322	220	..
October	514	588	..
November	661	312	..
December	1,065	551	..
January	514	290	..
February	676	463	..
March	680	279	..
Total	4,873	5,114	..

From July, 1938 to September, 1938 trading was being done in one delivery month, *i.e.*, October only but from October 1938 onwards two options ran in one month and only one option in the next month and so on. For instance, in December there were two " options " open for December and February while in January, trading was done only for February. Again in February trading was open for February and April, while in March only April option was open. This explains the almost rhythmic rise and fall in the volume of business in alternate months shown by the figures given in the above table. Except this no marked periodicity is discernible from the above data.

All the " futures " transactions are not settled by actual deliveries. Figures in the following table show the proportion of actual deliveries in settlement of " futures " transactions to the total volume of business done.

Total volume of "futures" trading, actual deliveries and precentage of actual deliveries to total "futures" business.

Contract months.	Total volume of "futures" trading. Tons.	Actual deliveries. Tons.	Percentage of actual deliveries to total business done.
1938—			
October	762	186	24·4
December	1,800	384	21·3
1939—			
February	1,286	256	19·9
April	1,488	303	20·4
June	1,010	113	11·2
August	772	136	17·6
October	643	112	17·4
December	863	117	13·6
1940—			
February	908	131	14·4
April	639	95	14·9
June	753	113	15·0
Total ..	10,924	1,946	17·8

It will be observed from the figures given above that the proportion of actual deliveries to total volume of trading varied from 11·2 per cent. for June 1939 to 24·4 per cent. for October 1938. On an average, 17·8 per cent. of the total "futures" business done for the abovementioned 11 delivery months was liquidated by actual deliveries.

The Chapra Beopar Vardhini Sabha, Mirzapur, does not keep any record of the transactions entered into by its members.

CHAPTER VII.—CONSERVATION.

A.—Practice in regard to storage of stick lac, seedlac, shellac and by-products.

(1) In producing centres.

Producers generally do not store stick lac for long periods. As soon as some is collected from the trees it is scraped and sold in the village *hat* or to a village merchant or *paikar*. Some big producers and village merchants at times hold stocks in anticipation of better prices. They generally use their own dwelling houses for this purpose. Before storing, it is usually dried by spreading on the floor, being frequently raked up to prevent it from getting "blocky". When it gets dry it is heaped in a corner of a room. These heaps are examined every now and then and turned over to prevent fermentation of the organic matter and the formation of lumps.

The rooms usually have mud plastered floors. Bamboo mats are spread occasionally on the floors to prevent dust and earth getting into the lac and to check damp. Sometimes dried stick lac is filled in bags which are rested against walls without the tops being sewn.

(2) In manufacturing centres.

As already stated in Chapter II, the financial position of small manufacturers does not permit them to hold stocks of stick lac or the manufactured products even for short periods. Small quantities of stick lac are purchased at short intervals and the seedlac or shellac manufactured is usually disposed of immediately, the sale proceeds being utilised for fresh purchases. In fact, the manufacturers frequently enter into contracts with buyers for the supply of seedlac or shellac before it is actually manufactured. In such cases the question of storage does not arise.

The bigger factory owners maintain sufficiently large stocks. They invariably possess their own godowns which are usually low roofed, and have stone or cement floors. These godowns are generally provided with small windows and wall holes for aeration. Stick lac is spread on the floor 4″ to 12″ deep depending upon the moisture content, damp stick lac being spread in thinner layers. It is stirred occasionally to prevent blocking. On drying, stick lac is stored in heaps which are examined frequently and if found to clot it is spread again on the floor and dried.

Seedlac or shellac is not usually stored for a long time. As soon as a sufficient quantity is collected it is either sold locally or despatched to Calcutta. When required to be stored, it is spread on the floor of a godown about 3″ to 6″ deep initially and about 15″ to 25″ subsequently when it becomes dry. Seedlac and shellac are sometimes filled in gunny bags which are kept in a cool dry place. High quality shellacs are stored in wooden cases.

(3) In markets.

The same practice of spreading and heaping on the floors as has been described above, is adopted in the *arhatiyas'* and merchants' godowns in the markets. Quite often dried lac, instead of being heaped, is filled in bags which are stacked 3 or 4 high. In the rainy season and summer

months the bags are turned over after an interval of about a week to prevent blocking of the contents.

(4) At ports.

In Calcutta, the stocks of lac are held by brokers, shippers and merchants, usually in godowns having cemented floors. Stick lac, seedlac and the by-products are stored in gunny bags. Ordinary grades of shellac like T. N. are kept in gunny bags while high quality shellacs are usually packed in wooden cases. Occasional turning over of lac is done to prevent blocking. Some high grade shellacs are kept in cold storage (for which facilities are available in the godowns of a company carrying on this business) more so during hot weather.

At the port docks, there is no special shed for the storage of lac as is the case with some grains and oilseeds. Consignments are usually sent to the docks when the steamers begin taking cargo. The goods are unloaded in the sheds and in most cases loaded into the steamer within a few days.

B.—Cost of Storage.

(1) In producing centres.

It has already been stated that producers and village merchants usually store stick lac in their own dwelling houses. When large quantities are involved, storage accommodation is rented. The practice is, however, not common and the rent in such cases varies from Re. 1 to Rs. 3 per month for a godown having a capacity of about 100 maunds. This works out to about 4 pies per maund per month. The cost of occasional turnings amounts to about 9 pies per maund per month during the drying period. Thereafter the cost of turning over decreases as this operation is done at comparatively longer intervals.

(2) In manufacturing centres.

The manufacturers generally have sufficient accommodation of their own and do not generally require any additional space. Labour charges for raking fresh stick lac spread out on floors for drying is estimated at about 6 pies to 1 anna per maund during the first month and 3 pies to 6 pies per maund per month for turning over bags subsequently. For seedlac and shellac also, the labour charges roughly amount to about 3 pies to 6 pies per maund per month.

(3) In markets.

In markets, the stocks of stick lac are mostly held in *arhatiyas'* godowns. The *arhatiyas* in Bihar generally do not charge anything from their clients for storage for less than a month. They have usually their own godowns and employ their own men who handle stick lac from the time it arrives in the market till it is sold. The labour charges given above for the manufacturing centres hold good for the markets also. In fact the manufacturing centres are located in the important markets. The godown rent usually varies from 3 pies to 6 pies per maund per month. In the Central Provinces stick lac is not generally stored for a long time

but if it is stored, the *arhatiya* charges rent at varying rates depending upon the quantity to be stored. In Gondia market, for large quantities stored in bulk, the charge amounts to Rs. 20 to Rs. 25 per month per 1,000 maunds while in the case of bags the rate varies from Rs. 3 to Rs. 4 per month per 100 bags. At Dhamtari 6 pies to 9 pies per bag per month are charged for small quantities while for large quantities the customary rate is Re. 1 per month per 100 bags.

It would appear that on an average the godown rent in upcountry markets amounts to about 3 pies to 6 pies per maund per month. The labour charges vary from 6 pies to 1 anna per maund per month during the period of initial drying and 3 pies to 6 pies per maund per month subsequently.

(4) At ports.

The brokers at Calcutta generally do not charge any rent from their clients for goods stored in their godowns. If a godown is taken on rent, the rent charges work out to about 1 anna per maund per month in winter and Re. 0-1-6 per maund per month in summer as smaller quantities are stored in the same place in summer than in winter to prevent blocking. Labour charges for turning over bags amount to about 1 anna per maund per month, except in winter when no turning is given. The total rent and labour charges thus amount to about Re. 0-2-6 per maund in summer and 1 anna per maund per month in winter.

The charges for cold storage vary from 2 annas to 4 annas per maund per month.

At Calcutta port, rents for appropriate periods are charged by the Port Commissioners when goods for shipment are received at their sheds before exports are opened for the vessel by which the goods are to be shipped, when goods are not shipped by the steamer for which they are booked, when goods received for shipment are subsequently removed and when goods received for shipment are not booked at the time to a specified ship. The rate of rent in the case of lac before the outbreak of the present War was 3 annas per ton or part thereof per week or part of a week but the Port Commissioners reserved the right to charge three times this rate in the case of goods not shipped by the steamer by which they were booked if in their opinion, the shutting out of goods was avoidable.

C.—Effect of storage.

(1) Qualitative.

The quality of stick lac, seedlac and shellac deteriorates in storage after a certain period depending upon the conditions of storage. It is generally believed that if stick lac is properly dried before storage and is free from predators and parasites, it keeps well for a period of about six to eight months in a cool dry place. After this period polymerisation sets in and the recovery of shellac goes down rapidly. The colour also takes on a darker shade. The least damage is sustained when lac is stored on cemented floors and is spread not more than about 6″ deep and turned over occasionally, depending upon temperature. In the case of bags, they require occasional turning over especially in summer and rainy season. If neglected in storage, formation of small lumps takes place and in worse

conditions large blocks result. Occasionally a consignment of stick lac may be seen which is nothing but a hard solid mass.

In the case of seedlac and shellac also, polymerisation takes place after some time and the older the lac, the less soluble in alcohol it becomes. During storage under unfavourable conditions, the following physical changes may be brought about :—

(*i*) Lac may get " set " or " matted ". Due to this change, the price is reduced by about 4 to 8 annas per maund.

(*ii*) Subsequently it may get " blocky ", *i.e.,* the grains or flakes may form into lumps. In this case the price is reduced by about 12 annas to Re. 1 per maund.

(*iii*) The formation of hard mass may take place due to melting of lac. In such cases the price is reduced by about Re. 1 to Rs. 2 per maund.

Button lac has a tendency to develop cracks on storage. Storing in a moist place is stated to prevent cracking.

As regards the comparative ability of stick lac, seedlac and shellac to stand storage, seedlac is reported to be the worst in this respect. Usually it cannot be kept in good condition for more than a few months. Of stick lac and shellac some say that the former stands storage better than the latter while others hold exactly the opposite view. This point deserves proper scientific investigation.

As has been stated earlier, a few important shippers store shellac at Calcutta in cold storage particularly in summer season and it is reported that the quality of lac is maintained for fairly long periods of storage. Experiments undertaken by the Indian Lac Research Institute, Namkum with a view to ascertaining the usefulness of cold storage for storing seedlac and shellac indicate that there is no appreciable advantage by cold storage in the case of seedlac but the deterioration in the physical properties of shellac is minimised. A note on the subject from the Director, Indian Lac Research Institute, Namkum, may be seen in Appendix 28.

(2) Quantitative.

As explained earlier, stick lac is spread on the floors of godowns and raked over now and then for drying purposes before it is finally stored. The loss in weight which occurs during this initial drying varies considerably, depending upon a number of factors such as (*i*) the condition of the crop whether *ari* or *phunki,* (*ii*) the amount of woody matter contained in the stick lac, (*iii*) the number of turnings given and (*iv*) the condition of aeration in the godowns. In the case of *ari* lac, the loss is much more than in *phunki* lac.

The loss due to driage in the case of *ari* lac weighed soon after it is cut and scraped may amount to as much as 30 per cent., while for *phunki* lac, it may be about 5 to 10 per cent. The woody matter loses weight due to driage and the greater the amount of woody matter, the greater is the loss in the total weight of stick lac. If the stick lac is not raked well, the loss due to evaporation is appreciably reduced. By the time the producers dispose of their stick lac some of this loss has already occurred and the loss in the initial drying in the buyer's godown is consequently reduced. It is estimated that, on an average, the loss in weight during the initial drying in the factory owner's godowns varies from 5

to 15 per cent. in the case of partly dried stick lac, whereas in the case of well-dried consignments the loss varies from ½ per cent. to 1 per cent. only.

As regards seedlac and shellac, there is very little loss during storage provided they have been properly dried before being stored. The loss seldom exceeds ½ to 1 per cent. In winter, however, seedlac and shellac do not dry properly.

D.—Carryovers and seasonal variations in stocks.

The estimated carryovers of stick lac, seedlac and shellac in terms of stick lac from year to year, compiled from the crop statements issued by the Indian Lac Cess Committee are given in Appendix 29. Calcutta stocks are not included in these figures.

No regular statistics are available about the stocks at different markets from time to time and as such it is difficult to comment on the seasonal variations in stocks with any degree of accuracy. However, *Baisakhi* crop being the major crop in the main lac producing tracts, stocks of stick lac are reported to increase appreciably after the arrival of this crop. As the *Baisakhi* crop generally begins to arrive in the markets in April and the arrivals are at their maximum in May-June, the stocks in these months are usually heavy. The arrival of the *Katki* and *Kusmi* crops bring about an increase of stocks again in November-December.

E.—Possibilities of improving storage facilities in India.

There are two kinds of losses in storage of lac—quantitative and qualitative. The former losses are mainly due to driage and are unavoidable. The qualitative losses are more pronounced in summer months and rainy season. The extent of deterioration during this period varies greatly, depending upon the conditions of storage. If lac is kept on *pakka* floors being spread not more than 6 inches deep and is turned over occasionally, the loss is greatly reduced. It is roughly estimated that, on an average, the deterioration in quality due to summer heat and rainy season amounts to about 4 annas per maund in the case of stick lac, and 8 annas per maund in the case of seedlac and shellac. It may be possible to further reduce the loss to some extent by devoting more attention to the products during storage.

When shellac is stored under cold storage, the deterioration is reported to be considerably minimised especially when storage over a long period is involved. The cost of storage in the existing cold store at Calcutta is reported to be about 3 annas per maund per month which at the present level of shellac prices is reported to be economical only for better grade shellac. If the prices of shellac rise, cold storage may become economical for lower grades of shellac also. Similarly, the provision of cold storage facilities at a cheaper cost is likely to result in large quantities of shellac being stored in air conditioned godowns. The possibilities of developing storage of shellac in air conditioned godowns and provision of cold storage facilities at a cheaper cost may be further examined.

CHAPTER VIII.—HANDLING AND TRANSPORTATION.

A.—Handling—methods and costs.

(1) At the forests, plantations, villages, etc.

The bulk of stick lac is produced by small producers who either own a few trees or take a few on rent from the landlords and other owners. The harvesting, transportation of lac-bearing twigs, scraping lac from twigs and the drying of stick lac are all performed by the producer himself with the aid of his family. No hired labour is usually engaged. The big producers such as landlords, contractors and forest departments engage hired labour for harvesting and scraping and the costs incurred on these operations have already been discussed in Chapter II. Scraped lac is carried to their godowns on hired bullock carts or pack animals. The transportation charges in such cases work out at about a little less than 3 pies per maund per mile.

Before sale, some producers give a casual dressing to stick lac. The large pieces of twigs, stones, etc., are picked out by hand, the smaller ones being separated by winnowing. The scraped stick lac is then either sold locally to the village merchants or is taken to the nearest *hat* or market. In the case of sales in the villages there are practically no handling costs. The weighment is done by the buyer and the quantities of stick lac being small no hired labourers are engaged for filling and sewing bags.

(2) At hats.

At *hats*, the sellers either exhibit their stick lac for sale or visit the various traders having their stalls there. After the bargain is struck, the trader weighs the produce with a handscale. The seller helps in the weighing operation by filling in the scales. When bags are full they are sewn by coolies and transported usually on bullock carts and sometimes on lorries to the bigger markets and factories. The coolies engaged for filling in and sewing bags are usually paid at the rate of 6 pies per maund of stick lac.

(3) At the markets.

On arrival at the market stick lac is unloaded and heaped or deposited at the *arhatiya's* shop usually by the cartmen who bring it, and sometimes by the labourers employed at the *arhatiya's* shop. Weighing is done by a weighman who is assisted by *palledars* or *hammals*.

The charges for these operations have already been discussed in Chapter V.

In spite of the preliminary dressing sometimes given by the producers it is estimated that stick lac brought to factories contains on an average 5 to 10 per cent. of such impurities as are easily removable by picking or using simple sieves without practically any cost. If producers took care to remove such impurities and no subsequent adulteration was done by the village merchants and *paikars*, appreciable saving could be made in the cost of handling and transportation of stick lac. The advantages of selling cleaner stick lac should, therefore, be brought to the

notice of the producers and *paikars*. For instance, it may be part of the work of the demonstrators appointed by the Indian Lac Cess Committee to see that clean stick lac is marketed.

(4) At rail heads.

Lac is brought to rail heads in gunny bags except in the case of shellac for which wooden cases are also used. On arrival at a railway station the bags or cases are unloaded from the vehicles (usually carts and sometimes lorries) and stacked in railway sheds. This may be done by the cartmen in the case of small loads or special labour may be employed for unloading and carrying bags and cases. The charges in such cases vary from 1 to 2 pies per bag or case.

Before booking, the goods are weighed. In the case of small consignments of a few bags all the bags are weighed while in larger consignments made up of bags or cases of uniform weight only a few (about 10 per cent. of the bags or cases) may be weighed to arrive at the total weight.

After weighment the goods are usually loaded into railway wagons within 24 hours. Loading and unloading are ordinarily done by the railway, the freights being inclusive of these charges.

The method of hiring labour by railways differs from one administration to another and sometimes even on different stations in the same administration. In certain cases labourers are engaged on monthly wages while in others the right of loading and unloading is auctioned to contractors who undertake to do the work at fixed rates. These contractors employ labourers on daily or monthly wages and get the work done under their own supervision.

The use of hooks is forbidden by the railway authorities but the labourers often disregard the rule because hooks facilitate the loading and unloading work. The hooks cause holes in the bags, out of which the contents run out. The loss is comparatively more in the case of seedlac since the grains are small and liable to leak out with greater ease.

Weighment of goods at the time of delivery is not common and is usually resorted to if some bags or cases appear to have been tampered with on the journey.

The clearing or booking of consignments at railway stations is often entrusted to a functionary known as station *dalal* (broker) or *hundikar*. For his services he may be paid ½ pie to 1 pie per maund or 4 annas to 1 rupee per consignment, depending upon the size of the consignment and the amount of business handled.

(5) At river heads.

It is only in Assam and to a very small extent in Bengal that lac is transported by river. Stick lac is brought to the river head in bags, loading and unloading charges for which are usually included in the boat hire.

(6) At ports.

Calcutta is the only port which figures in the lac trade. When a bargain is struck between a broker and a shipper, the latter usually

gets the goods transported to his own godowns by carts or lorries. Consignments of high quality shellac are sometimes taken to 'cold storage' godowns, where they remain till such time as they are exported. The loading and transport charges are paid by the shippers. For loading, a charge of 3 pies per bag of 2 maunds is paid while the transport charges vary according to the distance involved, the average charge being about 6 pies per maund inclusive of unloading charges. Prior to export, mixing of different qualities of seedlac or shellac as the case may be, is done in order to produce an article answering to the requirements of the buyers. The cost of piling at shippers' godowns is reported to be about 1 anna per maund. The bags or the cases are then transported to the port on bullock carts or lorries, the transport charges being about 3 annas per bag and 4 annas per case of 2 maunds or 1½ cwt. each. Unloading at the port is arranged by the port authorities, the charges for unloading working out to about 4 annas per ton. The bags or cases are unloaded in the sheds from where they are taken into steamers. Gates remain open from 10 A.M. to 5 P.M. but special facilities are offered for consignments to be sent in cold storage'. For such consignments, the shippers inform the port authorities on the previous day and the goods arrive early next morning by about 8 or 9 A.M. These are unloaded from the lorries straight into the steamers without having to wait in the sheds.

B.—Packing—containers and weights.

Stick lac, seedlac, ordinary qualities of shellac and by-products are invariably packed in gunny bags while high quality shellacs are put in light wooden or plywood cases. The containers used in the internal trade are generally of lower quality than those employed for export purposes. In the former case several types of bags, usually second-hand are used. For export purposes, ordinary qualities of shellac like T. N. are packed in double bags the outer one being a new E. type bag measuring 52″ × 28″. Seedlac is shipped in D. W. bags measuring 40″×28″. For shipments to America, single E. bags are used but they are lined inside with a cotton bag. Superior qualities of shellac are shipped in wooden boxes of which there are two types—plywood box measuring about 26″ ×26″ × 18″ and ordinary wooden box measuring about 22″ × 36″ × 12″ to 13″. The ordinary wooden box is lined inside with hessian and is packed in gunny cloth while no lining or packing is used for the plywood boxes.

The usual capacity of a bag varies from 1¼ maunds to 1½ maunds in the case of stick lac while for seedlac it varies from 1½ maunds to 2 maunds for internal trade and 2 maunds (164 lb.) for export purposes. The net weight of shellac in a bag is usually 1¼ maund in the internal trade and 2 maunds in the export trade. The contents of a box usually weigh 2 maunds or 1¼ cwt.

C.—Transportation.

(1) By road.

(*a*) *Headloads.*—Small producers usually carry stick lac to *hats* in headloads and sometimes in *bahangi** loads. In the former case stick lac is put in bamboo baskets or gunny bags or tied in a piece of cloth. The headloads generally weigh under 20 seers while *bahangi* loads may be upto a maund.

(*b*) *Pack animals.*—In certain lac producing tracts, *e.g.*, Palamau district in Bihar, conditions are unfavourable for vehicular traffic and lac is transported from producing centres to *hats* largely on pack animals. In other tracts also the itinerant dealers often have their own pack animals which they take with them in their rounds. The pack animals —bullocks, horses, asses or donkeys—carry lac in special containers with two pockets, which after filling are balanced on the back of the animal, one pocket hanging on either side. The capacity of an animal to carry load varies with its strength and also the condition of the road. On an average, each animal carries from about 2 to 4 maunds, the usual load in certain tracts in Bihar being a *tangi* weighing 4 maunds and 5 seers. During the rainy season, when *kachcha* roads become impassable for carts, the demand for pack animals increases.

(*c*) *Bullock carts.*—Where bullock carts can ply and the quantity is sufficient to make a cart load, they are employed for the transport of lac from producing centres to *hats* and from there to markets. In a bullock cart, stick lac is transported usually in gunny bags and sometimes in bulk, the carts in the latter case being lined with hessian cloth or sheets of strongly woven fabric made from hemp, coarse wool, etc. The carts are drawn by one or a pair of bullocks or buffaloes. The capacity of a cart depends on the number and strength of animals and the condition of the road. The normal weight carried by a bullock cart drawn by two bullocks is about 8 to 10 maunds on *kachcha* roads and about 12 to 15 maunds on *pakka* roads.

(*d*) *Motor lorries.*—Motor lorries have appeared in recent years. They ply on metalled or motorable roads and carry lac from roadside *hats* to markets and factories, and from one market to another. Seed-lac and shellac are also transported by lorries from some manufacturing centres in Bihar to Calcutta. Lorries compete seriously with railways between certain points so much so that the railways have had to introduce specially reduced rates, *e.g.*, from Ranchi, Jhalda, and Purulia to Calcutta. The popularity of motor lorries is reported to be increasing as besides providing quicker service at lower cost they load the produce at the consignor's godown and unload it at the consignee's place, eliminating handling and transport to and from railway stations together with the formalities attendant on booking and taking delivery of goods. As compared with bullock carts, motor lorries are generally used for longer hauls except in Calcutta where they are used side by side with carts for transporting goods from the shippers' godowns to the port.

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* *Bahangi* consists of a pole at both ends of which containers for carrying loads are suspended by ropes ; the pole is balanced on the shoulders.

(*e*) *Cost of conveyance.*—The cost of conveyance by road depends upon a number of factors such as, the condition of the road, the distance and quantities involved, the locality, the season and the possibility of getting a return load. Transport charges are higher on *kachcha* roads as compared with *pakka* roads and for short distances as compared with long hauls. Again, the rates are higher in big cities than in smaller markets. For instance, the transport charges from shippers' godowns to the port at Calcutta on an average amount to about 4 pies per maund per mile as against 3 pies per maund per mile from the manufacturers' godowns to the railway station at Mirzapur. During rainy season when *kachcha* roads are not easily negotiable the charges are highest while they are generally lowest during winter when dry weather prevails. When there is a possibility of getting a return load, transport charges are lower.

The cost of transportation by bullock cart in the main lac producing tracts normally varies from 1 to 2 pies per maund per mile on metalled roads and from 2 to 3 pies per maund per mile on *kachcha* roads. The cost of transportation by pack animals approximately equals that by bullock cart on *kachcha* roads.

Transport by motor lorries is in many cases cheaper than bullock carts for longer hauls. For instance, the lorry rate for carrying stick lac from Gumla to Ranchi—a distance of about 80 miles—is about 8 annas per maund as against 12 annas per maund charged by bullock carts. This works out at 1·2 pies per maund per mile for lorry and 1·8 pies per maund per mile for bullock carts. Motor lorries reduce their charges appreciably when they compete with railways. For example, the charges from Ranchi to Calcutta—a distance of about 280 miles—were reported to be about 8 annas per maund only in 1940. Similarly from Purulia to Calcutta (about 250 miles) the rate was also 8 annas per maund. In both these cases the cost of transportation works out at less than half a pie per maund per mile.

(2) By rail.

In spite of the fact that lorries have started transporting lac, the great bulk is still moved by rail.

(*a*) *Railway freight.*—Railway freight rates fall into the following three divisions :—

(*i*) Class rates,
(*ii*) Schedule rates, and
(*iii*) Station-to-station rates.

(*i*) *Class rates.*—The various commodities are grouped under 16 classes. The maximum and the minimum rates per maund per mile for each class are fixed and all rates, of whatever kind, subject to a few minor exceptions, must fall within these limits. If no special or schedule rates are quoted, freight is charged at the maximum of the class and this rate is known as ordinary or class rate.

The following maxima and minima have been fixed for different classes since May 1936 :—

Class.	Maxima per maund per mile (pies).	Minima per maund per mile (pies).
1	·38	
2	·42	
2A	·46	·100
2B	·50	
2C	·54	
3	·58	
4	·62	
4A	·67	
4B	·72	
5	·77	
6	·83	·166
6A	·89	
7	·96	
8	1·04	
9	1·25	
10	1·87	

The rates quoted above are exclusive of terminals, short distance charges and tolls. Stick lac, seedlac and lac refuse fall under class 2 while button lac, garnet lac and shellac are put in class 4.

(*ii*) *Schedule rates.*—A rate quoted lower than the maximum of the class rate is known as a Schedule rate. The Schedule rates may be on a uniform basis such as ·250 pie per maund per mile or it may vary according to distance on the telescopic (cumulative) principle. A schedule rate may be quoted per maund, per ton or per wagon. So far as lac is concerned there are no schedule rates except on the East Indian Railway where they are applicable to stick lac, seedlac and lac refuse booked to Mirzapur only. These rates are charged according to C|L Schedule which is given below :—

C|L Schedule rate.

	Pie per maund per mile.
For the first and upto 100 miles	·380
From 101 to 300 miles add at	·220
From 301 to 600 miles add at	·130
Above 600 miles add at	·110

(*iii*) *Station-to-station rates.*—A station-to-station rate is a special rate for the total distance between two specific points. These rates are generally quoted to meet the competition from other agencies operating between two particular points, or with the object of stimulating traffic

between specific points. A few specimens of station-to-station rates together with the freight rates calculated at class rates are given below :—

Rates of freight on lac.*

(Owners' risk)

From	To	Railway.	Station-to-station rate.		Class rate.	
			Shellac.	Seedlac and Stick lac.	Shellac.	Seedlac and Stick lac.
			Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Ranchi (Bihar) ..	Calcutta	B. N.	0 6 0	0 6 0	0 14 2	0 9 10
Purulia (Bihar) ..	„	„	0 6 0	0 6 0	0 10 2	0 7 0
Jhalda (Bihar) ..	„	„	0 6 0	0 6 0	0 11 11	0 8 4
Thulin (Bihar) ..	„	„	0 6 0	0 6 0	0 12 2	0 8 6
Gondia (C. P.) ..	„	„	1 5 0	†1 3 0	2 1 4	1 7 0

(*b*) *Terms of booking.*—Lac is booked at railway risk, except on the East Indian Railway for traffic in stick lac, seedlac, and lac refuse to Mirzapur, in which case consignments are accepted at reduced rates (owners' risk). Similarly consignments booked at station-to-station rates are at owners' risk.

Wharfage is charged on goods which remain lying on the station premises above a certain time limit, the free time and the rates of wharfage varying on different railways. For instance, on Bengal Nagpur Railway, the rate of wharfage is usually 2 pies per maund or part of a maund per day or part of a day, calculated after the expiry of 48 hours from midnight of the day on which the consignment is brought to the railway station for outward traffic. The same rate of wharfage applies to inward traffic on goods not removed from the railway premises at stations where goods sheds are not provided, within 48 hours after the midnight of the day on which they are unloaded at destination. On shellac, an enhanced rate of 6 pies per maund is levied and the free time limit is reduced to 15 hours. At stations where goods sheds are provided, wharfage is charged at 12 pies per maund per diem on shellac and 4 pies on other types of lac if not removed by 5 P.M. on the second day following that on which they are available for delivery. At Shalimar (Calcutta) the rate of wharfage is 6 pies per maund for all types of lac.

On the East Indian Railway, wharfage is charged at 1 pie per maund or a part of a maund per day or part of a day on goods not booked upto midnight of the day next following that on which goods are brought for outward traffic and on consignments not removed within 48 hours after

* Increased charge 12½ per cent. from 1st March 1940.

† Seedlac only.

the midnight of the day on which consignments are made available for delivery. At Howrah, for inward traffic, the rate of wharfage levied by the East Indian Railway is 2 pies instead of the usual charge of 1 pie per maund per day. Wharfage is charged on the actual weight of a consignment, if the freight has been charged by weight, and on the carrying capacity of the wagon if the freight has been charged on wagon basis.

In the case of full wagons, demurrage is charged if the goods are not loaded or unloaded as the case may be within the free time allowed. On the Bengal Nagpur Railway demurrage is charged at the rate of one anna per ton of carrying capacity per hour or part of an hour after the expiry of 24 hours from the time at which the wagons are placed ready for loading or unloading. On the East Indian Railway the demurrage is usually charged at the rate of 8 pies per ton or part of a ton after the expiry of 9 hours of day light from the time the vehicles are placed in position for loading or unloading. At Shalimar (Calcutta) demurrage is charged after 6 hours of day-light instead of the usual 9 hours, but the rate is reduced from 8 pies to 4 pies.

(3) By river.

As stated earlier, transport of lac by river is confined mainly to Assam only. Country boats are employed for this purpose and the charge amounts to about 1 pie per maund per mile inclusive of loading and unloading charges.

(4) By sea.

(*a*) *Coastal trade.*—The coastal trade in lac between different ports of India is practically negligible. For instance, the total annual imports of stick lac (for which figures are available) received into the ports of one province from another amounted to about 14 tons in all during the three-year period ending 1939-40. The bulk of the coastal trade is carried on between Calcutta and the ports in the Madras Province, the latter importing stick lac from the former.

(*b*) *Export trade.*—Calcutta is the only port which figures in the export trade in lac. The rates of freight are determined periodically by a conference of the shipping lines.

The rates of freight between Calcutta and the United Kingdom (London, Liverpool, Dundee and Glasgow) are given below :—

Steamer freight on shellac from Calcutta to the United Kingdom (London, Liverpool, etc.)

(Per ton of 16 cwt.)

(Subject to 10 per cent. rebate not exceeding 5*s*.)

	Maximum.	Minimum.	Average.
	s. *d.*	*s.* *d.*	*s.* *d.*
1935-36	42 6	42 6	42 6
1936-37	48 9	42 6	44 0
1937-38	60 0	48 9	55 0
1938-39	53 9	53 9	53 9
1939-40	80 9	53 9	65 6
1940-41	106 5	80 0	95 2

Source.—Calcutta Prices Current and Money Market Report.

The rates of freight began to increase after the outbreak of War in Europe in September 1939 and rose upto 80*s.* 9*d.* in January 1940. The rate remained at about this level up to July 1940 when it increased further to 92*s.* 6*d.* From November 1940 a surcharge of 15 per cent. was levied on the freights. It should, however, be noted that the rates of freight given for 1940-41 represent only nominal rates as the freights were quoted as space became available.

CHAPTER IX.—GRADING AND STANDARDISATION.

A.—Specifications used by the trade in India.

(*a*) *Stick lac.*—Stick lac as it arrives in the market, contains a good deal of impurities such as pieces of wood and earth, besides dead or living bodies of insects. The amount of such impurities varies greatly in various consignments. The buyers usually make a visual examination of each lot and offer prices on the basis of their estimates of the outturn of seedlac or what is called in trade "*chowri parta*". Persons experienced in trade are usually able to make fairly accurate estimates, and when they err, they more often than not do so in their own favour. Another method which is coming into vogue is known as the "*Beoli* basis". According to this method, a part of the stick lac brought for sale is spread on the floor 8" to 10" deep and samples are taken out from various places at random to make up a sample of about 20 seers of stick lac. Out of this quantity, a smaller sample of about 2 seers is taken. It is sifted through a 20 mesh sieve. All that passes through the sieve is taken as dust. From the sieved stick lac all pieces of wood, earth and stone are picked out by hand. The cleaned sample is then crushed with a piece of stone and subsequently winnowed to remove more dirt and impurities. The crushed and cleaned stick lac is dried on the floor for about a couple of hours and then weighed. The yield of the cleaned product per maund of stick lac is calculated and the prices offered accordingly. Sometimes factories go even a step further and determine the yield of seedlac from an average sample of about 20 seers of stick lac before purchasing the material. The factors taken into consideration by trade in assessing the quality of stick lac have already been discussed in Chapter III.

(*b*) *Seedlac.*—The various trade descriptions have already been referred to in Chapter III. Seedlac is usually purchased on the basis of impurities insoluble in hot alcohol, the franchise generally being 3 per cent. in the case of best Golden *Kusmi*, 3 per cent. in the case of ordinary *Kusmi*, Golden *Baisakhi* and fine *Baisakhi* and 5 per cent. in the case of ordinary *Baisakhi*. Seedlac is guaranteed not to contain any rosin or other rosinous impurities.

(*c*) *Shellac.*—Shellac is generally traded in on the basis of 3 per cent.* impurities together with a stipulation regarding rosin content. In purchases made on rosin-free basis, the buyer has the option to reject or to claim allowances if rosin is present. Shellac containing rosin is generally purchased on the basis of 12 per cent. rosin. Shellac with 3 per cent. rosin is sometimes put on the market by mixing pure and 12 per cent. rosin shellac in the proportion of 3 to 1. Apart from the specifications in respect of impurity and rosin contents, purchasers may or may not require shellac to be guaranteed free from orpiment. The rejection limits and scales of allowances regarding rosin content and impurities will be discussed in a later section.

(*d*) *By-products.*—No specifications appear to be used in the trade in the case of *molamma* and *passewa*, while *kiri* is sometimes classified into different qualities such as *Superfine kiri*, T. N. pure *kiri* and T. N. rosinous *kiri*.

*Recently the franchise has been lowered to 2 per cent. in the case of Standard I and higher qualities.

B.—Specifications used in the export trade.

The standard specifications adopted by the United States Shellac Importers Association Inc. and the London Shellac Trade Association are generally used as the basis of export trade.

(1) UNITED STATES.

(*a*) *Stick lac.*—In the case of stick lac 10 per cent. alcohol insoluble impurities are allowed free. For any excess the buyer gets an allowance at the rate of 1 per cent. of the invoice value for each 1 per cent. of impurities above the free tolerance limit.

(*b*) *Seedlac.*—The specifications for seedlac are in respect of the following items :—

(*i*) Moisture.
(*ii*) Impurities.
(*iii*) Bleachability.
(*iv*) Colour.

(*i*) *Moisture.*—Seedlac should not contain more than 2 per cent. moisture. For every 1 per cent. in excess of this limit the buyer receives an allowance of 2 per cent. of the invoice value.

(*ii*) *Impurities.*—The franchise for alcohol insoluble impurities is 3 per cent. in the case of *Kusmi-seedlac* and 5 per cent. in the case of *Baisakhi, Rungeen* and *Rangoon* seedlacs. The buyer has the option of rejection if the alcohol insoluble impurities exceed 5 per cent. in the case of *Kusmi-seedlac* and 8 per cent. in the case of others. Allowances are charged at the rate of 2 per cent. of the invoice value for each 1 per cent. above the free tolerance limit.

(*iii*) *Bleachability.*—The quantity of the prescribed bleaching solution to bring the seedlac to standard colour should not exceed 75 c.c. for *Kusmi* seedlac and 110 c.c. for *Baisakhi* seedlac*. When quantities required are in excess of the above mentioned limits, the following penalties apply :—

Baisakhi seedlac—Standard 110 *c.c.*

110 c.c. or less—	No penalty.
Over 110 c.c. and not exceeding 115 c.c.	penalty 1 per cent. of invoice value.

*These have since been revised. The revised specifications are as under :—

Bysacki Standard—115 c. c.

115 c. c. or less	no penalty.
Over 115 c. c. and not exceeding 120 c. c.	penalty 1 per cent. of invoice value.
Over 120 c. c. and not exceeding 125 c. c.	penalty 2½ per cent. of invoice value.
Over 125 c. c. and not exceeding 130 c. c.	penalty 5 per cent. of invoice value.
Over 130 c. c.	rejectable.

Fine Bysacki Standard—95 c. c.

95 c. c. or less	no penalty.
Over 95 c. c. and not exceeding 100 c. c.	penalty 1 per cent. of invoice value.
Over 100 c. c. and not exceeding 105 c. c.	penalty 2½ per cent. of invoice value.
Over 105 c. c. and not exceeding 110 c. c.	penalty 5 per cent. of invoice value.
Over 110 c. c.	rejectable.

Over 115 c.c. and not exceeding 120 c.c.	penalty 2½ per cent. of invoice value.
Over 120 c.c. and not exceeding 125 c.c.	penalty 5 per cent. of invoice value.
Over 125 c.c. and not exceeding 130 c.c.	penalty 10 per cent. of invoice value.
Over 130 c.c.	rejectable.

Kusmi seedlac—Standard 75 c.c.

75 c.c. or less.	no penalty.
Over 75 c.c. and not exceeding 80 c.c.	penalty 1 per cent. of invoice value.
Over 80 c.c. and not exceeding 85 c.c.	penalty 2½ per cent. of invoice value.
Over 85 c.c. and not exceeding 90 c.c.	penalty 5 per cent. of invoice value.
Over 90 c.c. and not exceeding 95 c.c.	penalty 10 per cent of invoice value.
Over 95 c.c.	rejectable.

(*iv*) *Colour.*—The colour should conform to that of the officially adopted standard types ; allowances for deliveries falling short of the standard are settled by arbitration.

(*c*) *Shellac.*—Specifications for the various grades of shellac are given in Appendix 30. It will be seen that the grades fall under two groups, one containing orpiment and the other free of orpiment. (F.O.) The franchise for alcohol insoluble impurities varies from 1¼ per cent. in F.O. Superfine to 3 per cent. in Heart and T. N. grades. The corresponding rejection limits are 2½ per cent. and 5 per cent., respectively with the exception of Heart in which case it is 4 per cent.

If the alcohol insoluble impurities are in excess of the franchise, allowance is claimed by the buyer at the rate of 2 per cent. of the invoice value for 1 per cent. in excess of the free tolerance and 4 per cent. of the invoice value for each additional 1 per cent.

The tolerance for rosin is 3 per cent. in London Standard T.N. and Heart* and the buyer has the option of rejection if it exceeds 4 per cent. All other grades are traded in on rosin-free basis. The buyer has the option of rejection if any rosin is detected in F.O. grades and if it exceeds 1 per cent. in the case of London Standard Pure T.N., No. 2 Pure T.N. and Superfine. Allowances are claimed as in the case of alcohol insoluble impurities.

For orpiment the tolerance is fixed at ·2 per cent. in grades containing orpiment and ·025 per cent. only in F.O. grades. The buyer has the option of rejection if the orpiment content exceeds ·3 per cent. in the former and ·03 per cent. in the latter. For grades containing orpiment, if orpiment content exceeds ·2 per cent. but is below ·25 per cent., penalty is levied at the rate of 1 per cent. of the invoice value.

*According to revised specifications, Heart Shellac is to be rosin-free, rejection over 1 per cent.

From ·25 per cent. to ·30 per cent., the rate of penalty is enhanced to 2 per cent. of the invoice value.

The limit for water soluble matter is 0·5 per cent. When it exceeds this limit, allowance is charged at 1 per cent. of the invoice value for each 1 per cent. of water soluble in excess of 0·5 per cent. It would be interesting to note here that the water soluble matter may consist of water soluble adulterants, some albuminous matter naturally present in lac, or a little water soluble dye in the case of poor quality shellacs made from under-washed seedlacs. No specifications are laid down for colour but it is required to conform to that of the officially adopted standard types, failing which allowances are settled by arbitration.

The samples are examined according to official methods of analysis prescribed by the United States Shellac Importers' Association Inc.

(2) UNITED KINGDOM.

The London Shellac Trade Association prepares standard samples each season and judges the quality of the deliveries with reference to these standard samples, making adequate allowances where necessary.

The Association has adopted the following six standards for seedlac :—

1. Golden *Kusmi.*
2. Fine *Kusmi.*
3. *Kusmi.*
4. Golden *Baisakhi.*
5. Fine *Baisakhi.*
6. *Baisakhi.*

A detailed analysis of samples of seedlac representing the above standards for the year 1937 is given in Appendix 31.

Shellac is traded in under three different contracts for T. N., orange and garnet shellacs. The contracts specify the amount of impurities and allowances as indicated in the table below :—

	T. N.	Orange.	Garnet.
Condition	Should be in free	condition.	
Basis	Equal to standard	sample.	
Admixture tolerance upto	3 per cent.	3 per cent.	10 per cent.
Buyer's option to reject if admixture over	10 per cent.	5 per cent.	15 per cent.

In the case of samples which contain admixture between the tolerance and rejection limits, fair allowances are made by arbitration. If the adulterating matter exceeds the rejection limit the buyer has the option of taking the same with the allowance fixed by the arbitrators or of having it invoiced back to the sellers at a price to be fixed by the same authority.

C.—Practice regarding sales.

(1) SALES ON SAMPLE.

Sales of stick lac do not generally take place on the basis of samples except in Calcutta where small quantities are sold by brokers on sample

basis. The sales of seedlac and shellac, however, usually take place on sample basis both at the manufacturing centres and in Calcutta. At the manufacturing centres, the manufacturers may bring samples to shippers' purchasing agencies. Alternatively, the manufacturers may send samples to their Calcutta brokers or shippers. The manufacturing of seedlac or shellac according to a sample is usually taken in hand by the manufacturers after prices have been settled on the basis of samples. At the time of delivery the goods are compared with the original sample. At Calcutta, the brokers go round to the shippers with samples who after visual examination declare their offers. If the broker agrees to the price, a contract is entered into and the shipper sends his clerk to take another average sample for comparison with the original sample. If the buyer thinks that both the samples agree he accepts the goods at the stipulated price. In cases of doubt the sample is analysed and the delivery taken according to the terms of the contract entered into by both the parties. In fact these sales are a combination of sales on sample and on the basis of contracts.

(2) Sales on the basis of contracts.

There are two types of contracts used in the inland trade (*a*) Delivery Contracts, (*b*) "futures" Contract.

(*a*) *Delivery contracts.*—These are used when manufacturers sell goods to shippers' agencies or other upcountry buyers or when brokers at Calcutta make sales to shippers or others. They may be entered into in respect of goods to be delivered immediately or by a specified date.

A copy each of typical contract forms for seedlac and shellac is given in Appendices 32 and 33 respectively. The contracts used by different buyers are generally uniform and invariably specify the quality of goods to be delivered, the quantity, the rate, the specifications in regard to the rosin content and alcohol insoluble impurities together with scale of allowances and deductions, terms of delivery and payment and the mode of settlement of disputes.

In the case of seedlac, the tolerance for hot alcohol impurities, as already stated, is 3 per cent. in the case of *Kusmi* seedlacs and Golden and Fine *Baisakhi* seedlacs and 5 per cent. in the case of ordinary *Baisakhi*.

Should it be found to contain any rosin or rosinous impurities, the buyers have the option of rejection. Should it be found to contain more alcohol insolubles than the specified franchise, an allowance is claimed by the buyer at the rate of 1 per cent. of the stipulated price for every ½ per cent. of insoluble matter or part thereof in excess of free tolerance and up to the rejection limit. In the event of the alcohol insolubles being in excess of the rejection limit, the buyer has the option to reject the goods and ask for a fresh tender within the contract time or accept the goods with an allowance which is some cases is fixed at 2 per cent. of the stipulated price for every ½ per cent. of the insolubles in excess of the rejection limit.

In the case of shellac, the tolerance for impurities is usually 3 per cent. Shellac may be specified to be free from rosin or not to contain more than a specified percentage. If the rosin admixture is found to exceed the free tolerance limit the buyers claim an allowance of Re. 1 or 8 annas per maund for every ½ per cent. or part thereof up to 1 per cent. above the franchise and Rs. 2 for each additional ½ per cent. or part thereof. In the case of impurities, the allowance is Re. 1 for every ½ per cent. or part

thereof above 3 per cent. and upto 4 per cent. and Rs. 2 for each additional ½ per cent. or part thereof.

Delivery is given or taken either at buyer's or seller's godown. Payment is made on delivery. In the event of any dispute under the contract, settlement is done according to the award of two arbitrators, one being appointed by each party. The decision of the arbitrators is taken to be final. Should arbitrators be unable to agree they appoint an umpire whose decision is final and binding on both the parties.

Since October 1938, the brokers in Calcutta have adopted new scales of franchises and allowances for impurities in shellac. For Standard I and higher qualities the franchise has been reduced from 3 per cent. to 2 per cent. Allowances for impurities in excess of free tolerance are calculated (for all qualities of shellac) on percentage basis instead of the fixed amount. Rejection limit has been fixed at 1 per cent. above the franchise. Allowance is calculated at 3 per cent. for every ½ per cent. or part thereof in excess of the free tolerance. Specifications for rosin and other terms and conditions remain unaltered.

(*b*) *"Futures" contracts.*—The Calcutta Shellac Exchange, Ltd., deals with "futures" transactions in shellac at Calcutta. A specimen copy of its contract form is given in Appendix 34, from which it will be seen that only T. N. Shellac is tenderable against "futures" contracts. Unlike Ready and Forward Contracts entered into for the sale and purchase of goods immediately or for delivery within a specified time, "futures" contracts may be settled during their currency by either party paying to the other the difference between the contract price and the market price.

The terms in respect of tolerance and scales of allowances for impurities and presence of rosin are similar to those in Delivery Contracts. The new scale of allowances referred to above has also been adopted for "futures" trading. Apart from these, the contract incorporates the conditions of delivery and settlement. Disputes are to be decided by the Tribunal of Arbitration of the Calcutta Shellac Exchange, Ltd.

"Futures" trading in T. N. Shellac is done at Mirzapur also under the auspices of the Chapra Beopar Vardhini Sabha, Mirzapur. The buying specifications and scales of allowances and penalties are similar to those at Calcutta before the introduction of the new scale of allowances.

(*c*) *Contracts for export trade.*—The London Shellac Trade Association has provided Contracts for three classes of shellac—Garnet, T. N. and Superior Orange.* All the three contracts are substantially identical except in respect of the quality clause which gives different specifications in each case. These specifications have already been discussed on page 107. Besides the quality specifications, the contract forms provide mainly for the taking of samples and their analysis and arbitration. The *c.i.f.* terms and landed terms are also included in the contract forms. There is a clause making the Bye-laws of the Association an integral part of the contract.

Business in the American market is regulated by the Rules and Regulations of the United States Shellac Importers Association. The rules specify the method of sampling and make provision for arbitration in addi-

*It is understood that there are separate contracts for button lac and seedlac also.

tion to giving the specifications for different grades and the allowances made for quality. Out of these, the grade specifications and the scales of allowances and penalties are the most important and have already been discussed on pages 105 and 106.

Sampling.—The shippers in India draw a sample from each consignment exported, get it analysed, and forward the results to the buyers. On arrival of the shipment at its destination, a sample is again drawn. The settlement of payment is made on the basis of the result of analysis of the sample drawn at the destination. The sample drawn by the shippers in India has little significance for final assessment of quality. Thus it only serves as a guide to the shipper though it is probably intended as a certificate of quality for the buyer. In the case of seedlac, the United States Shellac Importers Association objected to the procedure of sampling at Calcutta by the shippers themselves on the ground that the sample taken may not necessarily be representative of the shipment as a whole. This, according to the view taken by the Association, resulted in difficulties with buyers in America, because the shipments actually received there did not come up to the standard indicated by the samples drawn at Calcutta. The Association therefore proposed that an independent agency might be appointed for sampling and invited the opinion of the principal shippers in Calcutta on this point. The Association also appointed a firm of Analytical, Consulting and Technical Chemists in Calcutta as official samplers. The shippers refused to abide by the decision of the United States Shellac Importers Association as they stated that it encroached on their business liberty, gave outsiders access to their godowns and meant additional cost. The scheme proposed by the Association does not appear to have come into operation.

D.—Standardisation of grades of lac.

It has already been stated that lac produced on different hosts, and in different seasons and localities, as also seedlac and shellac manufactured from different lacs is subject to considerable variation in quality. In order to ascertain the variations in quality as a result of different factors, and the quality characteristics of various commercial descriptions of seedlac and shellac, samples of stick lac from different hosts, seasons and localities were collected and analysed under a scheme* for analysis of samples carried out in connection with the marketing survey.

Seedlac and shellac were prepared from the samples of stick lac collected and examined for various quality factors. Commercial samples

*The Scheme for analysis of lac samples was undertaken by the Agricultural Marketing Adviser to the Government of India in collaboration with the Indian Lac Cess Committee and with the co-operation of the Director and Staff of the Chemical Section of the Indian Lac Research Institute, Namkum. The collection of samples was done by an officer deputed by the Indian Lac Cess Committee and the Provincial Marketing Staff. The analytical work was done by two chemists specially appointed for this purpose at the laboratories of the Indian Lac Research Institute under the immediate direction of the First Assistant to the Physical Chemist and the guidance of the Director, Indian Lac Research Institute. The preparation of seedlac and shellac from stick lac samples was done at the Institute factory. The factors for which the samples were to be examined and the methods to be employed for analysis were examined and approved by a Sub-Committee appointed by the Indian Lac Cess Committee.

of seedlac and shellac were also examined. A detailed report* on the analysis work done and the results obtained has been prepared, from which the main conclusions are given below :—

(*i*) In the case of stick lac no definite relations could be observed between total impurities and "*chowri parta*" as also no conclusive inferences could be drawn regarding the effect of season or locality on the yield of *chowri*.

(*ii*) First quality *Kusmi* seedlacs containing 2 per cent. hot alcohol impurities or less can be prepared commercially.

(*iii*) Bleaching index does not depend only on colour but is also possibly influenced by the nature and the amount of impurities.

(*iv*) Shellacs of superior grades can be prepared out of lacs other than *Kusum*.

(*v*) Orpiment does not assist in giving lower colour indices for shellacs.

It was therefore considered that it was not possible to draw up practicable grade specifications for stick lac whereas seedlac and shellac could be grouped under well defined grades.

(1) SEEDLAC.

114 samples of seedlac were examined. Of these, 67 samples were of seedlac prepared at the Institute from stick lac of known hosts and the remaining 47 samples were of commercial seedlacs collected from factories and consignments for export. The samples were tested for the following factors :—

(*a*) Hot alcohol insolubles.
(*b*) Cold alcohol insolubles.
(*c*) Colour index.
(*d*) Wax.
(*e*) Softening and melting points.
(*f*) Viscosity of bleached lac.
(*g*) Bleaching index.
(*h*) Rate of filtration.

A summary of the results is given in Appendix 35 and the position in respect of different items is briefly discussed below.

(*a*) *Hot alcohol insolubles.*—Hot alcohol insolubles, representing the impurities present in seedlacs, provide a useful index of quality. The percentage of hot alcohol insolubles were determined for 108 samples—64 samples prepared from stick lacs at the Indian Lac Research Institute, and 44 commercial and export samples. A reference to the Appendix referred to above shows that in the case of samples prepared at the Institute, the hot alcohol insolubles varied from less than 1 per cent. to 7 per cent., only two samples showing over 7 per cent. The commercial samples

*The report gives in detail the values obtained for each of the tests carried out on the various samples of stick lac, seedlac, and shellac, the yields of seedlac from stick lac and shellac from seedlac as obtained at the Institute factory from the samples and discusses the limits of the values obtained and the extent of variations in the quality factors in samples from different areas, different seasons, different hosts and different commercial grades of shellac and seedlac.

showed hot alcohol insolubles from less than 2 per cent. to 7 per cent. only one sample exceeding the upper limit. It will be observed that among commercial samples, seedlacs with impurities not exceeding 2 per cent. were mostly *Kusmi*, while in the case of samples prepared at the Institute they were *Kusmi* as also from *Ber* and *Palas*. Samples with impurities over 2 per cent. but not exceeding 3 per cent. were also mostly *Kusmi* in the case of commercial samples but among samples prepared at the Institute 11 samples of non-*Kusmi* seedlacs had impurities not exceeding 3 per cent. Among the 64 samples prepared at the Institute, the hot alcohol insolubles did not exceed 3 per cent. in 22 samples ; 24 samples had impurities between 3 and 5 per cent. and 16 samples between 5 and 7 per cent. 2 samples gave result of over 7 per cent. Among the 44 commercial samples, the impurities did not exceed 3 per cent. in 15 samples, were between 3 per cent. and 5 per cent. in 17 samples and between 5 per cent. and 7 per cent. in 11 samples. Only 1 sample gave a result of over 7 per cent.

(*b*) *Cold alcohol insolubles.*—Cold alcohol insolubles provide an indication of the amount of useful alcohol soluble lac resin excluding wax and partly polymerised or deteriorated lac.

Cold alcohol insolubles were determined for 113 samples—67 samples prepared at the Institute from stick lacs of known hosts and 46 commercial samples. Most of the prepared samples showed cold alcohol insolubles varying from less than 6 per cent. to 12 per cent., only three samples showing over 12 per cent. Similarly in the case of commercial samples, only one sample contained more than 12 per cent.

Of the 67 samples prepared at the Institute 40 showed cold alcohol insolubles not exceeding 8 per cent., 17 had between 8 per cent. and 10 per cent. and 7 between 10 and 12 per cent. Of the 46 commercial samples, 20 showed cold alcohol insolubles not exceeding 8 per cent., 15 had between 8 per cent. and 10 per cent., while 10 samples had between 10 per cent. and 12 per cent. cold alcohol insolubles.

(*c*) *Colour index.*—Colour index was determined for 113 samples—66 samples prepared at the Institute and 47 commercial samples. The samples prepared at the Institute showed a colour index varying from 5 to 22, only one sample giving a colour index of 24. The commercial samples showed colour index varying from 3 to 26. Of the 66 samples prepared at the Institute, 34 had colour index under 10, 21 had between 10 and 14 and 7 between 14 and 18. 4 samples gave a colour index of over 18. Of the 47 commercial samples, 15 had colour index under 10, 12 had between 10 and 14 and 11 samples between 14 and 18, while 9 samples gave a colour index of over 18. Most of the *Kusmi* samples had a colour index less than 10 both in the case of samples prepared at the Institute and commercial samples.

(*d*) *Wax.*—Wax content was ascertained for 43 samples—32 samples prepared at the Institute and 11 commercial samples. It will be seen that of the 32 samples prepared at the Institute, as many as 10 contained 3 per cent. or less wax, 19 samples had between 3 per cent. and 4 per cent. wax, while the remaining 3 samples had over 4 per cent. wax. In the case of commercial samples also the wax did not exceed 4 per cent. in most of the samples.

(*e*) *Softening and melting points.*—Owing to the hetrogeneous nature of lac resin and the further presence of impurities in seedlac, it was not possible to get sharp softening or melting points. Detailed comparison between samples was not, therefore, possible.

(*f*) *Viscosity of bleached lac.*—Viscosity of bleached lac was determined for 91 samples—63 samples prepared at the Institute and 28 commercial samples. The majority of samples prepared from all hosts showed viscosity between 5·5 and 6·5 centipoises. In the case of commercial samples, the viscosity varied from below 5 to 7 in the case of *Kusmi* samples, and from 5·5 to over 7 centipoises in the case of others.

(*g*) *Bleaching index.*—Bleaching test was performed on 111 samples—64 samples prepared at the Institute from stick lacs of known hosts and 47 commercial samples. *Kusmi* seedlac stood out as a separate class by itelf from the point of view of bleaching. 30 grammes of *Kusmi* seedlac generally required 50 c.c. or less of bleach, while non-*Kusmi* lacs required anything from less than 60 to 110 c.c. bleach—only one prepared sample and one commercial sample required more than 110 c.c. bleach.

An examination of the results in respect of colour index and cold alcohol insolubles along with the figures obtained by bleaching test shows that colour index and amount of bleach required do not always move together but an increase in the percentage of cold alcohol insolubles in most cases is attended with an increase in bleach required. This shows that old lac requires more bleach liquor and is thus inferior for bleaching purposes.

(*h*) *Rate of filtration.*—The test was made to find out whether cold alcohol solutions of different seedlacs gave any definite filtering range. For most of the samples the solution filtered in 20 minutes varied between 80 and 90 c.c. One commercial sample gave only 32 c.c. and a sample of *Kusmi* seedlac gave only 56 c.c., obviously due to the presence of old lac. The test may, therefore, be used for ascertaining whether old or polymerised lac is present.

Considering the tests discussed above from the point of view of their suitability as grade specifications, it appears that softening and melting points, viscosity and wax have to be discarded in view of the fact that the results are not accurate in the case of softening and melting points, and the range is very narrow in the case of viscosity and wax. Cold alcohol insolubles provide useful information about the age of lac but the comparatively long time taken by the test, and the lack of consistency in the results are serious objections against it. As an indication of old lac can also be obtained more quickly by rate of filtration test, cold alcohol insolubles may be omitted from the specifications. The factors suitable for grade specifications, therefore, are :—

Hot alcohol insolubles,

Colour index, and

Rate of filtration test.

As bleach test is considered important by American buyers, it may be included in the specifications for seedlac meant for bleaching. Based on the above considerations and the results of analysis, the following grades and grade specifications for seedlac were drawn up by the Agricultural Marketing Adviser to the Government of India.

Proposed grades and grade specifications for seedlac.

Grade designations.	Definition of quality.			
	Special characteristics.			General characteristics.
	Hot alcohol insolubles.	Colour[1] Index.	Bleach Index.	
	2	3	4	5
Grade 1 (Special bleach)	Not more than 3.	Not more than 10.	Not more than 60.	The seedlac shall be the natural product obtained by washing[2] fresh[3] stick lac, reasonably dry and free from dirt, wood fibre and insect remains, and entirely free from bleaching agents and other colouring matter or other adulterants. The product shall be in free granular condition.
Grade I	Not more than 3.	Not more than 10.	..	
Grade II	Not more than 5.	Not more than 15.	..	
Grade III	Not more than 7.	Not more than 20.	..	
Grade III Dark ..	Not more than 7.	Over 20.	..	

(1) .005 N, iodine solution, taken as colour index 5.

(2) A mild alkaline reagent may be added to the washing water provided the final washing is done in plain water. An aqueous solution prepared from the seedlac shall be neutral to Methyl Red.

(3) The seedlac shall not be regarded as made from fresh stick lac, if a solution made by dissolving 10 gms. seedlac in 100 c.c. alcohol filtered at 25 oC through a specified filter paper. does not give at least 80 c.c. filtrate in 20 minutes.

It will be seen that a limit of 3 per cent. for hot alcohol insolubles was suggested for Grade I. This is also the limit prescribed for *Kusmi* seedlac by the United States Shellac Importers Association and in the draft British Standard Specifications. The limit suggested for second grade was 5 per cent. which corresponds to the limit prescribed by the United States Shellac Importers Association and draft British Standard Specifications for other seedlacs. A third grade permitting up to 7 per cent. impurities was proposed to cover seedlacs which do not fall under Grades I and II.

As regards the colour index, it was proposed to be not more than 10 for Grade I as most of the *Kusmi* samples showed a colour index less than 10 both in samples prepared at the Institute and in commercial samples. The specifications for Grades II and III were suggested as not more than 15 and 20 respectively.

As the bleach index for all the *Kusmi* samples was under 60, this figure was suggested for a special grade seedlac meant for bleaching.

Bleaching test was not included in other grades but it was amply borne by the results of analysis of samples that seedlacs having less than 5 per cent. impurities and not containing old lac would be satisfactory in respect of bleach test. The " rate of filtration " test was included as a useful check for shutting off old lac and also for dispensing with the necessity of including specifications for cold alcohol insolubles.

These grade specifiations proposed by the Agricultural Marketing Adviser were considered by the Indian Lac Cess Committee in their meet-

ing held in January 1940, and after a prolonged discussion they framed the following tentative standards :—

	Bleach Index.	Hot alcohol Insolubles.	
		Per cent.	
Baisakhi I	90	3	Premium for less, penalty for more.
Baisakhi II	110	4	Ditto.
Baisakhi III	125	5	Ditto.
Baisakhi IV	150	7	Ditto. Subject to rejection limit of 7 per cent.
Kusmi I	60	2	Premium for less, penalty for more.
Kusmi II	80	3·5	Ditto.
Kusmi III	100	4·5	Ditto.

These tentative standards were circulated by the Indian Lac Cess Committee to elicit expression of opinion from the trade interests concerned both in India and abroad. Replies so far received from the Indian interests show that the majority of shippers had no comments to make as, according to them, the standards suggested were far removed from commercial standards on which business was transacted in Calcutta. Two associations connected with shellac trade were against the grading of seedlac on bleach basis, as according to one it was impracticable and according to the other it would benefit no body except the American buyers. An important firm of manufacturers was in favour of trying the suggested system of grading while a competent authority on the chemical analysis of lac approved the suggested standards without any reservation.

No comments were received from London and the United States of America.

The general opinion of the trade in India, therefore, may be taken to be that grading on the basis of Bleach Index is a radical departure from the present practice and is not likely to be practicable. It has to be noted that seedlac is prepared both by big as well as small factories and the latter can ill afford to have arrangements for making elaborate chemical tests.

The present internal trade is being carried on on the basis of percentage of impurities only. The grades originally suggested by the Agricultural Marketing Adviser were also primarily based on the existing trade practice. The colour index was added as an additional factor to encourage better washing and rate of filtration to shut out admixture of old lac. The analytical data discussed in the foregoing pages amply prove that seedlac made from fresh lac and properly washed conforms to all the requirements of the buyers in the foreign countries. The fact that some of the samples made at the Institute from fresh non-*Kusmi* seedlac required less bleach than that prescribed by the United States Shellac Importers Association for *Kusmi* lac, is a further evidence that the amount

of impurities, the freshness of lac, and proper washing are the three factors which affect the quality of seedlac. These factors are amply provided for by hot alcohol insolubles, rate of filtration and colour index.

The grades originally proposed by the Agricultural Marketing Adviser to the Government of India were again considered at the meetings of the Indian Lac Cess Committee in January 1941, and after slight amendments were approved. The amended grade designations and their definition of quality were published in the *Gazette of India*, dated the 29th March, 1941, as Schedule I to the Draft Seedlac Grading and Marking Rules, 1941, notified for information and inviting objections or suggestions, if any. No objections were received. The Director, Indian Lac Research Institute, Namkum, however, suggested that the specifications of the funnel to be used in the rate of filtration test should be added in the relevant footnote to Schedule I referred to above. The suggestion was accepted and the Lac Grading and Marking Rules were promulgated by a notification in the *Gazette of India*, dated the 12th July, 1941. These rules are reproduced in Appendix 36.

The Indian Lac Cess Committee, in their meetings held in January, 1941, also recommended that, as an experimental measure, a system of Agmarking should be introduced on the basis of the revised specifications. A grading station financed by the Agricultural Marketing Adviser to the Government of India was, therefore, opened at Jhalda (Bihar) in July 1941. About 2,870 maunds seedlac were graded by the end of March 1942. Several consignments of graded seedlac were exported by shippers to the United States of America. These have been favourably commented upon by the importers in the United States of America.

It appears desirable that larger quantities of seedlac to conform to these specifications are made and exported to the United States of America. As, however, the buyers in America attach great importance to the bleachability of seedlac, the feasibility of including this factor in the specifications of all the different grades may be explored.*

(2) Shellac

It was pointed out in Chapter III that shellac is put on the market in a large number of brands and marks. As the specifications of most of the marks and brands are not known, the market for them becomes rather limited. It seems desirable, therefore, that a few recognised grades should be adopted by the trade. A large number of brands of the various shippers are reported to differ often slightly on such items as colour, or thickness of flakes. In many cases the different brands of different shippers represent almost identical shellac. For instance, R brand of shipper A is said to equal H brand of shipper B, while the T brand of the former is reported to be equal to the O brand of the latter. Again E brand of shipper C apparently closely corresponds to T of shipper A. The R and T brands are also similar, the only difference between the two apparently being that the former is unarsenicated and the latter arsenicated. All these brands of shellac can be grouped under a few main grades.

143 samples of shellac were examined at the Indian Lac Research Institute, Namkum, in connection with the Lac Marketing Survey. Of these, 82 samples were commercial and export samples, while others were prepared at the Institute from seedlac from known hosts.

*The bleach indices for grades I, II and III have since been tentatively laid down as 95 c.c., 115 c.c. and 125 c.c.

Out of the 82 commercial samples, 10 were of machine made shellacs, 1 of I. T. N., and 1 of 3 per cent. T. N. and 6 belonged to qualities inferior to T. N. and contained rosin. These have been left out and the results for the remaining 125 samples are classified in Appendix 37. The following properties were tested :—

(*a*) Hot alcohol insolubles.
(*b*) Cold alcohol insolubles.
(*c*) Colour index.
(*d*) Wax.
(*e*) Softening and melting points.
(*f*) Viscosity.
(*g*) Fluidity.
(*h*) Life under heat.
(*i*) Orpiment.
(*j*) Qualitative test for rosin.

Moisture was originally included for estimation but on the examination of several samples, it was found that the moisture of all samples was in the neighbourhood of 2 per cent. and the variation between one sample and another was too small to introduce any appreciable alteration either in the estimated values and|or in their classification for comparison.

(*a*) *Hot alcohol insolubles.*—The determination of hot alcohol insolubles in the case of pure and fresh shellacs is a valuable indication of the maximum purity attainable in practice. It will be observed from the results of the analysis given in Appendix 37 referred to above that the samples prepared at the Institute did not contain more than 1 per cent. impurities with the exception of one sample which exceeded this limit by about 0·1 per cent. only. In respect of the commercial samples the normal range for Superfines appears to be from less than 1 per cent. to 2 per cent., only one sample being over 2 per cent. In other grades the insolubles usually went up to 2½ per cent.

(*b*) *Cold alcohol insolubles.*—The normal range for *Kusmi* shellac was from 3 to 4 per cent. while for other hosts it was 3 to 5 per cent. In the case of commercial samples, the " Superfines " did not contain more than 6 per cent., and other grades not more than 8 per cent. cold alcohol insolubles.

(*c*) *Colour index.*—The colour index did not exceed 10 in the case of *Kusmi* samples, was normally 15 or below for *Ber* and 20 or under for *Palas*. As regards the commercial samples, the normal maximum limit was 25 for T. N. and 15 for grades superior to T. N.

(*d*) *Wax.*—Wax content in the case of samples prepared at the Institute varied from below 3 per cent. to 5 per cent. In the case of commercial samples, T. N. usually did not contain more than 5·5 per cent., while the maximum normal limit for others was 4·5 per cent.

(*e*) *Softening and melting points.*—The normal range for softening point in the case of samples prepared at the Institute appeared to be about 64°—69°C., while in the case of commercial samples it was about 66° to 71°C. The melting point is normally higher than the softening point by about 10°C.

(*f*) *Viscosity.*—The determination of viscosity of clear shellac solutions would be of some importance in the industrial application of shellac, chiefly in the manufacture of spirit varnishes. Thirty-seven pure samples manufactured at the Institute were examined for this property. Only one sample gave an exceptionally high value of 7·6 centipoises but all other samples fell within the range of 5·0 to 6·5 centipoises and mostly within the smaller range of 5·5 to 6·0.

(*g*) *Fluidity.*—Fluidity is considered to be a valuable indication of quality and is specially taken into consideration for making purchases by some consuming industries. It is liable to appreciable change by storage and transport. A reference to Appendix 37 shows that in the case of samples prepared at the Institute the fluidity index for *Kusmi* shellac normally varied from 50 to 100, while for others it varied from 50 to 200. As for the commercial samples " Superfines " normally fell in the range of 50 to 200 and the majority of samples of other grades lay between 100 and 250.

(*h*) *Life under heat.*—This property, which may also be termed the " polymerisation test ", determines the time for which a sample of shellac may be treated at a definite temperature without losing its fluidity. Like the flow test, the determination of this property is influenced by the age of the sample. In the case of samples prepared at the Institute, *Kusum* and *Ber* samples fell between 30 and 45 minutes, while in the case of *Palas* the limits were 20 to 45. The normal range for commercial samples appears to be from 25 to 50. There does not seem to be any marked characteristic difference amongst the various grades so far as life under heat is concerned.

(*i*) *Orpiment.*—The orpiment content of only those samples was ascertained which were either reported by manufacturers and shippers to contain it or which showed visible traces in the insolubles in the estimation of hot alcohol insolubles. T. N. Shellacs generally did not contain orpiment. Only the superior brands were found to be loaded with orpiment. In the arsenicated samples the range of variation was found to be from ·3 per cent. to 1·3 per cent.

(*j*) *Qualitative test for rosin.*—All samples of shellac declared to be pure gave negative indication with the exception of one. It is surprising to note that in the case of 12 per cent. T. N. Shellac half the number of samples gave negative indication, while others showed positive reaction.

It will be seen from the above discussion that the range of variation of viscosity was rather narrow. Similar is the case with softening and melting points. Moreover the test for the determination of softening and melting points is at best a rough one.

Tentative grades and grade specifications for shellac based on existing trade practices, requirements of the consumers and the data provided by the analysis of samples are given in Appendix 38. The specifications given for each grade represent the minimum standard of quality. These may be examined by the trade. After their approval, shippers and manufacturers should be required to register their brands and marks against these grades and all shellac exported under a particular grade—irrespective of trade brand or mark—should be required to conform to the minimum standard of quality prescribed for the grade.

CHAPTER X.—BROOD LAC.

A.—Supplies.

(1) Sources of supplies.

Lac on the stick from which swarming has not taken place and which is used for further infection of host trees is known as brood lac. As stated in Chapter II there are two methods of infection—natural and artificial. In the former case a few lac bearing twigs are left unharvested, and they serve as a source of infection for the fresh branches during the next season. In the case of artificial infection, brood lac is cut from one tree and transferred to another. It will thus be clear that so far as natural infection is concerned the source of supply of brood lac is the same tree. In the case of artificial infection, however, the producer may either keep brood lac from his own trees or he may have to buy it. Generally speaking most of the producers keep sufficient brood lac from their own trees for their requirements. The quantity purchased from other local producers and *hats* is comparatively small probably not exceeding 15 to 20 per cent. of the total requirements for artificial infection. The Indian Lac Research Institute supplies small quantities of brood lac from their plantation.

(2) Quality and quantity.

Quality of brood lac is mostly influenced by climatic conditions and the extent of attack of parasites and predators. Excessive heat or too long and dry period of hot winds during summer months, and a severe frosty weather in winter have a devitalising effect upon the mother insect and the larvae produced by it. Similarly premature cutting, *i.e.*, earlier than 8 or 10 days prior to swarming cuts off the female insects from their food supply and consequently weakens them and their larvae. The attack of parasites and predators particularly *Eublemma amabilis* and *Holcocera pulverea* renders brood lac unfit for use.

Before use brood lac should be carefully examined and unhealthy and pest infected sticks should be discarded. In the case of healthy brood lac the encrustation is thick and continuous or semi-continuous while poor brood lac is characterised by a thin and sparse encrustation. An outward sign of attack by *Eublemma amabilis* and *Holcocera pulverea* is the appearance of small circular holes and tunnels in the lac encrustation. The attack of predators will be revealed by the presence of their larvae and pupae in the encrustation.

If the effect of adverse climatic conditions mentioned above and the attack of parasites and predators is very severe, there is every likelihood of the mother insects being incapacitated and even killed. Such lac is rendered useless as brood lac. Another factor which sometimes affects the supply of brood lac is the prices prevailing at the time of harvesting. When prices are high there is a tendency to sell all stick lac without retaining sufficient amount for use as brood lac. This is particularly true in the case of producers with small means. Generally speaking sufficient quantities of ordinary quality of brood lac are available in all the lac producing tracts but there is a dearth of good quality brood lac.

Whenever the producers purchase brood lac they have usually no choice but to buy whatever quality they can obtain. The producers who keep brood lac from their own trees are generally able to make some selection and reserve fairly good quality brood lac.

It is roughly estimated that about 25 to 30 per cent. of the twigs and branches covered with lac encrustation are used as brood lac. (This is of course collected again after swarming and scraped for obtaining stick lac). Taking the lower figure into consideration and assuming that the yield of scraped lac (stick lac of commerce) from lac encrustation on twigs is in the neighbourhood of 36 per cent. approximately 33,000 tons of brood lac were, on an average, used annually for the infection of lac hosts during the quinquennium ending 1938-39.

B.—Methods of preservation.

In Bihar, Assam, Orissa and the Central Provinces brood lac is allowed to remain on the trees and is harvested only a week or two before the time swarming is expected to occur. In summer some producers take care to choose such branches for brood lac as are usually well shaded by other branches and leaves of the tree. The twigs bearing brood lac are cut into pieces of about one foot each. They are tied into bundles generally of 50 sticks each and are kept by the producers in their huts till the time of infection.

In Bengal, particularly in Murshidabad district, the method of preserving brood lac described below is adopted in the summer season :—

To prevent damage from excessive heat in May-June and also to safeguard against pilferage of brood lac from the trees, some of the growers cut brood lac about three to six weeks before the expected date of emergence of lac insects and keep it in a cool place inside their huts. A pit about 2 feet deep is dug and a sand bed of about 1 foot deep is formed in it. Water is poured over the sand and when it is absorbed the brood lac sticks are planted in the sand bed. The sticks draw moisture from the sand which is constantly kept moist. Sometimes the brood lac sticks instead of being planted in the sand bed are placed on a bamboo *machan* (platform) built over the moist sand bed. Swarming begins on or about the expected date and the brood lac is then taken out carefully and tied to the branches of the host trees. This procedure appears to be defective as it cuts off the mother insect from nourishment a long time before swarming and thus lowers its vitality. The effect of summer heat is particularly telling on the insects on the *ber* trees due to the fact that they are either partially or wholly leafless during that season. Experiments conducted by the Indian Lac Research Institute show that this difficulty can be overcome by partial pruning of *ber* trees carrying *Baisakhi* crop in the last week of January. It provides the plant with new leaves in the hot weather, which are helpful in protecting the brood lac from excessive heat. In partial pruning, branches very sparsely covered with lac, those covered mainly with male insects, and branches and shoots under $\frac{3}{4}$ inch diameter not bearing lac, should be cut flush. Also about $\frac{1}{3}$rd of the shoots thinner than the little finger of a man should be removed from branches mainly covered with female insects. Partial pruning will go a long way to reduce the scarcity of brood lac from the *ber* tree in *Baisakhi* crop.

C.—Possibilities of supplying improved brood lac.

As stated earlier there are two sources of brood lac for artificial infection. Firstly, the producer reserves brood lac from his own trees and secondly he obtains it either from a neighbour or a *hat*. It has also been stated that there is a scarcity of good quality brood lac in the *hats* and that the producers have no choice but to go in for whatever is available. Demand for good quality brood lac thus remains unsatisfied. Besides, experiments carried out at the Indian Lac Research Institute indicate that the introduction of fresh brood from elsewhere at intervals prevents deterioration of lac. When this practice becomes popular with the producers they will have to look to some other source besides their own trees for their brood lac requirements to a larger extent than at present.

In order to meet properly the demand for good quality brood lac it seems desirable that Brood Lac Farms should be established at suitable localities in the lac producing tracts. These Farms should produce good quality brood lac for distribution amongst the producers. In order to supplement the supplies from these Farms, arrangements may be made with some lac producers for further multiplication of good quality brood lac. Their lac producing trees infected with good quality brood lac should be kept under strict observation and if brood lac produced on them under the supervision of the expert staff of a neighbouring Brood Farm is found up to the mark, it may be purchased for further distribution. The scheme will thus more or less resemble the Seed Distribution schemes of the Agricultural Departments.

The Brood Lac Farms, besides supplying good quality brood lac, can serve as centres for the demonstration of improved methods of lac cultivation.

CHAPTER XI.—WEIGHTS, MEASURES AND UNITS OF SALE.

A.—Weights, scales and measures used.

(1) Weights.

There are two kinds of weights in current use in the main lac producing tracts of India—*kachcha* or non-standard and *pakka* or standard weights. The former, *i.e., kachcha* weights are commonly used in rural areas and *hats* while the latter, namely *pakka* weights, are in vogue in the manufacturing centres and the terminal market at Calcutta.

Kachcha weights show enormous variation in different localities. For instance in Bihar, a *kachcha* seer varies from 45 *tolas* to 80 *tolas* in Palamau district, and 70 to 90 *tolas* in Manbhum district. In Bengal, a 60-*tola* seer is in use at Nimtita, Dhulian, Partabgunj and Kaligunj *hats* in Murshidabad district, while a seer is equivalent to 64 *tolas* at Manakasha and Benodepur *hats* in Maldah district. At Khatia *hat* in Bankura district, a seer is of 80 *tolas*. In Assam, the customary seer at Baitalangshu, Barthole and Singmari is of 86 *tolas* and at Amtring of 90 *tolas*. Similarly, in the Central Provinces, the seers used at village *hats* by merchants for purchasing lac are heavier than the standard seer. A *pakka* or a standard seer is equivalent to 80 tolas and is the only recognised weight (with its multiples and sub-multiples) in use throughout the country at all railway stations and big trading centres.

The position in respect of weights is made more chaotic by the fact that in the case of stick lac a maund is made up of a variable number of seers at different places. For instance in Bihar, a maund of stick lac connotes 40½ seers at Jhalda, 42½ seers at Thulin and Chaibasa, 45 seers at Ranchi, 53 seers at Murhu and 60 seers at Tapkara. In the Central Provinces, although a 40-seer maund is common, maund with a different number of seers is in vogue in some places, *e.g.*, a maund equivalent to 40½ seers is used at Pendra and of 42½ seers at Dhamtari. So far as seedlac, shellac and by-products are concerned, a maund of 40 standard seers (82 2/7 lb.) is used by the manufacturers.

At Calcutta a maund of 40 standard seers (82 2/7 lb.) is employed for all kinds of lac including stick lac.

Generally speaking, weights used in markets and manufacturing centres are made of cast iron. The 5 seer weight or the *panseri* is usually rectangular, while the smaller weights are mostly circular. The larger units are in the form of truncated cones. In the rural areas, pieces of iron, stone, bricks and wood are commonly used as weights.

(2) Scales.

Three types of scales are used in the lac trade—hand scales, beam scales and platform scales.

A typical hand scale consists of two pans usually of leather, iron or basket work suspended by strings from the ends of a specially made stick known as *dandi*. It is used in the retail as well as the wholesale trade for weighing smaller quantities upto 5 seers at a time. The beam scales or platform scales are used to weigh heavier units such as a bag or a case. A beam scale is suspended on a tripod and the wooden or iron pans are

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*1 *Tola* = .4114 oz. (180 grains, the weight of a rupee).
5 *Tolas* = 1 *Chhattank*, 16 *Chhattanks* = 1 Seer (2.057 lb.)
40 Seers = 1 Maund (82.2857 lb.).

attached to the ends of the beam by chains or ropes. Platform scales or weighing machines are used mostly at railway stations and in the Calcutta market. It was, however, observed that even in Calcutta, preference was given to the beam scale over the platform scale on account of the former's simple mechanism and lower cost.

(3) MEASURES.

Measures are generally not employed in the sale or purchase of stick lac, seedlac or shellac.

(4) VERIFICATION OF WEIGHTS, SCALES AND MEASURES.

Except in the case of Bombay—which is of little importance in the lac trade—where local legislation makes the checking of weights and measures obligatory, no systematic verification is done in any other province and the bye-laws framed by most of the local governments and adopted by local bodies in this connection are in practice a dead letter. It is not surprising, therefore, to find that a large number of current weights, specially in rural areas, are faulty. For instance in an* investigation conducted under the auspices of the Board of Economic Enquiry, Punjab, in the years 1927—31 over 13,500 weights of all kinds, both from rural and urban areas were checked and it was found that only 51 per cent. of these were correct. Out of the remaining 49 per cent., 41 per cent. were underweight and 8 per cent. overweight. Similarly out of every three scales, two were defective. The result of this investigation not only gives an idea of the chaotic conditions prevailing in the Punjab but reflects the confusion which exists almost everywhere in India.

(5) UNITS OF SALE.

The producers sell stick lac in villages or *hats* usually in small quantities amounting to a few seers only. In such cases prices are quoted per seer. When larger quantities are involved the unit of price quotation is invariably a maund. The unit of delivery is a bag weighing $1\frac{1}{4}$ or $1\frac{1}{2}$ maunds. From the examples given earlier regarding the great diversity existing in weights it will be seen that the units of sale for purposes of price quotation and delivery necessarily vary in different *hats* and markets.

In the case of seedlac and shellac, prices are quoted on the basis of a standard maund in the wholesale trade and on the basis of a seer in the retail trade. The unit of delivery is a bag for seedlac and a bag or case usually weighing $1\frac{1}{4}$ to 2 maunds or $1\frac{1}{2}$ cwt. for shellac. In "futures" transactions, the unit adopted at Calcutta is 10 maunds and that at Mirzapur 25 maunds. For export, the usual unit of sale is the cwt.

B.—Possibilities of standardisation.

From what has already been said, it will be seen that the conditions regarding weights in the lac producing areas are chaotic. The use of diverse weights in rural areas, *hats* and markets hampers trade being particularly prejudicial to the interests of the producers, as they suffer not only on account of the manipulation of weights but also due to their inability to convert prices prevailing in the neighbouring markets to

*Conditions of weights and measures in the Punjab—Board of Economic Enquiry Publication No. 42, 1936.

their local basis The marketing surveys previously carried out also emphasised these defects.

The Standards of Weight Act, 1939, was passed by the Central Legislature in March 1939. It received the assent of the Governor-General on 28th March 1939. The Act specifies the following standard weights :—

Tola-seer series :

Standard tola = 180 standard grains.
Standard seer = 80 standard tolas.
Standard maund = 40 standard seers.

Avoirdupois series :

Standard pound = 7,000 standard grains.
Standard ounce = 1/16 standard pound.
Standard hundredweight = 112 standard pound.
Standard ton = 2,240 standard pound.

The Mint Master, Bombay, has been entrusted with the preparation of necessary sets of weights of a number of denominations specified in the Act. The Provincial Governments should take steps to bring the use of standard weights into operation.

SUMMARY.

CHAPTER I.

Supply.

India holds a virtual monopoly in lac—a resinous substance secreted by the insect *Laccifer lacca* on the branches of certain trees known as its hosts. The most common hosts are *Kusum, Ber* and *Palas.* The encrustations scraped from the branches form the stick lac of commerce. Seedlac is obtained by grinding and washing stick lac. Shellac is made by melting or extracting the resin from seedlac.

Four lac crops are harvested in a year—*Jethua* and *Aghani* (*Kusum*) from *Kusum* hosts, and *Baisakhi* and *Katki* from other hosts. *Baisakhi* is the biggest and most important of the four crops and is harvested between April and July. *Katki* is cut in October-November, *Aghani* (also called *Kusmi*) is harvested between November and February. *Jethua* which is a small crop is cut in June-July.

The main lac producing areas are certain districts of Bihar, the Central Provinces, the United Provinces, Bengal and Assam, and the Central India and Eastern States. The quantities of lac collected have varied in different years but in recent years production has shown a substantial increase. The average production during the five years ending 1938-39 was about 48 thousand tons, of which Bihar alone accounted for more than 28 thousand tons.

Besides India's own production, until recently the bulk of the stick lac produced in Burma, Straits Settlements and Siam, which produce some lac, found its way into India, the imports during the quinquennium ending 1938-39 having amounted to over 6 thousand tons. These imports were all landed at Calcutta from where considerable quantities were consigned to manufacturing centres in Bihar and the United Provinces—apparently for use in the preparation of seedlac and shellac along with Indian stick lac. This practice has been objected to by the buyers and it is desirable that when imported stick lac is wholly or partially used for the preparation of seedlac or shellac, the final product should be declared to that effect.

Exports from India consist mainly of shellac and button lac and seedlac. The latter formed an insignificant part of the total exports of lac in earlier years but gradually gained ground so much so that during the five years ending 1938-39, the exports of shellac and button lac amounted to 21,000 tons and those of seedlac to only 9,000 tons. During the same

period, the exports of shellac, button lac, seedlac, stick lac and other forms of lac together totalled 32,000 tons which, expressed in terms of stick lac, worked out to 50,000 tons. The United States of America has been India's biggest customer for seedlac in recent years while the United Kingdom and the United States of America have been the two chief buyers for shellac and button lac. After meeting the export requirements, India, on an average, used only about 4 thousand tons of lac annually, but since the outbreak of the present War, the quantities consumed in India are reported to have increased considerably.

CHAPTER II.

Preparation for the market.

" Artificial infection " and " natural infection " are the two methods used for infecting or inoculating lac hosts. For artificial infection, a few sticks of brood lac, *i.e.*, lac from which larvæ are about to emerge are tied to a host tree suitably pruned. For natural infection, all or a part of the lac encrustation on a host is left on its branches. In both cases, the larvæ emerge, settle down on new shoots and start secreting lac.

Artificial infection is the more common and better of the two methods. Correct pruning, proper amount of brood lac and systematic rotation of host trees help to improve the yield and quality of lac.

The branches with encrustations of lac may be cut before the emergence of larvæ when the lac is called *ari*, or after swarming, *i.e.*, emergence of larvæ, such lac being called *phunki*. A major part of the lac crop is collected as *ari* lac.

After the lac bearing twigs and branches have been cut from the trees, lac is scraped from them and sold as stick lac.

For preparing seedlac, the stick lac is ground or crushed and then washed in cup shaped stone or cement pots called *nands*. During washing, a labourer rubs the crushed lac with his feet against the sides of the *nand*. In some of the large factories, power driven steel drums fitted with agitating arrangements are used for washing. The yield of seedlac is about two-thirds the weight of stick lac and the cost of manufacture averaged about 8 annas per maund before the outbreak of the War in 1939. An improved method for preparing light colour seed lac of greater purity has been evolved by the Indian Lac Research Institute.

Shellac is prepared by extracting the resin with suitable solvents at two factories and by the indigenous method at all the other establishments. The latter method consists of melting seedlac filled in long tabular cloth bags over a charcoal fire in *bhattas*. The molten resin is stretched into a thin sheet, which after cooling is broken into small pieces. The stretching process is dispensed with for manufacturing button lac and the molten lac is shaped into circular button shaped cakes. Rosin and orpiment are added for preparing certain grades of shellac. The yield of shellac from seedlac may, on an average, be taken as 87 per cent. The cost of manufacturing shellac from stick lac averaged about Rs. 3-8-0 per maund of shellac before the outbreak of the War.

Most of the shellac manufacturing establishments in India are either cottage factories with one or two *bhattas* or small factories having 3 to 25 *bhattas*. The total number of *bhattas* in India is about 5,000, capable of producing about 48,000 tons of shellac annually.

CHAPTER III.

Utilisation and demand.

Lac finds use mainly in the preparation of gramophone records and manufacture of paints, varnishes, polishes and various electric goods.

Gramophone records require lac having good fluidity and without dirt and gritty impurities. For varnishes and polishes, colour is of greater importance, while for electrical goods lac should be free from rosin or orpiment. Besides these industries, lac is also utilised for various other purposes such as preparation of sealing wax, stiffening of hats, preparation of plastic mouldings, etc. Synthetic resins compete with lac in respect of some uses, but several special properties possessed by lac and its cheapness in price are strong points in its favour.

In India about 100 tons stick lac, 450 tons seedlac and 1,850 tons shellac are estimated to have been annually used (before the outbreak of the present War) for gramophone records, paints, polishes and varnishes, bangles, jewellery, wood turning, etc.

The quality of stick lac depends upon a number of factors such as the type of host, the time of the crop, the method of infection, the stage of maturity, etc. For instance, *Kusum* lac is considered best. Between *Ber* and *Palas*, the former is said to give a higher percentage of lac

of lighter colour. *Baisakhi* crop yields lac of paler colour compared with *Katki* crop. Again lac from " natural infection " is generally inferior to that from " artificial infection " and *phunki* lac invariably contains less colouring matter than *ari* lac.

The quality of seedlac depends mainly upon the type and quality of stick lac and the extent of washing. *Kusmi* stick lac produces seedlac of lighter colour and care in washing improves colour and helps to reduce the impurities. The main commercial grades of seedlac are golden, fine and ordinary *Kusmi* and similar grades for *Baisakhi*.

The quality of shellac depends upon the type and quality of seedlac used, the method of manufacture and the extent of mixing or addition of substances like rosin and orpiment. The main commercial grades of shellac are T. N., Standard I, Fine and Superfine. Among these, there are grades with and without the admixture of rosin and addition of orpiment. The trade brands under which shellac is put on the market by the various manufacturers and shippers are over 300 in number.

CHAPTER IV.

Prices.

Lac prices have experienced violent fluctuations during the last thirty years. In London, the prices of shellac averaged as high as 350 shillings per cwt. in 1922-23 and as low as 42 shillings in 1938-39. Similarly at Calcutta, shellac prices averaged over Rs. 169 per maund in 1920-21 and 1922-23 and only Rs. 15 per maund in 1938-39. The prices at Calcutta and London markets generally moved in sympathy with each other except in 1934-35 and 1935-36 when as a result of an attempted corner by a London Syndicate, the normal relationship between Calcutta and London prices was disturbed. The failure of the syndicate brought about a crash in prices in 1935 and they remained at a very low level thereafter till the outbreak of the War in 1939. The " futures " prices at Calcutta generally displayed a " bullish " tendency but owing to the erratic course taken by the " futures " quotations at times, these did not exercise a stabilising effect on prices.

The prices of different grades of shellac have differed by a varying margin from time to time so that prices of different grades did not always remain on a par with their respective qualities.

Seedlac prices have generally followed shellac prices but at times the prices of shellac and seedlac have been out of parity with each other even at Calcutta. *Kusmi* seedlac, however, has invariably fetched a higher price than *Baisakhi*. The prices of seedlac and shellac at Markets in producing areas have usually followed the Calcutta prices. In the case of stick lac, however, due to the absence of any comparable quality, the prices appear to vary from market to market and lot to lot. Apart from prices in different markets not being comparable, the cultivator is often unaware of the prevailing market prices, and consequently is not in a position to bargain. A wider adoption of the system of offering prices on the basis of yield of seedlac (*beoli* basis) and provision of suitable arrangements for the dissemination of reliable market prices would help to bring about a closer relationship between the prices in different markets as also between seedlac and stick lac prices.

The unstability of lac prices has been complained of by buyers abroad and although the problem has received the attention of the Indian Lac Cess Committee and the Governments of lac producing provinces from time to time, lac prices even in recent years have been subject to wide fluctuations. It is interesting to note in this connection that the prices of synthetic resins which compete with lac in several spheres of its use have not been subject to such wide fluctuations.

CHAPTER V.

Assembling.

Most of the stick lac reaches the seedlac and shellac manufacturing factories after passing through the hands of one or more intermediaries such as *paikars,* village merchants, *arhatiyas,* wholesale merchants, etc.

The *hats* held periodically in villages and *arhatiyas'* shops at manufacturing centres serve as assembling markets to which producers, *paikars,* and village merchants, etc., take their lac for disposal. In the *hats,* the prospective buyers negotiate the transactions with the sellers direct. At *arhatiyas'* shops, on the other hand, the *arhatiya* arranges to sell the produce on behalf of the seller, charging a commission for his services. *Arhatiyas* also buy and sell on behalf of outstation buyers and sellers. Besides the *arhatiya's* commission a number of other charges have to be paid in connection with sales through *arhatiyas* or at *hats* or markets. These charges vary from market to market, and are levied

in cash or kind or both. They may be payable by seller or buyer, or shared by both buyer and seller. The charges found in vogue at different centres, include brokerage, weighing charges, handling charges, contributions to charity, tolls and taxes, quality and weighment allowances and various other miscellaneous charges. The wide variations in the market charges at different centres prevent orderly and efficient marketing. A more orderly system of marketing can be brought about by establishing regulated markets and standardising market charges in these regulated markets.

CHAPTER VI.

Distribution.

The quantities of stick lac required both for export and internal markets being very small, most of the stick lac is manufactured by factories into seedlac and shellac. Again, as the bulk of seedlac and shellac manufactured in India enters the export trade and is shipped from the port of Calcutta, the manufacturers consign most of their seedlac and shellac to their brokers at Calcutta who arrange sales on their behalf to shippers. The distribution of these commodities for the internal market is done mainly by the manufacturers and *arhatiyas* or commission agents.

The *arhatiyas* finance small *bhatta* owners by supplying them stick lac on short term credit and giving advances on the security of goods deposited with them for sale. Similarly, the Calcutta brokers advance 70 to 80 per cent. of the value of seedlac and shellac sent to them for sale by manufacturers and wholesale merchants.

The expense incurred in internal distribution include handling and transport charges, cost of containers and packing, and commission and other incidental charges. The additional expenses involved for export include piling charges, export cess, port charges, insurance, steamer freight, shippers' commission, etc.

CHAPTER VII.

Conservation.

Producers generally sell their lac soon after collecting it from the trees. Similarly, small manufacturers usually dispose of their seedlac and shellac soon after manufacture. On the other hand, big producers, *arhatiyas*, merchants and large factories often carry stocks of stick lac. Stocks of seedlac and shellac are usually carried by the shippers, the brokers at Calcutta and the large factories. No regular

statistics are, however, available about the stocks at various centres.

The quality of stick lac, seedlac and shellac deteriorates in storage after a certain period. The storage losses are comparatively less if lac is properly dried before storage and then spread in thin layers over *pucca* floors in a cool place and occasionally turned over. The deterioration in quality is also considerably minimized by " cold storage ", but in view of the comparatively high cost, cold storage is economical for better grades of shellac only. The possibilities of providing cold storage facilities at a cheaper cost should be examined.

CHAPTER VIII.

Handling and transportation.

Small producers, who account for the bulk of stick lac production, usually harvest, scrape and dry their stick lac themselves with the aid of the members of their family, and then sell it at the village to a *paikar*, or take it as headloads in baskets or bags to *hats*. Bigger producers and contractors employ hired labour for these operations and carry the lac loose or packed in bags to the markets or their godowns on bullock carts or pack animals. The cost of this transport usually varies from 1 to 3 pies per maund per mile.

Before taking the stick lac to the markets, a casual dressing is often given by picking the bigger pieces of twigs and stones by hand and separating the smaller ones by winnowing. Nevertheless, either on account of insufficient cleaning by the producers or subsequent adulteration by *paikars* and merchants, the stick lac brought to factories contains 5 to 10 per cent. of easily removable impurities. This unnecessarily increases the cost of handling and transportation.

At railway stations and ports, stick lac, seedlac and shellac are usually handled in gunny bags. For high grade shellac, wooden cases are also used. Second hand bags are invariably used in the inland trade and new bags in the export trade. The usual weight of a stick lac bag is from 1¼ maund to 1½ maunds. A seedlac bag usually weighs 2 maunds for export trade and from 1½ maunds to 2 maunds for internal trade. A shellac bag is usually of 1¼ maunds nett weight in the internal trade and 2 maunds in the export trade. The contents of a wooden case also weigh 2 maunds or 1½ cwt.

The ordinary rate of freight for rail transport is ·42 pies per maund per mile for stick lac and seedlac and ·62 pies per maund per mile for shellac. A number of cheaper schedule

and special rates are, however, allowed between various points. Motor lorries sometimes seriously compete with the railways for traffic between certain points.

On arrival at Calcutta, the various consignments received from upcountry manufacturers are invariably opened for " piling " or " mixing " so that consignments of the quality required for export may be obtained. The cost of piling is reported to be about 1 anna per maund.

CHAPTER IX.

Grading and standardisation.

The producer sells his lac in the form of stick lac but there are no well-known standards defining its quality. The buyer of stick lac makes his own rough estimate by visual examination only, and offers his price on the basis of this rough estimate. A more satisfactory method which is coming into vogue is the system of sales on "*beoli*" basis, under which the yield of clean lac is worked out for a small sample taken out from the consignment of stick lac offered for sale.

Seedlac is bought and sold in the internal trade on the basis of alcohol insoluble impurities, the free tolerance for which varies from 3 per cent. to 5 per cent. for different grades. Similarly, shellac is traded in on the basis of alcohol insoluble impurities and rosin content. In addition to these two factors, buyers may sometimes require shellac to be free from orpiment. The free tolerance for alcohol insoluble impurities is 2 per cent. for some grades and 3 per cent. for others. The amount of rosin permissible varies from *nil* to 12 per cent.

Written contracts are generally used in respect of sales made by manufacturers and Calcutta brokers to shippers and other buyers. Besides stating the quantity, quality and rate, these contracts specify a scale of allowances, deductions and rejection limits when impurities, rosin, orpiment, etc., exceed the specified free tolerance. Contracts are also entered into in respect of " futures " transactions carried on at Calcutta and Mirzapur. Only T. N. shellac is tenderable against these contracts.

The export trade is regulated mainly by the bye-laws, rules, regulations and contract terms adopted by the United States Shellac Importers' Association and the London Shellac Trade Association. In the case of seedlac, the United States specifications lay down a free tolerance of 2 per cent. moisture and 3 per cent. alcohol insoluble impurities for

Kusmi seedlac and 5 per cent. alcohol insoluble impurities for *Baisakhi* seedlac. The colour has to conform to approved samples. The standard regarding bleaching is 75 c.c. for *Kusmi* and 110 c.c. for *Baisakhi*. The London Association prepares standard samples each season and the quality of consignments received is examined with reference to the standard sample.

For shellac, the United States specifications lay down a free tolerance of ½ per cent. water soluble impurities and 1¼ per cent. to 3 per cent. alcohol insoluble impurities for different grades. The free tolerance for rosin is 3 per cent. for some of the grades. For orpiment, the free tolerance is 0·2 per cent. for grades containing orpiment and 0·025 per cent. for F. O. grades (free from orpiment). The London Shellac Trade Association has three contracts, one for T. N., another for orange and the third for garnet lac. The free tolerance for impurities varies from 3 to 10 per cent. for different grades.

An examination of a large number of commercial samples of seedlac and shellac as also samples of seedlac and shellac prepared from stick lac from different hosts, seasons and localities has shown that seedlac can be graded on the basis of hot alcohol impurities, colour and rate of filtration. Grades and grade specifications on the basis of these factors were drawn up under the Agricultural Produce (Grading and Marking) Act and several consignments of seedlac conforming to these grades were shipped to the United States of America. These were very favourably commented upon. Tentative grade specifications for shellac have also been drawn up.

CHAPTER X.

Brood lac.

About 33,000 tons of brood lac are estimated to be used annually for the infection of lac hosts. The bulk of brood lac requirements are met by producers who keep sufficient brood lac from their own trees, but when their own supply is insufficient, they buy from other producers and *hats*. Generally speaking, producers have little choice about the quality of brood lac they have to use : they use whatever quality they have or can obtain readily. Although sufficient quantities of ordinary quality brood lac are generally available, there is often a dearth of good quality brood lac.

Supplies of good quality brood lac can be increased by establishing brood lac farms.

CHAPTER XI.

Weights.

The standard maund of 40 seers and the seer of 80 *tolas* are used throughout India at railway stations and big trading centres, but in rural areas and *hats,* the use of *kachcha* weights is very common. A *kachcha* seer may be anything from 45 *tolas* to 90 *tolas* at different places and the number of seers of stick lac required to be delivered for every maund may vary from 40 seers to 60 seers. Apart from the confusion caused by these variations, a large proportion of weights and scales used are faulty.

A step towards the standardisation of weights has been taken by the passing of the Standards of Weight Act by the Central Legislature in 1939, under which standard weights of the *tola-seer* series and the avoirdupois series have been specified. It is desirable that the use of these weights should be enforced in all the provinces and States in India.

CONCLUSIONS AND RECOMMENDATIONS.

Improving the accuracy of production figures and the system of crop reporting.

Estimates of lac production have been issued by the Indian Lac Cess Committee since 1928-29. The system of crop reporting was slightly modified in 1938 with a view to improving the accuracy and utility of the forecasts. The reported figures can, however, be considered as only approximate. The possibilities of further improving the accuracy of production figures and the system of crop reporting may be examined by the Indian Lac Cess Committee. A possible method of approaching the problem may be to request the Provincial Governments to publish, like other crops, estimates of the lac crop (page 5).

Wider adoption of systematic methods of pruning, infection and rotation of host trees.

Correct pruning, systematic infection with correct amount of brood and rotation of hosts to give them occasional rest are necessary to obtain the best results but the cultivators do not always prune and infect the lac hosts correctly. Schemes for rotation of hosts do not appear to be practised by growers or contractors of government forests. The Indian Lac Cess Committee has been attempting to educate the growers in the correct methods of pruning and infecting hosts through *kamdars* trained at the Indian Lac Research Institute. As a wider adoption of the methods recommended will help in getting better results, the Indian Lac Cess Committee may examine the possibilities of expanding this work (pages 28 and 29).

Increasing the production of Kusmi lac.

Lac collected from *Kusmi* hosts is estimated to account for only about 18 per cent. of the lac collected in India. As *Kusmi* hosts yield the best quality lac which fetches the highest prices, the production of *Kusmi* lac should be encouraged. This may be done by the demonstrators of the Indian Lac Cess Committee encouraging the cultivators to take up uninfected *Kusum* trees wherever possible and by the Forest Department being requested to lease out uninfected *Kusum* trees to cultivators on reasonable rent (pages 8, 42 and 60).

Research on the use of lac-dye.

Little attempt appears to have been made to revive the lac-dye trade after its disappearance as a result of competition from synthetic dyes. The possibilities of developing this by-product by finding out modern and cheaper methods of recovery may be examined (page 14).

Mixing of imported lac with Indian lac for the manufacture of seedlac and shellac.

Considerable quantities of stick lac are imported into India from Burma and Siam (Thailand). Almost the whole of the imports are landed at Calcutta from where appreciable quantities find their way to the shellac and seedlac manufacturing centres in Bihar and the United Provinces, and are used in the preparation of seedlac and shellac along with Indian stick lac. The admixture of Burma and Siam lac with Indian lac in the manufacture of seedlac and shellac has been objected to by buyers abroad. It appears desirable that when Burma or Siam lac is wholly or partially used for the preparation of seedlac or shellac, the product should be declared to that effect. The enforcement of such measures, however, presents serious difficulties (pages 11 and 12).

Improvements in the methods of preparing seedlac.

The indigenous process of preparing seedlac is not altogether inefficient but admits of improvement in the direction of saving in time and labour and a higher degree of efficiency in respect of the removal of colouring matter and impurities.

The Indian Lac Research Institute has evolved an improved method for washing seedlac which yields a light colour seedlac of greater purity. It is claimed that such seedlacs will fetch 20 per cent. higher prices. The method, however, does not appear to have been adopted by any factory. Steps should, therefore, be taken to encourage one or more manufacturers to give the method a trial. Consignments of seedlac prepared by this process should also be sent to the United States of America to ascertain whether the produce meets with the consumers' requirements (pages 37 and 38).

Improving the quality of shellac.

The country process of shellac manufacture retains all the good properties of shellac but appreciable quantities of by-products are produced which fetch comparatively lower

prices. The use of double bags yields shellac of better quality but increases the amount of by-products produced. Experiments conducted at the Indian Lac Research Institute indicate that *kiri* which is an important by-product can be utilised for preparing garnet lac and in the manufacture of moulded plastics. It is, therefore, desirable that shellac manufacturers should adopt the practice of using double bags as far as possible and take steps towards better utilisation of by-products such as conversion into garnet lac. The production of garnet lac from by-products may be encouraged by running a plant on a co-operative basis at some centre. The demand for garnet lac and the economics of the process may be kept in view in schemes for the conversion of by-products into garnet lac (pages 38 and 39).

Increased utilisation of lac in India.

Lac finds place in the preparation or manufacture of a large variety of articles of common use but the total amount of lac used in India is small. Researches carried out at the Indian Lac Research Institute indicate possibilities of a larger use of shellac for plastics and electric insulation purposes. Modified forms of lac may find use in various other industries. Investigations to bring about a larger use of lac in India should be continued by the Indian Lac Research Institute (pages 40 and 49).

Closer relation between stick lac and seedlac prices.

The prices of stick lac are usually offered by judging quality and estimating the probable yield of seedlac by visual examination, and vary from lot to lot and market to market. Sales on "*Beoli*" basis *i.e.*, after making a rough and ready determination of the amount of impurities take place only in case of comparatively big consignments. As under this system, stick lac gets prices consistent with quality, it is desirable that the system of buying and selling stick lac on "*Beoli*" basis should be encouraged. The system could be first adopted and tried in regulated markets. A wider adoption of the system in primary markets may help to bring about closer relationship between stick lac and seedlac prices (page 62).

Re-organising "futures" trading at Calcutta.

There are often violent and erratic fluctuations in the "futures" prices of shellac at Calcutta, which do not appear to have any stabilising effect on the "ready" prices. The buyers of shellac in America expressed an opinion that the

use of lac as a purely speculative medium threatened the existence of the industry. The " futures " (*fatka*) trading in shellac needs to be re-organised (pages 63 and 66).

Dissemination of reliable market prices in rural areas.

The cultivator is often unaware of prevailing prices and whatever information reaches him is not only out of date but in most cases is of doubtful accuracy. A system of relaying the prices of stick lac corresponding to the ruling prices of T. N. Shellac at Calcutta, to all important markets in the State adopted in Mayurbhanj State since 1935 is reported to have helped the producers in securing substantially higher prices. It appears desirable that suitable arrangements for the dissemination of reliable market prices in the rural areas of lac growing tracts be made so that the lac grower may obtain a better return for his lac. For instance, the practicability of posting lac prices in the *hats* and markets in lac growing areas in collaboration with the Provincial Marketing Officers may be explored (page 64).

Stabilisation of prices.

The prices of shellac have varied within very wide limits and this has often caused alarm to consumers of lac. The fluctuations have been greater and more frequent than those in the prices of synthetic resins. The possibility of taking steps to keep lac prices at suitable levels and avoiding violent fluctuations in prices should be examined (page 65).

Regulation of market practices and reduction and standardisation of market charges.

Various practices and market charges which usually have the sanction of long usage are found in vogue in markets. Malpractices in the process of weighment such as wrong weighment, taking additional weight and use of false weights, and buyers forming a ring, etc., are met with in some *hats* and markets. The market charges which may be payable in cash or kind or both vary from market to market and in some cases may amount to over 9 annas per maund of stick lac. There are no regulated markets for lac in India and apart from a few *hats* owned by the Government, where market charges have been fixed, there is no State control over the practices and charges in vogue in different markets. As establishment of regulated markets will provide a check on the malpractices found in markets and excessive market charges, it is desirable that early steps should be taken to establish regulated markets at important centres. The marketing charges should not only be reduced to a reasonable

limit, but should also be standardised as far as possible (pages 71, 75, 76 and 123).

Marketing of clean stick lac.

Stick lac brought to factories contains, on an average, 5 to 10 per cent. of such impurities as are easily removable by picking or using simple sieves without practically any cost. If producers took care to remove such impurities and no subsequent adulteration was done by village merchants and *paikars,* appreciable saving could be made in the cost of handling and transportation of stick lac. The advantages of selling cleaner stick lac should, therefore, be brought to the notice of the producers of stick lac and *paikars.* For instance, it may be part of the work of the demonstrators appointed by the Indian Lac Cess Committee to see that clean stick lac is marketed (pages 95 and 96).

Co-operative sale societies for the marketing of stick lac.

The producer's share in the consumer's price is bigger when he sells his stick lac direct to a shellac or seedlac factory than when he sells through *paikars* and *arhatiyas.* There are, however, certain difficulties in the way of producers selling directly to factories, and it is, therefore, desirable that producers should be organised into co-operative sale societies for the disposal of their stick lac especially, in places where regulated markets may be established (page 85).

Provision of cold storage facilities.

Stick lac, seedlac and shellac deteriorate in quality after a certain period. For short period storage, ordinary precautions such as turning over and aeration are adequate but for long period storage of shellac, cold storage appears to offer advantages. Experiments undertaken by the Indian Lac Research Institute also indicate that while no appreciable advantage is secured by cold storage of seedlac, deterioration in the physical properties is minimised in the case of shellac. At the present level of shellac prices and the cost of cold storage, it is economical only for better grades of shellac but if shellac prices rise or cold storage costs are reduced, it may become economical for lower grades also. The possibilities of developing storage of shellac in air-conditioned godowns and provision of cold storage facilities at a cheaper cost may be further examined (pages 92, to 94 and Appendix 28).

Establishing grades for seedlac and shellac.

The lac trade in India recognises several commercial descriptions of seedlac, based on appearance, size of grains

and amount of (alcohol insoluble) impurities. The purchases by the United States of America are mainly on the basis of impurities and bleachability, the tolerances for which are recognised for *Kusmi* and *Baisakhi* seedlacs. Manufacturers in India generally do not sell on the basis of bleachability.

The results of analysis of a large number of seedlac samples indicate that seedlac made from fresh stick lac, properly washed and reasonably free from impurities, conforms to all the requirements of the buyers. Grades and grade specifications have been laid down under the Agricultural Produce (Grading and Marking) Act to cover these factors. Some shipments of graded seedlac have been sent to the United States of America and these have been favourably commented upon. It appears desirable that larger quantities of seedlac conforming to these specifications be made and exported abroad. As, however, the buyers in America attach great importance to the bleachability of seedlac, the feasibility of including this factor in the specifications of all the different grades may be explored (pages 43, 105, 106 and 116).

The shellac trade in India is carried on on the basis of several grades based on the amount of alcohol insoluble impurities and rosin, but there are a large number of private trade brands and marks which represent shellac with varying amounts of impurities, rosin, orpiment or with variations in colour, thickness of flakes, etc. The specifications for most of these latter marks and brands are not known but different brands in many cases represent almost identical shellac. It seems desirable, therefore, that a few recognised grades should be adopted by the trade. The specifications for these grades should represent the minimum standards of quality and after the specifications meet with the approval of the trade, shippers and manufacturers should be required to register their brands and marks against these grades (pages 43 and 118).

Adoption of standard weights.

The conditions regarding weights in lac producing areas are chaotic and there is no system of verification of weights used. The Central Government have fixed standards of weight. It is desirable that the Provincial Governments should take the necessary steps to enforce the use of standard weights in their respective provinces (pages 123 and 124).

APPENDIX 1.

List of lac hosts.

Botanical Names.	English and Vernacular Names
Major lac hosts.	
Butea frondosa	Palas, Paras, Dhak, Chheola (C. P.), Chhichra (Punjab), Pauk (Burma).
Schleihera trijuga	Kusum, Poovam Konnai (Madras), Gyo (Burma).
Zizyphus jujuba	Ber, Plum, Kul, Elandai (Madras), Zi (Burma).
Minor lac hosts.	
Ficus Species—	
Ficus altissima	....
Ficus Bengalensis	Giting (Assam), Banyan (Punjab), Bargat (C. P.).
Ficus carica	Fig (Punjab).
Ficus Cunia	Porho, Thadut (Burma).
Ficus glabella	Putkul.
Ficus glomerata	Dumber, Fig, Gular, Thapan (Burma).
Ficus hispida	Kadut (Burma).
Ficus indica	Nyaung-thabye (Burma).
Ficus infectoria	Pakaur, Pakri, Nyaung-gyin (Burma).
Ficus nervosa	Nyaung-peinne (Burma).
Ficus obtusifolia	Nyaung-gyat (Burma).
Ficus religiosa	Pipal, Bawdi (Burma).
Ficus Roxburghii	Sinthapan.
Ficus Rumphii	Prap (Assam).
Ficus tsiela	....
Acacias—	
Acacia arabica	Babul, Kikar (Punjab), Babla (Bengal), Kar gai (Madras.)
Acacia canescens	.. .
Acacia catechu	Khair, Sha (Burma).
Acacia concinna	. .
Acacia Farnesiana	Kastura.
Acacia latronum	. .
Acacia leucophlaea	. . .
Acacia monilliformis ..	. .
Acacia pinnata	. .
Acacia suma	San-kanta.
Albizzias—	
Albizzia lebbek	Siris, Kokko (Burma).
Albizzia lucida	Galwang (Assam).
Albizzia stipulata	Siris.
Albizzia ordoratissima ..	Airma Bonsa (C. P.), Taung-Magyi (Burma).

APPENDIX 1—*concld.*

List of Lac hosts—concld.

Botanical Names.	English and Vernacular Names.
Dalbergias—	
Dalbergia cultrata	Yindiak (Burma).
Dalbergia lanceolaria	....
Dalbergia latifolia	Shishum (C. P.).
Dalbergia Oliveri	Tamalan (Burma).
Dalbergia paniculata	Dhoben (C. P.).
Miscellaneous—	
Anona squamosa	Custard Apple, Awza (Burma).
Atylosia albicans	....
Atylosia mollis	....
Bursera Serrata	Thadi (Burma).
Berrya amonilla	Pauk-nwe (Burma).
Butea superba	Pauk-nwe (Burma).
Caesalpinia coriaria	Angrezi Imli (C. P.).
Cajanus indicus	Arhar, Rarhar, Tur, Nandu (Assam).
Croton oblongifolius	....
Dicrostachys cinerea	....
Dolichos falcatus	....
Engelhardtia spicata	Wakgru (Assam), Thitnu (Burma).
Entada scandens	....
Flemingia congesta	....
Flemingia congesta var semialata	Marda Noyi.
Grewia laevigata	....
Grewia multiflora	Bolmengo (Assam).
Kydia calycina	Boldabak (Assam).
Leea crispa	....
Leea robusta	Gangma (Assam).
Nephelium litchi	Litchi.
Ougeinia dalbergioides ..	Panjan, Tinsa (C. P.).
Pentacme suavis	Ingyin (Burma).
Pithecolobium Saman	Rain Tree, Thinbaw Kokko (Burma).
Polyalthia suberosa	....
Shorea obtusa	Thitya (Burma).
Shorea talura	Jalla, Jalari.
Zizyphus Xylopyra	Ghont, Malhar (Punjab).

Source.—Lac Cultivation in India by P. M. Glover.

APPENDIX 2.

Host trees used for lac cultivation in the various centres of the lac divisions.*

Divisions.	Centres.	Hosts used.
Balarampur ..	Balarampur-Barabazar ..	Ber, Palas, Kusum and a few minor hosts.
	Chandil	Ber, Palas, Kusum and minor hosts.
Jhalda ..	Thulin	Ber, Palas, Kusum and a few minor hosts.
	Gola	Palas, Kusum do. do.
	Jhalda	Ber, Palas, Kusum and some minor hosts.
	Chas	Palas and Ber.
	Purulia	Ber, Palas and a few minor and Kusum hosts.
	Manbazar	Do. do. do.
Ranchi ..	Ranchi	Palas, Ber, Kusum and a few minor hosts
	Lohardaga-Gumla ..	Palas, Kusum, minor hosts and some Ber hosts.
	Silli	Ber, Palas, Kusum and a few minor hosts.
	Bundu	Palas, Ber, Kusum and some minor hosts.
	Murhu (Khunti)	Do. Do. Do.
Singbhum ..	Chakradharpur	Ber, Kusum, Palas, and minor hosts.
	Chaibasa	Kusum, Ber, Palas and some minor hosts.
	Mohulia	Ber, Palas, some Kusum and a few minor hosts.
	Champua (Keonjhar) ..	Mostly Kusum.
	Rairangpur (Mayurbhanj)	Do.
Pakur ..	Purnea (including Nepal)	Ber.
	Rajmahal (Malda) ..	Ber.
	Kotalpakur	Ber.
	Dhulian	Ber.
	Kaligunj (Nimtita) ..	Ber.
	Pakur	Ber.
	Hiranpur	Ber.
	Dumka	Palas and Ber.
	Jharmundi	Do.
Daltonganj ..	Latehar (including Tori) ..	Mostly Palas with a few Ber, Kusum and minor hosts.
	Satbharoa	Mostly Palas, with some minor and a few Ber and Kusum hosts.
	Daltonganj	Mostly Palas, some minor and a few Ber hosts.
	Garwah	Mostly Palas, with some minor and a few Ber hosts.
	Bohla (Surguja State) ..	Mostly Palas.
Kota-Pendra ..	Kota (Bilaspur) ..	Mostly Palas.
	Pendra (Manendragarh) ..	Mostly Palas with a few minor hosts.
Rajim-Dhamtari	Rajim	Palas and Kusum.
	Dhamtari	Do.

*The hosts mentioned against each centre are in order of importance for the centre.

APPENDIX 2—*concld.*

Host trees used for lac cultivation in the various centres of the lac divisions*—**concld.**

Division.	Centres.	Hosts used.
Gondia.. ..	Seoni (including Nainipur & Mandia).	Mostly Palas with a few Kusum, Ber and minor hosts.
	Chhindwara	Palas with some Kusum and a few minor and Ber hosts.
	Katanghi (Balaghat) ..	Mostly Palas.
	Gondia	Do
	Dongargarh	Do.
Katni-Damoh	Katni	Mostly Palas.
	Sihora (Jubbulpore) ..	Do.
	Damoh-Hatta	Do.
	Raipura (Panna) ..	Do.
Umaria ..	Umaria (Umaria, Manpur and Birsingpur Ranges).	Mostly Palas.
	Sahdol (Sahdol, Jaithara and Bechari Ranges).	Do.
Minor divisions	See Appendix 3.	Palas, Ber, Kusum and other minor hosts.

*The hosts mentioned against each centre are in order of importance for the centre.

Source.—Compiled from the crop forecast statements issued by the Indian Lac Cess Committee.

APPENDIX 3.

List of divisions for reporting lac crop with their centres and the name of districts and States covered.*

Name of division.	District and province where located.	Names of centres.	Names of districts and States covered by the division.
1. Balarampur	Manbhum (Bihar)	Balarampur, Barabazar, Chandil.	Manbhum (Bihar).
2. Jhalda ..	Manbhum (Bihar).	Thulin, Gola, Chas, Jhalda, Purulia, Manbazar.	Manbhum (Bihar).
3. Ranchi ..	Ranchi (Bihar)	Ranchi, Silli, Khunti, Murhu, Bundu, Lohardaga-Gumla.	Ranchi (Bihar).
4. Singbhum	Singbhum (Bihar).	Chakardharpur, Chaibasa, Mohulia, Champua (Keonjhar), Rairangpur (Mayurbhanj).	Singbhum (Bihar) and Mayurbhanj and Keonjhar States.
5. Pakur ..	Santhal Parganas (Bihar).	Purnea, Rajmahal, Malda Kotalpakur, Dhulian, Kaliganj, Nimtita, Pakur, Hirampur, Dumka, Jharmundi.	Santhal Parganas, Purnea (Bihar), Murshidabad, Malda (Bengal) and Nepal State.
6. Daltonganj	Palamau(Bihar)	Latehar, Satbharoa, Daltonganj, Garwah, Bohla.	Palamau (Bihar), Surguja State, Mirzapur (U. P.)
7. Kota-Pendra.	Bilaspur (C. P.)	Kota (Bilaspur), Pendra (Manendragarh).	Bilaspur (C. P.), Surguja and Korea States and Uprora, Matin, Pendra and Korlea Zamindaris.
8. Rajim-Dhamtari.	Raipur (C. P.)	Dhamtari, Rajim ..	Raipur (C. P.), Kanker, Bastar, Kalahandi States.
9. Gondia ..	Bhandara (C.P.)	Seoni, Chhindwara, Katanghi, Balaghat, Gondia, Dongargarh.	Bhandara, Balaghat Chhindwara (C. P.), Khairgarh State.
10. Katni Damoh.	Jubbulpore Saugor (C. P.)	Katni, Sihora, Damoh, Hatta, Raipura (Panna).	Jubbulpore, Saugor (C. P.), Panna State.
11. Umaria ..	Rewa State	Umaria, Sahdol ..	Rewa State.
12. Minor divisions.	..	(*a*) Gangapur-Sambalpur	Gangapur State, Sambalpur (Orissa).
		(*b*) Raigarh-Champa ..	Raigarh State, Bilaspur (C.P.).
		(*c*) Naila-Rajnandgaon ..	Bilaspur (C. P.), Nandgaon State.
		(*d*) Saugor-Harpalpur ..	Saugor(C. P.), Jhansi (U.P.)
		(*e*) Satna-Maihar ..	Maihar State.
		(*f*) Bombay-Baroda ..	Bombay and Baroda State.
		(*g*) Chhotaudaipur ..	Chhotaudaipur State (South of Surguja State).
		(*h*) Itarsi-Bankhedi ..	Hoshangabad (C. P.)
		(*i*) Bhopal-Betul ..	Bhopal State, Betul (C. P.).
		(*j*) Mirzapur-Lucknow ..	Mirzapur and Lucknow (U. P.).
		(*k*) Hyderabad-Sind ..	Hyderabad (Sind).
		(*l*) Hoshiarpur-Punjab ..	Hoshiarpur (Punjab).
		(*m*) Chatra-Sherghati ..	Hazaribagh and Gaya (Bihar).
		(*n*) Imamganj-Raniganj ..	Gaya (Bihar).

*The Indian Lac Cess Committee decided in the meeting held in July-August 1940 to make certain changes in the divisions. Subsequent crop estimates have been made on the basis of the revised divisions.

APPENDIX 4.

Forms used under '' Skeleton System '' of crop reporting.

Preliminary Report of————crop of————Division for the year————.
Previous five years average————maunds.

(All estimates are in maunds of stick lac.)

1. Centres.
2. Nature of infection.
   (*a*) Present crop.
   (*b*) Last crop.
3. Result of Phunki examination.
4. Climatic condition.
   (1) At the time of infection.
      (*a*) For broods.
      (*b*) For crops.
   (2) After infection.
      (a) 4—8 weeks in the case of winter crop.
      (*b*) 14—18 weeks in the case of summer crop.
   (3) A month before the maturity of the crop.
5. Progress of the crop.
6. Damage by :—
   (*a*) mortality of insects.
   (*b*) parasites and predators.
   (c) climate.
7. Host plants, largely used.
8. Percentage of different hosts infected.
9. Estimated yield present year.
10. Finals for the last 2 years.
    19 .
    19 .
11. Quality of lac.
12. Approximate quantity of import of lac from different *hats* upto the last *hat* day.
13. Remarks

APPENDIX 4—*contd.*

Forms used under "Skeleton System" of crop reporting—contd.

General Preliminary Report of————Crop for the year————.

(All estimates are in maunds of stick lac.)

1. Divisions.
2. Nature of infection.
   (*a*) Present crop.
   (*b*) Last crop.
3. Climatic condition for crop.
   (*a*) at the time of infection.
   (*b*) after infection.
   (*c*) a month before maturity of the crop.
4. Progress of the crop.
5. Damage.
6. Estimated yield this year.
7. Finals for last two years.
8. Quality of lac.
9. Expected outturn of shellac or *chowri* per maund of lac.
10. Approximate total quantity of lac imported from different *hats* up to the last *hat* day.
11. Previous 5 years' average.
12. Remarks.

$\frac{\text{Semi-Final}}{\text{Final}}$ Report of————crop of————Division for the year.

Previous 5 years' average————maunds.

(All estimates are in maunds of stick lac.)

1. Centres.
2. Climatic condition—a month before maturity of the crop.
3. Progress of the crop.
4. Estimated yield.
   (*a*) 1st Report.
   (*b*) Revised or Final.
5. Finals for the last 2 years.
6. Quality of lac.
7. Expected outturn of shellac or *chowri* per maund of lac.
8. Approximate total quantity of lac imported from different *hats* up to the last *hat* day.
9. Workings :—
   (1) Quantity removed.
      (*a*) Shellac.
      (*b*) Lac.
      (*c*) *Chowri*.
      (*d*) Equivalent as lac.
   (2) Foreign lac imported.
      (*a*) By rail.
      (*b*) By road.
10. Remarks.

APPENDIX 4—*concld.*

Forms used under "Skeleton System" of crop reporting—**concld.**

General —Semi-Final / Final— Report of————crop for the year.

(All estimates are in maunds of **stick lac.**)

1. Divisions.

2. Climatic condition a month before maturity of the crop.

3. Progress of the crop.

4. Estimated yield.

1st or Semi-Final.

Semi-Final or Final.

5. Finals for the last 2 years.

6. Quality of lac.

7. Workings :—

(1) Equivalent quantity of lac removed.

(*a*) Shellac.

(*b*) Lac.

(*c*) *Chowri.*

(2) Foreign lac imported.

(*a*) By rail.

(*b*) By road.

8. Approximate stock of lac in the division on 1st April————.

Crops finally estimated.

Foreign import.

Total available quantity.

9. Approximate stock by the end of ————in the division.

APPENDIX 5.

Production of stick lac in India from different crops.

(Tons).

Crop.	1928-29.	1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	1936-37.	1937-38.	1938-39.	1939-40.	1940-41.
Reporting areas. (12 Lac divisions).													
Baisakhi crop ..	28,722	21,032	29,188	21,786	20,261	18,038	23,402	23,255	27,663	28,949	29,555	40,742	23,255
Jethua crop	4,308	1,552	1,690	1,111	1,323	1,653	827	1,102	3,674	1,268	1,598	909	1,382
Katki crop	9,276	8,817	10,011	4,712	4,188	11,692	7,853	7,035	12,721	11,443	17,249	6,925	14,989
Kusmi crop	11,205	5,795	5,731	3,398	5,639	4,455	3,804	7,458	13,988	3,228	3,784	1,562	4,344
Total	53,511	37,196	46,620	31,007	31,411	35,838	35,886	38,850	58,046	44,888	52,186	50,138	43,970
Assam	1,580	1,626	2,021	1,653	1,047	808	1,745	1,414	1,231	956	808	Not available.	
Non-reporting areas ..			Not available.				503	422	422	624	771	781	918
Grand Total ..	55,081	38,832	48,641	32,660	32,458	36,646	38,134	40,686	59,699	46,468	53,765	50,919*	44,888*

* Excluding Assam.

Source.—From 1928-29 to 1930-31 " Lac Cultivation in India ": Glover.
From 1931-32 to 1940-41 " Indian Lac Cess Committee Reports and crop forecasts ".

APPENDIX 6.

Production of stick lac from different crops in different lac divisions, Assam and non-reporting areas.

(Tons).

Name of Lac division.	1934-35.					1935-36.				
	Baisakhi.	*Jethua.*	*Katki.*	*Kusmi.*	Total.	*Baisakhi.*	*Jethua.*	*Katki.*	*Kusmi.*	Total.
Lac divisions.										
Pakur	2,021	..	294	..	2,315	2,756	..	918	..	3,674
Jhalda	3,086	110	1,029	367	4,592	2,388	110	368	1,102	3,968
Balarampur	3,196	92	735	450	4,473	3,674	110	367	1,102	5,253
Ranchi	2,939	220	918	1,286	5,363	2,939	184	863	2,939	6,925
Singbhum	1,359	37	230	395	2,021	1,836	147	276	1,121	3,380
Kota Pendra	1,010	18	588	28	1,644	1,102	..	551	46	1,699
Rajim Dhamtari	202	129	275	845	1,451	220	294	184	588	1,286
Gondia	1,249	..	1,102	9	2,360	1,102	..	955	9	2,066
Katni Damoh	404	..	349	..	753	294	..	441	..	735
Umaria	643	..	257	2	902	552	..	367	18	937
Daltonganj	4,225	..	790	18	5,033	4,041	18	643	92	4,794
Minor divisions	3,068	221	1,286	404	4,979	2,351	239	1,102	441	4,133
Total of 12 divisions ..	23,402	827	7,853	3,804	35,886	23,255	1,102	7,035	7,458	38,850
Assam	..	20*	1,725*	..	1,745	..	30*	1,384*	..	1,414
Non-reporting areas	277*	20*	161*	45	503	232	17*	135*	38	422
Total ..	23,679	867	9,739	3,849	38,134	23,487	1,149	8,554	7,496	40,686
Share of each crop	62·1%	2·3%	25·5%	10·1%	100·0%	57·8%	2·8%	21·0%	18·4%	100·0%

* Figures estimated on the basis of proportions of different crops in 1936-37 to 1938-39.

APPENDIX 6—*contd.*

Production of stick lac from different crops in different lac divisions, Assam and non-reporting areas—contd.

(Tons.)

Name of Lac division.	1936-37.					1937-38.				
	Baisakhi.	*Jethua.*	*Katki.*	*Kusmi.*	Total.	*Baisakhi.*	*Jethua.*	*Katki.*	*Kusmi.*	Total.
Lac divisions.										
Pakur	4,684	..	2,122	..	6,806	2,645	..	2,204	..	4,849
Jhalda	4,041	735	1,286	3,857	9,919	4,225	184	918	367	5,694
Balarampur	3,674	643	734	3,674	8,725	2,829	147	643	294	3,913
Ranchi	2,939	808	1,286	3,380	8,413	4,261	184	1,010	937	6,392
Singbhum	1,469	919	808	1,837	5,033	1,763	294	515	459	3,031
Kota-Pendra	1,212	..	735	37	1,984	1,286	..	808	37	2,131
Rajim-Dhamtari	220	257	147	588	1,212	331	220	147	661	1,359
Gondia	1,139	..	1,470	9	2,618	1,653	..	1,543	5	3,201
Katni-Damoh	294	..	496	..	790	551	..	643	..	1,194
Umaria	1,194	..	515	18	1,727	735	..	367	9	1,111
Daltonganj	4,409	9	1,836	147	6,401	4,776	9	1,359	18	6 162
Minor divisions	2,388	303	1,286	441	4,418	3,894	230	1,286	441	5,851
Total of 12 Divisions ..	27,663	3,674	12,721	13,988	58,046	28,949	1,268	11,443	3,228	44,888
Assam	..	92	1,139	..	1,231	..	..	956	..	956
Non-reporting areas	257	..	110	55	422	367	18	184	55	624
Total ..	27,920	3,766	13,970	14,043	59,699	29,316	1,286	12,583	3,283	46,468
Share of each crop ..	46·8%	6·3%	23·4%	23·5%	100%	63·1%	2·8%	27·1%	7·0%	100%

APPENDIX 6—*concld.*

Production of stick lac from different crops in different lac divisions, Assam and non-reporting areas—concld.

(Tons.)

Name of Lac division.	1938-39					Average 1934 1935 to 1938-39				
	Baisakhi.	*Jethua.*	*Katki.*	*Kusmi.*	Total.	*Baisakhi.*	*Jethua.*	*Katki.*	*Kusmi.*	Total.
Lac divisions.										
Pakur	4,041	..	1,672	..	5,713	3,229	..	1,442	..	4,671
Jhalda	4,409	220	1,433	551	6,613	3,630	272	1,006	1,249	6,157
Balarampur	3,490	184	992	367	5,033	3,373	235	694	1,177	5,479
Ranchi	4,041	276	2,057	1,102	7,476	3,424	334	1,227	1,929	6,914
Singbhum	1,837	367	918	643	3,765	1,653	353	549	891	3,446
Kota-Pendra	1,395	..	1,286	19	2,700	1,201	4	794	33	2,032
Rajim-Dhamtari	202	276	257	551	1,286	235	235	202	647	1,319
Gondia	1,102	..	2,021	9	3,132	1,249	..	1,418	8	2,675
Katni-Damoh	532	..	1,286	..	1,818	415	..	643	..	1,058
Umaria	772	..	551	9	1,332	779	..	412	11	1,202
Daltonganj	3,968	18	2,572	55	6,613	4,284	11	1,440	66	5,801
Other Minor Divisions ..	3,766	257	2,204	478	6,705	3,093	250	1,433	441	5,217
Total of 12 divisions ..	29,555	1,598	17,249	3,784	52,186	26,565	1,694	11,260	6,452	45,971
Assam	..	..	808	..	808	..	28	1,203	..	1,231
Non-reporting areas	367	55	294	55	771	300	22	177	49	548
Total ..	29,922	1,653	18,351	3,839	53,765	26,865	1,744	12,640	6,501	47,750
Share of each crop	55·7%	3·1%	34·1%	7·1%	100%	56·2%	3·7%	26·5%	13·6%	100·0%

Source.—Compiled from crop forecast reports issued by the Indian Lac Cess Committee.

APPENDIX 7.

Imports of lac into India.

(Tons.)

Year.	Stick lac.			Shellac and other forms of lac.		
	From Burma.	From other countries.	Total.	From Burma.	From other countries.	Total.
1900-01	551	413	964	..	13	13
1901-02	755	735	1,490	..	12	12
1902-03	1,083	327	1,410	..	14	14
1903-04	1,540	253	1,793	3	1	4
1904-05	1,235	141	1,376	1	6	7
1905-06	1,336	510	1,846	1	6	7
1906-07	1,361	202	1,563	..	15	15
1907-08	713	24	737	..	4	4
1908-09	1,065	89	1,154	..	6	6
1909-10	754	43	797	1	2	3
1910-11	1,364	134	1,498	36	1	37
1911-12	89	84	173	..	3	3
1912-13	473	545	1,018	63	9	72
1913-14	318	666	984	..	7	7
1914-15	148	49	197	..	12	12
1915-16	967	106	1,073	..	58	58
1916-17	1,212	1,040	2,252	29	15	44
1917-18	791	517	1,308	5	5	10
1918-19	928	180	1,108	10	..	10
1919-20	2,252	955	3,207	4	4	8
1920-21	1,241	803	2,044	22	20	42
1921-22	2,568	654	3,222	55	3	58
1922-23	2,291	2,076	4,367	62	2	64
1923-24	3,162	1,089	4,251	4	3	7
1924-25	2,914	412	3,326	7	41	48

APPENDIX 7—*concld.*

Imports of lac into India—concld.

(Tons.)

Year.	Stick lac.		Total.	Shellac and other forms of lac.		
	From Burma.	From other countries.		From Burma.	From other countries.	Total.
1925-26	1,890	62	1,952	14	9	23
1926-27	4,323	572	4,895	114	1	115
1927-28	2,295	1,167	3,462	17	5	22
1928-29	5,324	1,113	6,437	17	6	23
1929-30	4,745	3,837	8,582	9	6	15
1930-31	647	1,165	1,812	16	2	18
1931-32	1,878	359	2,237	1	1	2
1932-33	845	202	1,047	..	1	1
1933-34	3,352	2,569	5,921	..	1	1
1934-35	2,398	6,160	8,558	..	..	..
1935-36	1,604*	4,036	5,640	..	5	5
1936-37	2,763*	5,893	8,656	..	93	93
1937-38	1,076	2,316	3,392	..	..	..
1938-39 ..	794	4,298	5,092	..	..	..
1939-40	2,042	9,219	11,261	..	1	1
1940-41	291	3,055	3,346	61	3	64

Source.—Report on Lac and Shellac : Lindsay and Harlow. Reports of the Indian Lac Cess Committee and Annual Statements of the Sea-borne Trade of British India and Accounts relating to the Sea-borne Trade and Navigation of Burma.

*Exports from Burma to India.

APPENDIX 8.

Imports of stick lac into India from different countries.

(Tons.)

Sources.	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.	Average 1909-10 to 1913-14.	Percentage to total
Burma	754	1,364	89	473	318	600	67·1
Straits Settlements and Siam.	43	131	84	410	665	266	29·8
Other Countries ..	..	3	..	135	1	28	3·1
Total ..	797	1,498	173	1,018	984	894	100·0

Sources.	1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	Average 1929-30 to 1933-34.	Percentage to total.
Burma	4,745	647	1,878	845	3,352	2,293	58·5
Straits Settlements and Siam.	3,818	1,163	350	163	2,550	1,609	41·0
Other Countries ..	19	2	9	39	19	18	0·5
Total ..	8,582	1,812	2,237	1,047	5,921	3,920	100·0

Sources.	1934-35.	1935-36.	1936-37.	1937-38.	1938-39.	Average 1934-35 to 1938-39.	Percentage to total.
Burma	2,398	1,604	2,763	1,076	794	1,727	27·6
Straits Settlements and Siam.	6,130	4,036	5,883	2,316	4,298	4,533	72·3
Other Countries .	30	..	10	..	..	8	0·1
Total ..	8,558	5,640	8,656	3,392	5,092	6,268	100·0

Source.—Annual Statements of the Sea-borne Trade of British India and Accounts relating to the Sea-borne Trade and Navigation of Burma.

APPENDIX 9.

Exports of lac from India.

(Tons.)

Year.	Stick lac.		Seedlar.	Button lac.	Shellac	Other kinds of lac.	Total.
	*To Burma.	To Other countries.					
1900-01	32	22	193	1,472	9,661	(a)	11,380
1901-02	19	..	70	1,621	6,162	..	7,872
1902-03	80	137	231	1,790	9,789	(a)	12,027
1903-04	91	104	212	2,525	8,925	12	11,869
1904-05	67	287	265	1,714	9,665	70	12,068
1905-06	64	402	142	2,092	10,880	200	13,780
1906-07	35	589	85	1,856	10,274	575	13,414
1907-08	27	629	282	1,976	13,917	1,108	17,939
1908-09	1	206	188	1,571	16,148	891	19,005
1909-10	1	290	63	2,473	23,052	1,841	27,720
1910-11	33	62	188	1,545	17,881	1,290	20,999
1911-12	20	79	262	1,455	17,506	1,794	21,116
1912-13	1	821	471	2,075	16,736	923	21,027
1913-14	3	60	679	1,093	13,749	1,174	16,758
1914-15	7	56	610	1,276	15,389	962	18,300
1915-16	9	175	1,232	630	17,932	892	20,870
1916-17	3	373	1,413	154	16,212	912	19,067
1917-18	77	75	348	138	14,388	1,076	16,102
1918-19	6	(a)	305	176	11,136	329	11,952
1919-20	69	80	119	677	16,887	957	18,789
1920-21	9	31	32	546	14,011	822	15,451
1921-22	3	44	91	536	18,997	2,078	21,749
1922-23	7	144	237	919	19,169	3,331	23,807
1923-24	6	90	955	843	19,858	2,538	24,290
1924-25	8	288	1,756	1,081	16,360	1,829	21,322
1925-26	15	958	1,871	1,084	20,830	2,072	26,830
1926-27	14	272	4,419	1,031	21,247	2,480	29,463
1927-28	12	430	2,560	902	20,213	2,864	26,981
1928-29	21	979	4,279	1,236	26,535	3,450	36,500
1929-30	23	315	3,133	1,209	24,911	3,574	33,165
1930-31	18	196	5,197	1,184	18,321	2,303	27,219
1931-32	15	308	5,233	908	14,850	1,550	22,864
1932-33	20	85	6,041	871	13,087	705	20,809
1933-34	20	201	7,597	955	26,454	1,186	36,413
1934-35	39	219	4,429	786	21,597	2,216	29,286
1935-36	34	310	6,292	1,469	14,227	2,028	24,360
1936-37	37	104	13,091	1,661	24,847	1,866	41,606
1937-38	..	25	9,374	1,201	20,461	2,172	33,233
1938-39	..	144	10,303	1,000	19,209	1,536	32,192
1939-40	..	59	13,500	1,225	21,606	1,607	37,997
1940-41	..	40	10,084	820	18,456	324	29,724

(a) Less than 10 cwt. *Imports into Burma.

Source.—Annual Statements of the Sea-borne Trade of British India and Accounts relating to the Sea-borne Trade and Navigation of Burma.

APPENDIX 10-A.

Exports of stick lac from India.

(Tons.)

Destinations.	1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	1934-35	1935-36.	1936-37.	1937-38.	1938-39.	1939-40.	1940-41.
United Kingdom..	46	28	31	20	28	28	33	29	4	12	6	2
United States of America.	33	11	..	..	1	5	..	5	9	5	..	..
Germany ..	134	83	88	11	3	47	1	..	4	..	..	..
Other Countries ..	125	92	204	74	189	178	310	107	8	127	53	38
Total	338	214	323	105	221	258	344	141	25	144	59	40

Source.—Annual Statements of the Sea-borne Trade of British India.

APPENDIX 10-B.

Exports of seedlac from India.

(Tons.)

Destinations.	1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	1936-37.	1937-38.	1938-39.	1939-40.	1940-41.
United Kingdom..	388	488	480	582	578	414	775	870	711	844	847	659
United States of America.	2,584	3,983	3,851	4,198	5,892	3,308	4,005	10,293	6,796	7,370	11,205	9,407
Germany ..	34	189	261	426	360	303	476	827	925	869	454	..
Other Countries ..	127	537	641	835	767	404	1,036	1,101	942	1,220	994	18
Total ..	3,133	5,197	5,233	6,041	7,597	4,429	6,292	13,091	9,374	10,303	13,500	10,084

Source.—Annual Statements of the Sea-borne Trade of British India.

APPENDIX 10-C.

Exports of shellac from India.

(Tons)

Destinations.	1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	1936-37.	1937-38.	1938-39.	1939-40.	1940-41.
United Kingdom..	6,014	4,792	4,152	4,071	15,464	10,750	2,223	7,247	5,249	6,044	2,276	1,825
United States of America.	11,112	5,770	4,962	3,213	4,625	4,083	4,328	7,814	7,045	6,376	13,247	12,720
Germany	3,272	3,210	1,725	1,713	2,015	1,019	1,423	2,476	2,492	1,717	792	..
Other Countries ..	4,513	4,549	4,011	4,090	4,350	5,745	6,253	7,310	5,675	5,072	5,291	3,911
Total ..	24,911	18,321	14,850	13,087	26,454	21,597	14,227	24,847	20,461	19,209	21,606	18,456

Source.—Annual Statements of the Sea-borne Trade of British India.

APPENDIX 10-D.

Exports of button lac from India.

(Tons.)

Destinations.	1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	1936-37.	1937-38.	1938 39.	1939 40.	1940-41.
United Kingdom..	739	789	629	590	652	524	909	996	632	598	608	343
United States of America.	174	93	47	36	69	72	145	167	151	70	217	313
Germany ..	115	120	82	69	60	54	100	153	117	86	45	..
Other Countries ..	181	182	150	176	174	136	315	345	301	246	355	164
Total ..	1,209	1,184	908	871	955	786	1,469	1,661	1,201	1,000	1,225	820

Source.—Annual Statements of the Sea-borne Trade of British India.

APPENDIX 10-E.

Exports of other kinds of lac (excluding lac-dye) from India.

(Tons.)

Destinations	1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	1936-37.	1937-38.	1938-39.	1939-40	1940-41.
United Kingdom ..	45	74	8	..	94	58	56	29	18	27	109	68
United States of America.	..	..	..	..	..	89	138	55	110	151	395	154
Germany	2,211	1,379	846	502	408	946	129	845	900	689	391	..
Other Countries ..	1,318	850	696	203	684	1,123	1,705	937	1,144	669	712	102
Total ..	3,574	2,303	1,550	705	1,186	2,216	2,028	1,866	2,172	1,536	1,607	324

Source.—Annual Statements of the Sea-borne Trade of British India.

APPENDIX 10-F.

Total exports of lac of all forms from India.

(Tons.)

Destinations	1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	1936-37.	1937-38.	1938-39.	1939-40.	1940-41.
United Kingdom ..	7,232	6,171	5,300	5,263	16,816	11,774	3,996	9,171	6,614	7,525	3,846	2,896
United States of America.	13,903	9,857	8,860	7,447	10,587	7,557	8,616	18,334	14,111	13,972	25,074	22,599
Germany	5,766	4,981	3,002	2,721	2,846	2,369	2,129	4,301	4,438	3,361	1,682	..
Other Countries	6,264	6,210	5,702	5,378	6,164	7,586	9,619	9,800	8,070	7,334	7,395	4,229
Total ..	33,165	27,219	22,864	20,809	36,413	29,286	24,360	41,606	33,233	32,192	37,997	29,724

Source.—Annual Statements of the Sea-borne Trade of British India.

APPENDIX 11.

Cost of manufacturing seedlac and shellac.

(i) Cost of manufacturing one maund of seedlac from stick lac.

——	Ranchi (Bihar).	Jhalda (Bihar).		Thulin (Bihar).	Dalton-ganj (Bihar).	Bundu (Bihar).	Dhamtari (C. P.)	Laharpur (Bengal).	Rewa State.	Mayur-bhanj. State.	Average.
		Factory A.	Factory B.								
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Crushing, sieving and cleaning of stick lac	0 2 6	0 2 6	0 3 0	0 2 6	0 2 0	0 2 0	0 3 6	0 1 6	0 1 6	0 1 9	0 2 3
Washing	0 4 0	0 6 0	0 1 6	0 4 0	0 3 6	0 4 0	0 4 0	0 4 0	0 3 0	0 3 3	0 3 9
Drying and sieving of Seedlac ..	0 1 9	0 4 0	0 2 0	0 2 0	0 2 0	0 2 6	0 2 6	0 1 0	0 2 0	0 3 0	0 2 3
Total ..	0 8 3	0 12 6	0 6 6	0 8 6	0 7 6	0 8 6	0 10 0	0 6 6	0 6 6	0 8 0	0 8 3
(ii) Cost of manufacturing one maund of shellac from seedlac.											
Melting charges ..	1 9 0	1 11 0	1 2 0	1 0 0	1 3 0	1 2 0	1 12 0	1 3 0	1 13 0	1 8 0	1 6 4
Cloth	0 15 0	0 15 0	0 10 0	0 10 0	0 9 6	0 12 0	0 10 0	0 9 6	0 10 0	0 12 0	0 11 3
Charcoal	0 9 6	0 9 6	0 8 0	0 10 0	0 9 6	0 12 0	0 8 0	0 9 6	0 10 0	0 12 0	0 9 10
Miscellaneous ..	0 3 0	0 2 9	0 2 0	0 2 0	0 2 0	0 2 0	0 2 0	0 2 0	0 2 0	0 2 0	0 2 2
Total ..	3 4 6	3 6 3	2 6 0	2 6 0	2 8 0	2 12 0	3 0 0	2 8 0	3 3 0	3 2 0	2 13 7
(iii) Cost of manufacturing one maund of shellac from stick lac.											
Seedlac charges (for 48 seers) ..	0 10 0	0 15 0	0 8 0	0 10 3	0 9 0	0 10 3	0 12 0	0 8 0	0 8 0	0 9 6	0 10 0
Shellac charges ..	3 4 6	3 6 3	2 6 0	2 6 0	2 8 0	2 12 0	3 0 0	2 8 0	3 3 0	3 2 0	2 13 7
Total ..	3 14 6	4 5 3	2 14 0	3 0 3	3 1 0	3 6 3	3 12 0	3 0 0	3 11 0	3 11 6	3 7 7

APPENDIX 12.

Number and location of factories and bhattas.

Province.	District.	Important Manufacturing Centres.	Total No. of factories.	Total No. of *Bhattas.*
Bihar	Manbhum ..	Jhalda, Purulia, Chandil, Balarampur.	111	1,339
,, ...	Singbhum ..	Chaibasa, Chakradharpur.	10	163
,, ...	Ranchi ..	Ranchi, Thulin, Murhu, Bundu.	68	712
,, ...	Palamau ..	Daltonganj, Gharwa, Latehar, Chandwa-Tori.	27	479
,, ...	Santhal Parganas	Pakur, Kotalpakur ..	34	604
,, ...	Gaya	Raniganj, Imamganj, Sherghati.	24	151
Central Provinces and Berar.	Bhandara ..	Gondia	9	175
,, ..	Bilaspur ..	Kota	7	
		Pendra	5	
		Champa	2	
,, ..	Raipur ..	Dhamtari	1	
		Naila	1	
,, ..	Jubbulpore ..	Jubbulpore	2	
		Katni	1	
,, ..	Nimar ..	Burhanpur	1	
,, ..	Chhindwara ..	Seoni	2	
United Provinces	Mirzapur ..	Mirzapur	20	725
,, ..	Cawnpore ..	Cawnpore	1	25
Bengal	Murshidabad ..	Dhulian	6	75
		Nimtita		
,, ...	Malda	Malda		
,, ...	Calcutta ..	Calcutta	10	400
Punjab	..	Amritsar	8	60
		Hoshiarpur and others ..		
Central India ..	Rewa State ..	Umaria	1	45
Eastern States ..	Mayurbhanj State	Rairangpur	1	40
		Total ..	352	4,993

APPENDIX 13.

Trade (Rail and River-borne) in lac and shellac between the different provinces and States of India.

(Average 1934-35 to 1938-39).

(Tons).

Despatched from—	Received into—														
	Assam.	Bengal.	Bihar and Orissa.	United Provinces.	Punjab.	Sind and British Baluchistan.	Central Provinces and Berar.	Bombay.	Madras.	Rajputana.	Central India.	Hyderabad.	Mysore.	Kashmir.	Total.
Assam	..	1112·8	24·5	37·1	..	..	..	..	..	0·1	..	..	..	..	1174·5
Bengal	3·9	..	1637·7	509·3	7·3	1·0	0·7	2·5	3·7	1·5	(a)	0·1	0·4	..	2168·1
Bihar and Orissa ..	(a)	20970·2	..	216·3	4·6	(a)	56·5	1·2	13·6	1·9	..	6·2	1·8	..	21272·3
Bombay	(a)	0·2	2·3	376·3	0·4	(a)	1·0	..	0·9	4·1	3·8	0·8	0·2	..	390·0
Central India	..	165·8	20·2	664·1	6·4	(a)	152·3	13·4	..	1·5	..	..	..	..	1018·7
Centra Provinces and Berar	..	3086·5	1530·2	1843·2	96·6	0·1	..	46·3	39·3	25·9	114·9	2·3	..	..	6785·3
Hyderabad	..	0·1	0·2	(a)	..	..	1·4	0·2	..	..	(a)	..	..	..	1·9
Kashmir	..	..	..	0·1	1·1	..	..	..	..	..	..	..	..	..	1·2
Madras	..	0·9	0·7	0·3	..	0·2	1·2	1·2	..	..	0·1	10·6	2·2	(a)	17·4
Mysore	..	..	0·8	0·3	..	..	..	0·1	2·1	0·1	..	..	..	..	3·4
Punjab	..	(a)	4·0	50·5	..	4·3	0·2	0·1	..	20·4	0·4	..	..	0·6	80·5
Rajputana	..	0·2	..	3·2	1·2	..	0·2	0·5	..	..	4·1	(a)	..	..	9·4
Sind and British Baluchistan	..	..	..	36·1	0·6	..	..	..	..	0·5	..	..	..	..	37·2
United Provinces ..	..	2517·9	138·8	..	52·5	4·3	20·4	81·9	1·1	71·7	26·7	(a)	0·1	0·2	2915·6
TOTAL ..	3·9	27849·6	3359·4	3736·8	170·7	9·9	233·9	147·4	60·7	127·7	150 0	20·0	4·7	0·8	35875·5

(a) Less than 1/20th of a ton.

Source.—Accounts relating to the Inland (Rail and River borne) Trade of India.

APPENDIX 14.

Average monthly prices of T. N. shellac at Calcutta.

(Per maund).

Year.	April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	Average.
	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.
1911-12	34 3	34 2	33 6	32 8	30 2	31 3	31 15	31 2	30 14	30 15	30 4	30 9	31 12
1912-13	32 7	31 5	30 3	30 2	30 9	32 6	34 7	34 10	34 10	37 6	43 3	41 10	34 7
1913-14	40 15	40 0	45 8	45 7	50 6	51 9	46 11	45 0	42 2	41 1	36 5	35 1	43 5
1914-15	34 15	32 10	30 4	30 7	24 6	22 1	23 7	25 0	27 6	29 2	27 10	26 4	27 13
1915-16	24 9	24 5	23 8	23 5	26 5	29 1	29 9	33 5	36 9	32 13	35 0	36 11	29 9
1916-17	39 0	41 5	41 5	50 1	62 15	62 0	54 9	71 10	72 6	64 8	76 5	93 1	60 12
1917-18	91 5	87 14	87 7	87 5	84 13	72 4	62 5	84 1	90 14	90 14	91 14	94 2	85 7
1918-19	85 9	87 12	94 1	94 4	94 3	95 1	97 4	96 8	97 8	93 12	85 2	73 7	91 3
1919-20	74 0	100 5	114 7	143 3	163 11	141 2	140 9	168 8	187 8	230 11	180 0	163 13	150 10
1920-21	160 4	160 6	193 9	221 1	211 12	186 6	209 5	197 5	167 0	129 11	102 8	96 4	169 10
1921-22	105 12	154 15	124 14	116 8	125 14	137 3	146 7	158 2	153 5	156 8	166 14	189 10	144 11
1922-23	193 2	183 13	194 3	180 15	151 13	139 14	145 12	157 10	164 12	175 13	169 15	171 15	169 2
1923-24	153 10	132 15	129 7	119 5	132 15	149 9	152 3	151 10	147 1	141 14	140 3	142 5	141 1
1924-25	136 3	129 12	131 3	126 2	132 8	138 12	142 3	141 13	136 4	131 10	127 3	117 1	132 9
1925-26	117 3	107 4	98 5	100 9	96 7	92 1	92 11	97 4	91 10	80 7	66 7	63 11	92 0
1926-27	55 10	47 0	50 5	49 5	49 8	72 8	79 8	96 2	92 1	92 8	88 0	79 5	71 0
1927-28	76 5	98 11	105 5	121 11	113 12	106 9	103 8	107 12	111 13	94 11	82 3	79 15	100 3
1928-29	81 13	88 3	87 0	100 10	93 15	98 10	95 6	98 8	89 9	86 5	89 5	87 11	91 7
1929-30	85 15	90 4	88 2	89 0	92 8	89 2	84 11	75 3	73 3	66 0	56 13	54 3	78 12
1930-31	56 15	53 12	45 7	40 7	39 1	37 13	34 0	34 13	32 10	28 3	29 0	35 2	38 15
1931-32	28 14	28 10	27 4	28 8	26 8	27 11	28 13	29 15	29 10	26 14	26 8	24 8	27 13
1932-33	21 1	17 11	16 12	18 0	23 3	23 5	20 13	20 11	20 5	19 8	18 11	18 10	19 14
1933-34	18 2	21 10	21 6	24 8	22 14	21 5	22 14	22 11	29 9	41 15	40 10	38 14	27 3
1934-35	36 11	51 14	51 3	48 1	43 10	43 1	42 6	41 9	42 13	38 3	33 2	24 14	41 7
1935-36	24 3	23 10	24 10	24 4	23 14	24 12	27 15	26 6	26 2	23 15	21 12	22 13	24 8
1936-37	22 5	21 3	21 5	22 2	21 14	20 9	19 13	20 10	22 0	24 4	22 6	22 10	21 12
1937-38	22 9	19 4	17 5	18 2	18 7	18 5	17 15	17 5	17 6	16 15	16 0	15 12	17 15
1938-39	15 2	13 7	12 7	15 13	15 1	14 11	14 10	15 14	17 3	16 2	15 10	14 1	15 0
1939-40	13 4	13 10	13 0	14 2	13 15	20 13	19 5	25 0	35 8	31 9	26 5	27 10	21 3
1940-41	25 11	25 3	21 13	20 8	23 14	21 15	22 10	27 10	30 10	28 15	23 14	29 0	25 2

Source.—Average of daily prices from (1) Statistics published by the Calcutta Shellac Brokers' Association (April 1911 to March 1931), (2) prices obtained from a Calcutta broker's record (April 1931 to March 1938) and (3) prices collected from Shellac Brokers' Association (April 1938 onwards).

APPENDIX 15.

Average monthly prices (Spot) of T. N. shellac at London.

(Per cwt.)

Year.	April.	May.	June.	July.	August.	Septem-ber.	October.	Novem-ber.	Decem-ber.	Janu-ary.	Febru-ary.	March.	Average.	Rs. per maund.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	Rs. ▲.
1922-23 ..	..	371 3	375 0	368 0	332 6	306 3	299 0	352 6	354 4	375 0	366 3	348 9	349 11	192 13
1923-24 ..	343 2	306 3	283 0	267 6	267 6	295 0	310 0	315 0	307 0	293 4	288 9	290 0	297 3	163 13
1924-25 ..	280 0	265 0	270 0	270 0	284 0	321 3	328 9	331 0	323 9	305 0	278 9	257 6	292 11	161 7
1925-26 ..	260 0	251 0	247 6	243 4	230 10	213 9	228 0	247 6	220 0	195 0	153 9	140 0	219 3	120 13
1926-27 ..	128 0	118 4	125 0	131 9	132 6	170 0	184 0	215 0	197 6	196 5	190 0	176 3	163 9	90 4
1927-28 ..	162 0	214 9	233 2	263 0	243 9	232 6	248 0	250 0	256 8	232 6	202 6	182 3	226 9	111 1
1928-29 ..	183 4	202 6	198 0	228 9	221 0	226 3	218 9	208 0	201 3	193 2	199 3	193 0	206 1	100 15
1929-30 ..	189 8	196 9	197 6	202 6	199 6	194 5	185 8	171 0	157 6	153 6	130 0	121 6	175 0	85 12
1930-31 ..	130 0	127 5	116 8	107 6	98 0	93 2	87 0	88 6	80 10	71 10	72 6	87 6	96 9	47 6
1931-32 ..	75 10	74 9	71 3	75 0	70 0	71 10	75 11	77 10	76 3	71 4	70 3	67 0	73 1	35 13
1932-33 ..	61 5	55 8	54 6	55 10	64 6	65 5	61 8	58 2	56 7	55 3	53 2	51 4	57 10	28 5
1933-34 ..	50 8	58 3	61 2	67 3	65 3	62 5	65 0	67 0	74 10	97 8	93 6	93 2	71 4	34 15
1934-35 ..	92 6	115 9	114 11	105 0	101 5	98 0	96 6	93 0	89 10	83 0	72 4	65 6	94 0	46 1
1935-36 ..	51 2	50 8	52 9	54 3	54 8	56 0	60 2	61 6	59 3	58 0	54 9	58 8	56 0	27 7
1936-37 ..	56 10	57 10	58 6	59 10	58 9	55 0	54 5	54 9	58 0	60 0	56 9	56 8	57 3	28 1
1937-38 ..	57 0	54 4	50 3	49 10	49 8	49 9	48 4	45 9	45 8	45 9	45 2	44 1	48 10	23 15
1938-39 ..	42 2	40 9	39 8	43 6	42 2	42 0	41 9	42 0	41 7	42 3	43 0	41 5	41 11	20 9
1939-40 ..	38 8	39 0	38 0	37 6	37 6	54 9	58 2	62 10	85 3	88 6	81 0	84 6	58 10	28 13
1940-41 ..	83 0	82 1	81 4	80 0	80 0	80 0	80 0	80 0	85 8	87 6	87 6	96 8	83 8	41 0

Sources.—Average of weekly prices reported in Indian Trade Journal upto August 1939 and Oil and Colour Trade Journal from September 1939 onwards.

Note.—The exchange rate has been taken @ 1*s.* 4*d.* per rupee upto March 1927 and 1*s.* 6*d.* for the subsequent period.

APPENDIX 16.

Average monthly wholesale prices (Spot) of T. N. shellac at New York.

(Per maund).

Year.	April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	Average.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1935-36 ..	30 11 0	30 1 0	30 15 0	30 14 0	30 12 0	30 9 0	33 15 0	34 5 0	33 7 0	31 9 0	30 9 0	30 15 0	31 9 0
1936-37 ..	32 0 0	31 13 0	31 8 0	31 8 0	31 7 0	31 5 0	31 4 0	30 2 0	29 5 0	31 1 0	31 3 0	31 4 0	31 2 0
1937-38 ..	31 1 0	28 11 0	28 7 0	27 7 0	27 6 0	27 8 0	26 11 0	26 9 0	26 3 0	26 3 0	25 4 0	24 10 0	27 3 0
1938-39 ..	24 3	24 7 0	24 10 0	24 10 0	24 14 0	25 3 0	25 7 0	24 9 0	24 13 0	24 12 0	24 11 0	24 1 0	24 11 0
1939-40 ..	23 9 0	23 9 0	22 10 0	22 10 0	22 13 0	36 4 0	43 6 0	43 8 0	49 11 0	51 12 0	42 3 0	43 13 0	35 8 0

Source.—Average of weekly prices reported in Oil, Paint and Drugs Reporter.

Note.—The prices at New York quoted in cents per lb. have been converted into rupees per maund on the basis of the rates of exchange reported in the International Year book of Agricultural Statistics.

APPENDIX 17.

Average monthly wholesale prices of different grades of shellac at Calcutta.

(Per maund.)

—	April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	Average.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1931-32													
T. N. ..	28 14 0	28 10 0	27 4 0	28 8 0	26 8 0	27 11 0	28 13 0	29 15 0	29 10 0	26 14 0	26 8 0	24 8 0	27 13 0
I. T. N. ..	26 13 0	26 15 0	25 14 0	26 15 0	24 14 0	26 1 0	27 4 0	28 3 0	28 2 0	25 4 0	25 2 0	22 14 0	26 3 0
S. T. I. ..	30 5 0	29 12 0	28 2 0	29 8 0	27 8 0	28 10 0	29 13 0	30 6 0	30 11 0	27 13 0	27 9 0	25 6 0	28 13 0
Fine ..	31 3 0	30 12 0	28 14 0	30 4 0	28 5 0	29 5 0	30 12 0	31 5 0	31 8 0	28 8 0	28 10 0	26 4 0	29 10 0
Superfine	34 11 0	33 5 0	31 2 0	33 1 0	31 5 0	33 1 0	34 4 0	34 10 0	34 4 0	31 2 0	30 9 0	27 13 0	32 7 0
1932-33													
T. N. ..	21 1 0	17 11 0	16 12 0	18 0 0	23 3 0	23 5 0	20 13 0	20 11 0	20 5 0	19 8 0	18 11 0	18 10 0	19 14 0
I. T. N. ..	19 4 0	15 10 0	14 13 0	16 10 0	21 11 0	21 4 0	19 13 0	19 3 0	18 13 0	17 15 0	17 0 0	17 2 0	18 4 0
S. T. I. ..	21 14 0	18 4 0	17 3 0	18 11 0	23 12 0	23 6 0	21 14 0	21 11 0	21 7 0	20 11 0	19 15 0	20 0 0	20 12 0
Fine ..	22 13 0	19 2 0	18 1 0	19 11 0	25 8 0	24 10 0	23 13 0	23 5 0	22 13 0	21 9 0	20 8 0	20 7 0	21 14 0
Superfine ..	24 8 0	20 4 0	19 11 0	21 6 0	27 14 0	26 10 0	26 4 0	25 9 0	24 13 0	24 12 0	24 1 0	23 7 0	24 2 0
1933-34													
T. N. ..	18 2 0	21 10 0	21 6 0	24 8 0	22 14 0	21 5 0	22 14 0	22 11 0	29 9 0	41 15 0	40 10 0	38 14 0	27 3 0
I. T. N. ..	16 14 0	20 2 0	20 3 0	23 8 0	21 10 0	20 11 0	20 12 0	20 13 0	26 14 0	37 7 0	35 11 0	34 13 0	24 15 0
S. T. I. ..	19 1 0	22 0 0	21 12 0	25 0 0	23 12 0	21 14 0	23 6 0	23 2 0	30 0 0	42 5 0	41 1 0	39 6 0	27 12 0
Fine ..	19 9 0	22 6 0	22 6 0	25 12 0	24 0 0	22 11 0	24 3 0	23 13 0	30 8 0	42 10 0	41 13 0	40 9 0	28 6 0
Superfine ..	22 5 0	24 9 0	25 6 0	28 0 0	26 11 0	25 14 0	26 12 0	26 13 0	32 5 0	45 4 0	44 3 0	43 6 0	30 15 0

	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1934-35													
T. N. ..	36 11 0	51 14 0	51 3 0	48 1 0	43 10 0	43 1 0	42 6 0	41 9 0	42 13 0	38 3 0	33 2 0	24 14 0	41 7 0
I. T. N. ..	34 6 0	49 7 0	47 7 0	44 0 0	39 8 0	38 6 0	37 14 0	37 1 0	38 1 0	33 5 0	28 11 0	21 9 0	37 8 0
S. T. I. ..	37 5 0	52 7 0	51 11 0	48 11 0	45 7 0	45 6 0	45 1 0	44 8 0	45 6 0	40 14 0	35 13 0	29 5 0	43 8 0
Fine ..	38 0 0	53 0 0	52 5 0	51 0 0	48 4 0	47 11 0	46 8 0	45 7 0	46 7 0	42 12 0	36 11 0	33 3 0	45 2 0
Superfine ..	41 10 0	56 15 0	57 3 0	57 3 0	54 2 0	50 15 0	49 4 0	48 12 0	49 12 0	46 5 0	40 9 0	37 0 0	49 2 0
1935-36													
T. N. ..	24 3 0	23 10 0	24 10 0	24 4 0	23 14 0	24 12 0	27 15 0	26 6 0	26 2 0	23 15 0	21 12 0	22 13 0	24 8 0
I. T. N. ..	21 8 0	21 2 0	22 12 0	22 3 0	21 10 0	22 13 0	26 2 0	25 0 0	24 7 0	22 13 0	20 12 0	21 15 0	22 12 0
S. T. I. ..	27 9 0	25 13 0	26 15 0	26 0 0	25 1 0	25 13 0	29 15 0	27 15 0	27 7 0	25 1 0	22 14 0	23 10 0	26 3 0
Fine ..	29 0 0	26 5 0	27 8 0	26 11 0	26 0 0	26 12 0	30 10 0	29 6 0	28 3 0	25 14 0	23 12 0	24 4 0	27 0 0
Superfine ..	33 0 0	28 6 0	29 10 0	29 4 0	28 8 0	29 2 0	32 8 0	31 4 0	30 9 0	28 3 0	25 14 0	26 2 0	29 6 0
1936-37.													
T. N. ..	22 5 0	21 3 0	21 5 0	22 2 0	21 14 0	20 9 0	19 13 0	20 10 0	22 0 0	24 4 0	22 6 0	22 10 0	21 12 0
I. T. N. ..	21 5 0	20 10 0	20 14 0	21 10 0	21 5 0	19 10 0	18 14 0	20 0 0	21 3 0	22 15 0	21 1 0	21 8 0	20 15 0
S. T. I. ..	23 0 0	21 10 0	21 12 0	22 10 0	22 2 0	20 14 0	19 15 0	21 2 0	22 11 0	25 3 0	23 1 0	23 0 0	22 4 0
Fine ..	23 9 0	22 2 0	22 6 0	23 2 0	22 7 0	21 6 0	20 7 0	21 13 0	23 6 0	26 2 0	23 11 0	23 6 0	22 13 0
Superfine ..	25 5 0	23 11 0	23 11 0	24 6 0	23 13 0	22 10 0	21 15 0	22 13 0	24 13 0	27 5 0	25 2 0	24 9 0	24 3 0
T. N. ..	22 9 0	19 4 0	17 5 0	18 2 0	18 7 0	18 5 0	17 15 0	17 5 0	17 6 0	16 15 0	16 0 0	15 12 0	17 15 0
I. T. N. ..	21 12 0	18 10 0	16 13 0	17 4 0	17 7 0	18 0 0	17 1 0	16 8 0	16 5 0	16 4 0	15 6 0	15 2 0	17 3 0
S. T. I. ..	23 0 0	20 1 0	18 14 0	18 12 0	19 2 0	20 1 0	19 1 0	18 5 0	17 13 0	17 13 0	16 15 0	16 3 0	18 13 0
Fine ..	23 6 0	21 5 0	19 10 0	19 7 0	19 14 0	20 12 0	19 13 0	19 0 0	18 11 0	18 6 0	17 13 0	17 3 0	19 10 0
Superfine ..	24 10 0	23 2 0	21 8 0	21 1 0	21 9 0	22 7 0	21 9 0	21 0 0	21 0 0	20 13 0	20 8 0	19 8 0	21 9 0

APPENDIX 17—*concld.*

Average monthly wholesale prices of different grades of shellac at Calcutta—concld.

(Per maund).

——	April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	Average.
1938-39.													
T. N.	15 2 0	13 7 0	12 7 0	15 13 0	15 1 0	14 11 0	14 10 0	15 14 0	17 3 0	16 2 0	15 10 0	14 1 0	15 0 0
I. T. N. ..	14 9 0	12 15 0	11 13 0	15 0 0	14 1 0	13 13 0	13 12 0	14 10 0	15 3 0	14 15 0	14 13 0	13 6 0	14 1 0
S. T. I. ..	16 1 0	14 2 0	13 3 0	16 8 0	16 4 0	15 14 0	15 9 0	16 12 0	17 6 0	16 14 0	16 7 0	15 2 0	15 14 0
Fine ..	16 7 0	15 1 0	14 3 0	17 1 0	17 3 0	16 13 0	16 5 0	17 5 0	17 11 0	17 5 0	17 3 0	15 12 0	16 8 0
Superfine ..	17 1 0	15 9 0	14 12 0	17 13 0	17 14 0	17 12 0	17 5 0	18 1 0	18 5 0	18 2 0	17 15 0	16 11 0	17 4 0
1939-40.													
T. N. ..	13 4 0	13 10 0	13 0 0	14 2 0	13 15 0	20 13 0	19 5 0	25 0 0	35 8 0	31 9 0	26 5 0	27 10 0	21 3 0
I. T. N ..	12 11 0	13 2 0	12 8 0	13 4 0	13 8 0	19 6 0	17 11 0	22 15 0	32 11 0	29 14 0	24 12 0	25 10 0	19 13 0
S T. I. ..	14 1 0	14 14 0	14 7 0	15 0 0	15 1 0	21 15 0	21 0 0	27 13 0	38 1 0	34 9 0	28 15 0	31 4 0	23 1 0
Fine ..	14 12 0	15 3 0	14 15 0	15 6 0	15 9 0	23 6 0	22 10 0	29 10 0	39 15 0	36 11 0	30 10 0	33 2 0	24 5 0
Superfine ..	15 11 0	15 9 0	15 7 0	15 15 0	16 2 0	24 14 0	24 6 0	31 4 0	42 1 0	39 10 0	34 4 0	36 10 0	26 0 0

Source.—Average of daily prices from the records of a Calcutta broker.

APPENDIX 18.

Average monthly wholesale prices of baisakhi seedlac at Calcutta.

(Per maund).

Year.	April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	Average.
	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.
1929-30	73 10	77 14	75 1	75 13	77 5	74 2	69 4	61 15	61 7	54 10	47 0	45 13	66 3
1930-31	46 12	43 5	34 14	31 5	31 2	30 6	25 7	25 15	24 1	19 11	21 6	28 5	30 3
1931-32	22 14	22 2	19 12	22 3	20 4	21 3	21 14	21 13	22 6	20 4	20 3	18 0	21 1
1932-33	15 6	12 3	11 7	13 4	18 11	18 1	16 7	15 10	15 2	13 13	12 14	12 14	14 10
1933-34	12 4	16 7	16 0	18 8	16 14	15 7	15 7	15 14	20 6	28 11	27 2	25 0	19 0
1934-35	25 10	40 11	38 1	36 15	35 0	34 13	35 13	36 3	37 5	32 9	25 12	21 7	33 6
1935-36	19 11	20 3	22 12	20 0	18 14	20 2	23 6	22 4	20 13	19 13	17 14	18 8	20 6
1936-37	18 1	16 0	16 2	17 5	17 3	15 10	15 7	15 12	18 1	19 12	17 4	17 9	17 0
1937-38	17 3	15 9	13 10	14 3	14 7	14 15	14 2	13 12	13 12	13 10	12 5	11 4	14 1
1938-39	10 14	10 2	9 8	13 0	12 0	11 8	11 7	11 12	14 13	11 10	11 3	10 0	11 8
1939-40	9 7	10 7	10 0	10 8	10 8	15 14	14 10	20 2	28 10	26 4	22 7	23 12	16 14
1940-41	21 1	20 13	17 13	17 0	20 12	17 10	18 12	23 3	24 6	23 1	19 2	23 10	20 10

***Source.*—Average of daily prices from the records of a Calcutta broker and the Calcutta Brokers' Association.**

APPENDIX 19.

Average monthly wholesale prices of baisakhi stick lac at Jhalda and Daltonganj.
(Per maund).

Months.	Jhalda.			Daltonganj.		
	1936-37.	1937-38.	1938-39.	1936-37.	1937-38.	1938-39.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
April	9 13 0	9 3 0	6 0 0	8 1 0	7 12 0	5 4 0
May	9 3 0	8 11 0	5 10 0	7 0 0	8 0 0	4 0 0
June	9 8 0	7 15 0	5 6 0	7 13 0	6 11 0	4 0 0
July	10 10 0	8 10 0	7 15 0	8 8 0	7 5 0	4 4 0
August	10 7 0	9 4 0	7 9 0	8 4 0	7 5 0	4 3 0
September	9 14 0	9 14 0	7 5 0	8 2 0	7 11 0	5 0 0
October	8 2 0	9 10 0*	7 3 0	8 3 0	7 5 0	5 0 0
November	9 5 0	9 6 0	8 15 0	7 3 0	6 8 0	5 0 0
December	10 11 0	9 5 0	8 4 0	7 0 0	6 0 0	5 2 0
January	10 12 0*	9 5 0	9 5 0	8 6 0	6 0 0	..
February	9 15 0	8 7 0	7 5 0	8 1 0	5 8 0	..
March	10 4 0*	8 14 0	7 14 0	8 8 0	5 8 0	..

Source.—Bihar Lac Marketing Report.
*Nominal.

APPENDIX 20.

Average monthly wholesale prices of T. N. shellac at Mirzapur.

(Per maund).

Months.	1936-37.	1937-38.	1938-39.
	Rs. A. P.	Rs. A. P.	Rs. A. P.
April	21 0 0	22 1 0	14 1 0
May	19 15 0	18 15 0	12 11 0
June	20 8 0	17 4 0	12 7 0
July	20 13 0	17 8 0	14 14 0
August	20 8 0	18 0 0	14 3 0
September	18 13 0	18 4 0	14 0 0
October	18 12 0	17 2 0	13 15 0
November	19 4 0	16 12 0	14 9 0
December	20 12 0	16 2 0	15 12 0
January	22 12 0	16 0 0	14 15 0
February	21 4 0	15 1 0	14 9 0
March	21 15 0	14 9 0	13 2 0

Source.—United Provinces Lac Marketing Report.

APPENDIX 21.

Weekly closing "Futures" and "Ready" prices of T. N. shellac at Calcutta.

(Per maund).

Date.	Ready.	Delivery months.					
		October.	December.	February	April.	June.	August.
1938.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
July—							
2	13 12 0	14 12 0 (1 0 0)	..	..	..	..	..
9	16 4 0	16 10 0 (0 6 0)	..	..	..	..	..
16	16 4 0	17 4 0 (1 0 0)	..	..	..	..	..
23	16 12 0	17 14 0 (1 2 0)	..	..	..	..	..
30	15 8 0	16 6 0 (0 14 0)	..	..	..	..	..
August—							
6	15 0 0	16 2 0 (1 2 0)	..	..	..	..	..
13	15 8 0	16 6 0 (0 14 0)	..	..	..	..	..
20	14 12 0	15 15 0 (1 3 0)	..	..	..	..	..
26	14 12 0	15 11 0 (0 15 0)	..	..	..	..	..
September—							
3	14 12 0	15 13 0 (1 1 0)	..	..	..	..	..
10	14 8 0	15 8 0 (1 0 0)	..	..	..	..	..
17	14 12 0	15 6 0 (0 10 0)	..	..	..	..	..
24	14 8 0	15 4 0 (0 12 0)	..	..	..	..	..
29	14 8 0	15 1 0 (0 9 0)	..	..	..	..	..
October—							
7	14 8 0	15 2 0 (0 10 0)	15 6 0 (0 14 0)	..	..	..	..
14	14 8 0	15 4 0 (0 12 0)	15 5 0 (0 13 0)	..	..	..	..
21	14 8 0	15 6 0 (0 14 0)	15 7 0 (0 15 0)	..	..	..	..
28	14 12 0	15 6 0 (0 10 0)	15 8 0 (0 12 0)	..	..	..	..

N.B.—The figures within brackets show the excess of "[86] Futures" prices over "Ready" prices

APPENDIX 21—*contd.*

Weekly closing "Futures" and "Ready" prices of T. N. shellac at Calcutta—contd.

(Per maund).

Date.	Ready.	Delivery months.					
		October.	December.	February.	April.	June.	August.
1938.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
November—							
5	15 14 0	..	16 6 0 (0 8 0)	..	..	..	..
12	15 12 0	..	16 2 0 (0 6 0)	..	..	..	..
19	16 0 0	..	16 3 0 (0 3 0)	..	..	..	..
26	16 0 0	..	16 1 0 (0 1 0)	..	..	..	..
December—							
3	16 4 0	..	16 5 0 (0 1 0)	16 7 0 (0 3 0)	..	..	..
10	16 12 0	..	17 10 0 (0 14 0)	17 6 0 (0 10 0)	..	..	..
16	18 0 0	..	18 5 0 (0 5 0)	17 11 0 —(0 5 0)	..	..	..
23	17 12 0	..	18 8 0 (0 12 0)	17 7 0 —(0 5 0)	..	..	..
30	18 0 0	..	..	17 5 0 —(0 1 10)	..	..	..
1939.							
January—							
6	16 8 0	..	..	17 6 0 (0 14 0)	..	..	..
14	15 12 0	..	..	16 8 0 (0 12 0)	..	..	..
21	16 0 0	..	..	17 4 0 (1 4 0)	..	..	..
28	16 4 0	..	..	17 3 0 (0 15 0)	..	..	..
February—							
4	16 0 0	..	..	16 12 0 (0 12 0)	17 0 0 (1 0 0)	..	..
11	16 0 0	..	..	16 12 0 (0 12 0)	16 14 0 (0 14 0)	..	..
18	15 4 0	..	..	15 14 0 (0 10 0)	16 2 0 (0 14 0)	..	..
25	15 12 0	..	..	..	16 5 0 (0 9 0)	..	..

N.B.—The figures within brackets show the excess of "Futures" prices over "Ready" prices.

APPENDIX 21—*contd.*

***Weekly closing "futures" and "ready" prices of T. N. shellac at Calcutta.*—contd.**

(Per maund).

Date.	Ready.	Delivery months.					
		October.	December.	February.	April.	June.	August.
1939.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
March—							
4	15 4 0	..	..	16 0 0 (0 12 0)	..	..	..
11	14 8 0	..	..	15 2 0 (0 10 0)	..	..	..
18	14 0 0	..	..	14 4 0 (0 4 0)	..	..	..
25	13 4 0	..	..	13 15 0 (0 11 0)	..	..	..
April—							
1	13 0 0	..	..	13 9 0 (0 9 0)	..	14 2 0 (1 2 0)	..
6	13 0 0	..	..	13 5 0 (0 5 0)	..	13 8 0 (0 8 0)	..
15	13 0 0	..	..	13 9 0 (0 9 0)	..	13 14 0 (0 14 0)	..
22	13 12 0	..	..	14 9 0 (0 13 0)	..	15 1 0 (1 5 0)	..
29	13 4 0	..	..	..	..	14 6 0 (1 2 0)	..
May—							
6	13 12 0	..	..	..	..	15 3 0 (1 7 0)	..
13	13 12 0	..	..	..	..	14 15 0 (1 3 0)	..
20	13 8 0	..	..	..	..	14 8 0 (1 0 0)	..
27	13 12 0	..	..	..	..	14 9 0 (0 13 0)	..
June—							
3	13 0 0	..	..	..	..	13 15 0 (0 15 0)	14 4 0 (1 4 0)
10	13 0 0	..	..	..	..	13 11 0 (0 11 0)	14 0 0 (1 0 0)
17	12 12 0	..	..	..	..	13 8 0 (0 12 0)	13 12 0 (1 0 0)
24	13 4 0	..	..	..	..	..	14 9 0 (1 5 0)
30	13 3 0	..	..	..	..	..	14 6 0 (1 3 0)

N.B.—The figures within brackets show the excess of "Futures" prices over "Ready" prices.

APPENDIX 21—*contd.*

Weekly closing "Futures" and "Ready" prices of T. N. shellac at Calcutta.—contd.

(Per maund).

Date.	Ready.	Delivery months.					
		October.	December.	February.	April.	June.	August.
1939.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
July—							
8	14 0 0	..	..	..	..	..	14 13 0 (0 13 0)
15	14 0 0	..	..	..	..	..	14 10 0 (0 10 0)
22	14 8 0	..	..	..	..	..	15 1 0 (0 9 0)
29	14 4 0	..	..	..	..	..	14 15 0 (0 11 0)
August—							
5	14 0 0	15 0 0 (1 0 0)	..	..	..	..	14 10 0 (0 10 0)
12	13 12 0	14 15 0 (1 3 0)	..	..	..	..	14 10 0 (0 14 0)
19	13 14 0	14 14 0 (1 0 0)	..	..	..	..	14 7 0 (0 9 0)
26	14 0 0	15 1 0 (1 1 0)	..	..	..	..	..
September—							
2	14 8 0	15 6 0 (0 14 0)	..	..	..	..	..
9	17 0 0	19 12 0 (2 12 0)	..	..	..	..	..
15	24 0 0	27 8 0 (3 8 0)	..	..	..	..	..
23	24 0 0	25 12 0 (1 12 0)	..	..	..	..	..
30	22 8 0	23 8 0 (1 0 0)	..	..	..	..	.
October—							
7	17 12 0	19 12 0 (2 0 0)	19 15 0 (2 3 0)	..	..	..	..
13	18 8 0	22 0 0 (3 8 0	22 8 0 (4 0 0)	..	..	..	..
23 .. .	19 12 0	..	22 0 0 (2 4 0)	..	..	..	..
30	19 8 0	..	23 8 0 (4 0 0)	..	..	..	..

N. B.—The figures within brackets show the excess of "Futures" prices over "Ready" prices.

APPENDIX 21—*contd.*

Weekly closing "Futures" and "Ready" prices of T. N. shellac at Calcutta.—contd.

(Per maund).

Date.	Ready.	Delivery months.					
		October.	December.	February.	April.	June.	August.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1939.							
November—							
4	21 0 0	..	25 8 0 (4 8 0)	..	..	..	..
9	25 0 0	..	28 14 0 (3 14 0)	..	..	..	..
17	26 8 0	..	30 5 0 (3 13 0)	..	..	..	..
25	26 8 0	..	30 11 0 (4 3 0)	..	..	..	..
December—							
2	30 0 0	..	34 14 0 (4 14 0)	37 4 0 (7 4 0)	..	..	..
9	36 0 0	..	38 4 0 (2 4 0)	40 12 0 (4 12 0)	..	..	..
16	37 0 0	..	40 8 0 (3 8 0)	44 0 0 (7 0 0)	..	..	..
22	36 0 0	..	..	41 6 0 (5 6 0)	..	..	..
29	34 0 0	..	..	40 2 0 (6 2 0)	..	..	..
1940.							
January—							
6	36 8 0	..	..	42 0 0 (5 8 0)	..	..	..
13	34 0 0	..	..	36 12 0 (2 12 0)	..	..	..
19	31 0 0	..	..	32 4 0 (1 4 0)	..	..	..
February—							
7	24 8 0	..	..	25 5 0 (0 13 0)	26 13 0 (2 5 0)	..	
15	23 0 0	..	..	26 0 0 (3 0 0)	28 5 0 (5 5 0)	..	..
3 ..	30 0 0	..	..	34 9 0 (4 9 0)	..	..	..
9	30 0 0	..	..	31 12 0 (1 12 0)	..	..	..

N.B.—The figures within brackets show the excess of "Futures" prices over "Ready" prices

APPENDIX 21—*contd.*

Weekly closing "Futures" and "Ready" prices of T. N. shellac at Calcutta.—contd.

(Per maund).

Date.	Ready.	Delivery months.					
		October.	December.	February.	April.	June.	August.
1940.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
March—							
6	30 8 0	..	..	..	34 4 0 (3 12 0)	..	..
15	26 0 0	..	..	..	27 3 0 (1 3 0)	..	..
20	25 8 0	..	..	..	26 6 0 (0 14 0)	..	..
30	27 12 0	..	..	..	30 4 0 (2 8 0)	..	..
April—							
8	27 8 0	..	..	..	28 6 0 (0 14 0)	28 13 0 (1 5 0)	..
15	26 8 0	..	..	..	27 0 0 (0 8 0)	27 0 0 (0 8 0)	..
22	23 0 0	..	..	..	24 8 0 (1 8 0)	25 7 0 (2 7 0)	..
30	23 8 0	..	..	..	..	27 4 0 (3 12 0)	..
May—							
7	25 0 0	..	..	..	..	26 11 0 (1 11 0)	.. ..
15	25 8 0	..	..	..	..	26 10 0 (1 2 0)	..
23	24 8 0	..	..	..	..	26 10 0 (2 2 0)	..
31	24 3 0	..	..	..	..	25 1 0 (0 14 0)	..
June—							
7	24 12 0	..	..	..	..	25 6 0 (0 10 0)	25 13 0 (1 1 0)
15	23 0 0	..	..	..	..	23 12 0 (0 12 0)	23 12 0 (0 12 0)
22	19 0 0	..	..	..	..	..	20 3 0 (1 3 0)
29	19 0 0	..	..	..	..	..	19 2 0 (0 2 0)
July—							
6	18 8 0	..	..	..	..	..	19 13 0 (1 5 0)
15	20 0 0	..	..	..	..	..	21 2 0 (1 2 0)
23	22 0 0	..	..	..	..	..	24 0 0 (2 0 0)
31	22 0 0	..	..	..	..	..	24 0 0 (2 0 0)

N.B.—The figures within bracke s show the excess of "Futures" prices over "Ready" prices.

APPENDIX 21—*contd.*

Weekly closing "Futures" and "Ready" prices of T. N. shellac at Calcutta.—contd.

(Per maund).

Date.	Ready.	Delivery months-					
		October.	December.	February.	April.	June.	August.
1940.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
August—	23 0 0	25 5 0	..	..	..	..	25 0 0
7		(2 5 0)					(2 0 0)
15	24 0 0	25 4 0	..	..	..	..	25 10 0
		(1 4 0)					(1 10 0)
23	25 4 0	25 11 0	..	..	..	..	..
		(0 7 0)					
31	23 0 0	23 4 0	..	..	..	..	..
		(0 4 0)					
September—							
7	22 4 0	23 0 0	..	..	..	..	..
		(0 12 0)					
14	22 0 0	22 15 0	..	..	..	..	..
		(0 15 0)					
23	21 8 0	21 5 0	..	..	..	..	..
		—(0 3 0)					
30	21 8 0	21 7 0	..	..	..	..	..
		—(0 1 0)					
October—							
5	21 0 0	22 0 0	22 0 0	..	..	..	..
		(1 0 0)	(1 0 0)				
14	21 8 0	23 2 0	23 4 0	..	..	..	..
		(1 10 0)	(1 12 0)				
23	24 0 0	..	24 8 0	..	..	..	..
			(0 8 0)				
29	24 0 0	..	26 6 0	..	..	..	..
			(2 6 0)				
November—							
7	25 0 0	..	25 10 0	..	..	..	..
			(0 10 0)				
15	27 2 0	..	27 14 0	..	..	..	..
			(0 12 0)				
23	28 8 0	..	30 8 0	..	..	..	..
			(2 0 0)				
30	32 0 0	..	34 2 0	..	..	..	..
			(2 2 0)				
December—							
7	35 0 0	..	36 12 0	35 8 0	..	..	..
			(1 12 0)	(0 8 0)			
14	30 0 0	..	30 8 0	28 10 0	..	..	..
			(0 8 0)	—(1 6 0)			
23	27 8 0	..	..	29 6 0	..	..	..
				(1 14 0)			
30	31 0 0	..	..	30 3 0	..	..	..
				—(0 13 0)			

N.B.—The figures within brackets show the excess of "Futures" prices over "Ready" prices.

APPENDIX 21—*concld.*

***Weekly closing** "Futures" and "Ready" prices of T. N. shellac at Calcutta.*—concld.

(Per maund).

Date.	Ready.	Delivery months.					
		October.	December.	February.	April.	June.	August.
1941.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
January—							
7	29 8 0	..	..	29 10 0 (0 2 0)	..	..	..
15	29 8 0	..	..	31 1 0 (1 9 0)	..	..	..
23	29 0 0	..	..	30 0 0 (1 0 0)	..	..	..
31	25 8 0	..	..	26 13 0 (1 5 0)	..	..	..
February—							
8	26 0 0	..	..	26 8 0 (0 8 0)	26 2 0 (0 2 0)	..	..
15	22 0 0	..	..	24 2 0 (2 2 0)	23 10 0 (1 10 0)	..	..
22	22 8 0	..	..	..	24 2 0 (1 10 0)	..	..
28	25 0 0	..	..	..	27 0 0 (2 0 0)	..	..
March—							
7	26 0 0	..	..	..	27 12 0 (1 12 0)	..	..
15	30 0 0	..	..	..	32 2 0 (2 2 0)	..	..
22	32 0 0	..	..	..	32 3 0 (0 3 0)	..	..
31	31 0 0	..	..	..	33 3 0 (2 3 0)	..	..

N.B.—The figures within brackets show the excess of "Futures" prices over "Ready" prices.

Source.—Calcutta Shellac Exchange.

APPENDIX 22.

Prices of T. N. shellac and Bakelite B. R. 254 in the beginning of each month at New York.

(Cents per lb.).

Months.	1935.		1936.		1937.		1938.		1939.		1940.	
	T.N. Shellac.	Bakelite B.R. 254.	T.N. Shellac.	Bakelite B.R. 254.	T.N. Shellac.	Bakelite B.R. 254.	T.N. Shellac.	Bakelite B.R. 254.	T.N. Shellac.	Bakelite B.R. 254.	T.N. Shellac.	Bakelite B.R. 254.
January	18·4	57·9	14·5	53·0	14·0	48·0	12·0	45·0	10·5	45·0	19·0	45·0
February	18·0	57·0	14·0	48·0	14·0	48·0	12·0	45·0	10·5	45·0	15·5	45·0
March	14·0	57·0	14·0	48·0	14·0	48·0	11·5	45·0	10·5	45·0	16·1	45·0
April	13·0	55·0	14·5	48·0	14·0	45·0	11·0	45·0	10·0	45·0	14·6	45·0
May	13·5	55·0	14·5	48·0	13·0	45·0	11·0	45·0	10·0	45·0	..	..
June	14·0	55·0	14·5	48·0	13·0	45·0	11·0	45·0	9·5	45·0	..	..
July	14·0	53 0	14·5	48·0	12·5	45·0	11·0	45·0	9·5	45·0	..	..
August	14·0	53·0	14·5	48·0	12·5	45·0	11·0	45·0	9·5	45·0	..	..
September	14·0	53·0	14·5	48·0	12·5	45·0	11·0	45·0	9·5	45·0	..	..
October	14·5	53·0	14·5	48·0	12·5	45·0	11·0	45·0	16·0	45·0	..	..
November	15·5	53·0	13·5	48·0	12·0	45·0	10·5	45·0	16·0	45·0	..	..
December	15·5	53·0	13·5	48·0	12·0	45·0	10·1	45·0	16·0	45·0	..	..
Average	14·9	54·5	14·3	48·4	13·0	45·8	11·1	45·0	11·5	45·0	..	..

Source.—Oil, Paint and Drug Reporter.

APPENDIX 23.

Average monthly stocks of shellac at London.

(Tons).

Year.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Average.
1911-12	7,043	7,084	7,205	7,294	7,375	7,526	7,457	7,349	7,276	7,391	7,348	7,331	7,307
1912-13	7,419	7,409	7,332	7,178	7,118	7,284	7,398	7,136	7,221	7,231	7,255	7,068	7,254
1913-14	6,777	6,907	6,700	6,556	6,677	6,718	6,808	6,630	6,548	6,902	7,077	7,302	6,800
1914-15	7,289	7,469	7,437	7,374	6,495	7,296	7,261	7,062	6,843	6,590	6,565	6,943	7,052
1915-16	7,134	7,340	7,065	7,114	6,956	7,051	7,085	7,002	7,135	6,885	6,938	6,096	6,983
1916-17	6,111	3,537	6,287	6,272	5,908	5,144	4,747	4,390	4,168	3,973	3,626	3,387	4,796
1917-18	3,115	2,919	2,752	2,686	2,643	2,537	2,413	2,231	2,057	1,930	1,769	1,461	2,376
1918-19	1,333	1,413	1,428	1,516	1,603	1,675	1,606	1,765	1,795	1,650	1,825	1,594	1,600
1919-20	1,660	1,902	1,866	2,143	1,928	1,868	1,936	1,802	1,057	531	1,040	847	1,548
1920-21	1,021	977	899	532	1,040	847	1,021	1,007	899	871	1,210	866	932
1921-22	782	528	829	871	1,173	866	782	528	814	771	931	857	811
1922-23	593	393	314	771	931	857	593	393	314	889	1,219	970	686
1923-24	734	686	1,127	888	1,219	970	734	657	1,127	826	735	617	860
1924-25	471	487	720	826	735	617	471	487	720	1,051	1,066	804	705
1925-26	602	446	792	1,051	1,066	804	602	446	792	1,048	1,166	1,142	830

APPENDIX 23—*concld.*

Average monthly stocks of shellac at London.

(Tons).

Year.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Average.
1926-27	1,157	1,063	950	951	1,086	1,017	793	857	1,174	1,269	1,424	1,486	1,102
1927-28	1,519	1,881	1,609	1,571	1,886	1,480	790	752	1,135	763	675	890	1,246
1928-29	741	640	579	976	1,120	1,061	1,016	960	1,430	1,340	1,691	1,619	1,098
1929-30	2,041	2,212	2,121	2,038	1,986	1,851	1,596	1,378	1,896	1,871	1,917	2,395	1,942
1930-31	2,681	2,651	2,622	2,651	2,803	2,490	2,200	1,939	1,842	1,740	1,801	1,780	2,267
1931-32	2,078	2,348	2,537	2,623	2,665	2,660	2,454	2,381	2,199	2,353	2,263	2,367	2,411
1932-33	2,209	2,203	2,412	2,420	2,539	2,411	2,403	2,540	2,350	2,338	2,507	2,723	2,421
1933-34	2,718	2,745	2,883	2,965	3,136	3,124	3,347	4,847	6,750	8,515	10,472	12,854	5,363
1934-35	15,522	17,530	19,249	19,423	22,813	22,650	22,475	22,765	23,513	23,478	22,806	22,295	21,210
1935-36	21,500	20,728	19,005	17,358	16,369	15,562	14,231	13,279	12,601	11,747	11,110	10,548	15,336
1936-37	10,053	9,611	9,439	9,422	9,357	9,389	9,249	9,269	9,357	9,275	9,546	10,110	9,506
1937-38	10,219	10,484	10,672	10,624	10,713	10,598	10,103	9,944	9,847	9,779	9,715	9,643	10,195
1938-39	9,557	9,538	9,415	9,046	8,783	8,096	7,556	7,286	7,252	7,250	7,330	7,157	8,189
1939-40	7,334	7,335	7,183	7,152	6,825	6,000	5,625	5,314	5,003	4,440	4,245	4,058	5,876
1940-41	4,083	3,857	3,861	3,896	3,954	3,097	2,987	3,007	3,126	3,126	2,936	2,728	3,388

Source.—Shellac Statistics by Calcutta Shellac Brokers' Association (upto March 1930.)
Reports of the Special Officer Lac Enquiry and London Shellac Research Bureau (from April 1930 to March 1939).
A firm of brokers at Calcutta—(1939-40 and 1940-41).

APPENDIX 24.

Market charges on stick lac in certain markets in the main lac producing tracts.

(Per hundred rupees.)

Items.	Bihar.						Central Provinces.				United Provinces.	
	Ranchi.	Jhalda.	Dalton-ganj.	Chaibasa.	Latehar.	Balram-pur.	Gondia.	Dham-tari.	Katni.	Kota.	Mirzapur.	Wyndham ganj.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Payable by seller.												
Tolls and taxes (terminal tax, octroi, tolls, etc.).	0 0 9	..	..	..	0 6 3	..	..	..	..	0 2 0	..	..
Commission	0 12 6	2 11 9	3 2 0	2 5 6	2 13 6	2 11 9	1 9 0	0 12 0	0 8 0	2 2 0	3 2 0	0 12 0
Brokerage	..	..	..	..	..	..	0 3 2	..	..	..	1 9 0	..
Handling and weighment charges	0 9 8	0 5 3	0 7 6	0 6 3	0 5 0	0 9 5	0 7 3	0 2 1	0 4 2	0 1 0	0 4 2	0 5 0
Charges for other services ..	..	..	..	..	0 0 3	..	..	..	0 2 0	..	..	..
Charities	0 11 0	0 5 3	0 6 0	0 2 4	0 2 0	0 9 5	..	0 1 0	0 1 0	0 4 0	0 1 10	0 1 6
Quality and weighment allowance	0 9 0	1 6 6	0 10 0	1 7 6	0 10 0	1 4 0	..	..	..	..	1 4 0	1 4 0

APPENDIX 24.—*concld.*

Market charges on stick lac in certain markets in the main lac producing tracts—concld.

(Per hundred rupees.)

Item.	Bihar.						Central Provinces.				United Provinces.	
	Ranchi.	Jhalda.	Dalton-ganj.	Chaibasa.	Latehar.	Balram-pur.	Gondia.	Dham-tari.	Katni.	Kota.	Mirzapur.	Wyndham ganj.
Payable by seller—concld.												
Miscellaneous	Rs. A. P. 0 8 0	Rs. A. P. 0 4 0	Rs. A. P. 0 3 0	Rs. A. P. ..	Rs. A. P. 0 3 0	Rs. A. P. 2 3 0	Rs. A. P. ..	Rs. A. P. 0 4 0	Rs. A. P. ..	Rs. A. P. 0 12 0	Rs. A. P. 0 4 9	Rs. A. P. ..
Total payable by seller ..	3 2 11	5 0 9	4 12 6	4 5 7	4 8 0	7 5 7	2 3 5	1 3 1	0 15 2	3 5 0	6 9 9	2 6 6
Payable by buyer.												
Commission	0 12 6	..	0 12 6	2 5 6	0 12 6	..	..	..	2 11 9	..	..	..
Brokerage	..	..	..	..	0 5 0	..	0 3 2	..	..	..	..	..
Handling and weighment charges	0 2 7	0 4 8	0 2 8	0 5 2	0 11 3	0 0 4	0 5 3	0 4 2	0 3 2	0 2 1	..	..
Charities	0 1 0	..	0 1 0	0 3 1	0 2 0	..	0 12 6	0 3 0	0 2 1	..	..	0 1 0
Miscellaneous	..	..	..	..	..	..	..	..	..	..	..	..
Total payable by buyer ..	1 0 1	0 4 8	1 0 2	2 13 9	1 14 9	0 0 4	1 4 11	0 7 2	3 1 0	0 2 1	..	0 1 0
Grand Total ..	4 3 0	5 5 5	5 12 8	7 3 4	6 6 9	7 5 11	3 8 4	1 10 3	4 0 2	3 7 1	6 9 9	2 7 6
Market charges calculated per maund.	0 5 4	0 6 10	0 7 5	0 9 3	0 8 3	0 9 5	0 4 6	0 2 1	0 5 2	0 4 5	0 8 6	0 3 2

Note.—The value of stick lac in these calculations has been taken as Rs. 8 per maund.

APPENDIX 25.

Distribution costs and price spreads from some manufacturing centres to Calcutta in the marketing of seedlac and shellac.

	Seedlac.				Shellac.			
	Jhalda to Calcutta.	Dalton-ganj to Calcutta.	Gondia to Calcutta.	Mirzapur to Calcutta.	Jhalda to Calcutta.	Dalton-ganj to Calcutta.	Gondia to Calcutta.	Mirzapur to Calcutta.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1. Manufacturer's price per maund (82 2/7 lb.) ..	9 11 4	9 5 5	8 14 4	9 3 7	13 2 2	12 12 2	12 3 2	12 8 6
2. Bagging, handling and transportation charges from factory to station.	0 2 2	0 2 1	0 2 2	0 2 5	0 3 4	0 3 4	0 3 4	0 3 6
3. Price f. o. r. manufacturing centre	9 13 6	9 7 6	9 0 6	9 6 6	13 5 6	12 15 6	12 6 6	12 12 0
4. Railway freight*	0 6 0	0 12 0	1 3 0	0 14 0	0 6 0	0 12 0	1 5 0	1 0 0
5. Cost at destination	10 3 6	10 3 6	10 3 6	10 4 0	13 11 6	13 11 6	13 11 6	13 12 0
6. Charges at destination	0 12 6	0 12 6	0 12 6	0 12 0	0 12 6	0 12 6	0 12 6	0 12 0
7. Total distribution charges	1 4 8	1 10 7	2 1 8	1 12 5	1 5 10	1 11 10	2 4 10	1 15 6
8. Price paid by the shipper	11 0 0	11 0 0	11 0 0	11 0 0	14 8 0	14 8 0	14 8 0	14 8 0

* Exclusive of surcharge.

APPENDIX 26.

Distribution costs and price spreads from three manufacturing centres to Calcutta in the marketing of kiri.

	Jhalda to Calcutta.	Daltonganj to Calcutta.	Mirzapur to Calcutta.
	Rs. A. P.	Rs. A. P.	Rs. A. P.
1. Manufacturer's price (per maund 82 2/7 lb.)	2 15 7	2 9 9	2 12 9
2. Bagging, handling and transportation charges from factory to station.	0 2 11	0 2 9	0 3 0
3. Price f. o. r. manufacturing centre	3 2 6	2 12 6	2 15 9
4. Railway freight*	0 6 0	0 12 0	0 9 3
5. Cost at destination	3 8 6	3 8 6	3 9 0
6. Charges at destination	0 7 6	0 7 6	0 7 0
7. Total distribution charges..	1 0 5	1 6 3	1 3 3
8. Price paid by the buyer	4 0 0	4 0 0	4 0 0

* Exclusive of increased charge.

APPENDIX 27.

A few instances showing the price spreads from producer to consumer in the marketing of stick lac.

——	Jhalda.			Daltonganj.		
	Producer-small *paikar*-big *paikar*-factory through *arhatiya*.	Producer-factory through *arhatiya*.	Producer-factory (direct).	Producer-small *paikar*-big *paikar*-factory through *arhatiya*.	Producer-factory through *arhatiya*.	Producer-factory (direct).
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Producer's price per maund (82 2/7 lb.).	4 0 2	4 11 6	4 15 5	2 7 10	3 5 0	3 10 9
Transportation charges from village to *hat*.	0 2 0	..	..	0 2 0	..	..
Charges paid by producer at *hat*.	0 0 10	..	..	0 1 6	..	..
Price paid by small *paikar* to producer at *hat*.	4 3 0	..	..	2 11 4	..	..
Charges paid at the *hat* by small *paikar* for buying from producer.	0 2 0	..	..	0 2 0	..	..
Charges paid at the *hat* by small *paikar* for resale to big *paikar*.	..	..	..	0 1 0	..	..
Margin of the small *paikar*.	0 3 0	..	..	0 3 0	..	..
Price paid by the big *paikar* to the small *paikar*.	4 8 0	..	..	3 1 4	..	..
Charges paid at the *hat* by the big *paikar*.	0 2 6	..	..	0 2 6	..	..
Cartage to the secondary market.	0 3 6	0 5 6	0 5 10	0 3 6	0 5 6	0 5 9
Charges paid at the market by the seller.	0 4 0	0 5 0	0 1 6	0 4 8	0 5 6	0 0 6
Margin of the big *paikar*.	0 4 0	..	..	0 4 0	..	..

APPENDIX 27—*concld.*

***A few instances showing the price spreads from producer to consumer in the marketing of stick lac*—concld.**

——	Jhalda.			Daltonganj.		
	Producer-small *paikar*-big *paikar*-factory through *arhatiya*.	Producer-factory through *arhatiya*.	Producer-factory (direct).	Producer-small *paikar*-big *paikar*-factory through *arhatiya*.	Producer-factory through *arhatiya*.	Producer-factory (direct).
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Price paid by the factory.	5 6 0	5 6 0	5 6 9	4 0 0	4 0 0	4 1 0
Charges paid by the factory at the market.	0 0 5	0 0 5	..	0 0 9	0 0 9	..
Cartage to factory ..	0 0 4	0 0 4	..	0 0 3	0 0 3	..
Cost price at the factory.	5 6 9	5 6 9	5 6 9	4 1 0	4 1 0	4 1 0

APPENDIX 28.

Note on effect of storage on seedlac and shellac under cold storage and ordinary conditions by the Director, Indian Lac Research Institute, Namkum.

Samples of *Baisakhi* and *Kusmi* stick lac, seedlac and shellac were kept in cold storage and a duplicate set was at the same time kept in an ordinary lac godown at Calcutta. An initial analysis of the samples was done at the time of storing and samples from both types of storage were drawn from time to time and analysed to find the difference in the change of properties. While the *Baisakhi* samples have been in storage for two years and may be said to have been examined sufficiently long for practical purposes, the *Kusmi* samples, which could be kept only much later, are still under observation.

Taking the case of seedlacs first, there seems to be not much difference between the two sets of samples as regards hot alcohol insolubles. The slight differences which are noticed are not uniform and are to be attributed more to experimental error than to any other factor. There appears to be a slight advantage with cold storage in respect of cold alcohol insolubles, colour and softening and melting ranges but the differences between the two sets of results is not progressive. The figures for rate of filtration and bleaching figure are erratic. On the whole, as much difference between the two kinds of storage are not indicated as might be expected. This is very likely due to the fact that a truly representative sample was not drawn every time at Calcutta and owing to the more heterogeneous nature of seedlac as compared with shellac, uniform results are not obtained.

In the case of shellac, on the other hand, more pronounced differences are noticed in the case of certain properties. There is no appreciable difference in the percentage of hot alcohol insolubles as a result of either type of storage. The cold alcohol insolubles, however, are found to increase slightly in the case of both samples. In the case of colour which remains nearly the same after cold storage, it seems to increase slightly (that is, the sample gets darker) when stored in ordinary godown.

The most impressive change is, however, to be found in the two important physical constants of shellac, *viz.*, fluidity and life under heat. As regards fluidity, while the increase in the figure for *Baisakhi* shellac put in cold storage for two years, for example, is only from 92 to 111 seconds, which is negligible, the increase for its counterpart in ordinary godown is from 92 to 394 seconds. As regards life under heat, the reduction in the life is appreciable in both cases but while the figure falls from 45 to about 32 minutes in the case of air-conditioned *Baisakhi* sample, it falls from the same figure to the much lower figure of 21 minutes when the same sample is stored in an ordinary godown.

It will be apparent from the statements made above that while no appreciable advantage is indicated in the case of seedlac, the deterioration in the physical properties of shellac can be definitely minimised by means of cold storage.

APPENDIX 29.

Estimated stocks of stick lac, seedlac and shellac in terms of stick lac on 1st April of each year.

(Tons).

Date.	Balarampur.	Jhalda.	Ranchi.	Singbhum.	Pakur	Daltongunj.	Kota-Pendra.	Rajim-Dhamtari.	Gondia.	Katni-Damoh.	Umaria.	Minor divisions.	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
1st April 1935	643	790	643	514	92	945	441	680	404	404	459	2,351	8,366
1st April 1936	1,617	1,029	1,378	478	606	1,176	918	1,010	661	680	588	3,086	13,227
1st April 1937	1,249	946	882	514	634	937	735	606	349	331	606	2,572	10,361
1st April 1938	1,166	1,561	1,268	808	1,424	1,745	918	680	808	661	836	2,388	14,263
1st April 1939	2,094	2,223	1,745	974	2,581	1,782	772	560	680	386	1,387	2,204	17,388
1st April 1940	1,681	955	716	661	1,469	1,442	478	331	1,185	294	909	2,746	12,867

Source.—Compiled from crop statements issued by the Indian Lac Cess Committee.

APPENDIX 30.

Buying specifications for shellac in the United States.

Grade.	Alcohol insoluble impurities.			Rosin.			Orpiment.			Water soluble.		Miscellaneous.
	Franchise.	Rejection limit.	Allowances and penalties.	Franchise.	Rejection limit.	Allowances and penalties.	Franchise.	Rejection limit.	Allowances and penalties.	Franchise.	Allowances and penalties.	
London Standard T. N., (USSA TN., USSA Pure TN)	3%	5%	2% of the invoice value for 1% adulteration in excess of free tolerance and 4% of the invoice value for each additional 1%	3%	4%	2% of the invoice value for 1% adulteration in excess of free tolerance and 4% of the invoice value for each additional 1%	·2%	·3%	From ·2% to ·25% 1% of the invoice value. Over ·25 to ·3% 2% of the invoice value. Over ·3% rejectable	·5%	1% of the invoice value for each 1% water soluble in excess of ·5%	1. With the exception of F. O qualities all standard grades of pure shellac shall be sold on the basis of 18 Iodine Value.
London Standard* Pure T. N.	3%	5%		..	1%		·2%	·3%		·5%		
No 2 Pure T. N.	3%	5%		..	1%		·2%	·3%		·5%		
Heart ..	3%	4%		3%	4%		·2%	·3%		·5%		2. Colour — to conform to officially adopted standard types failing which allowance as settled by arbitration.
Superfine ..	1¾%	3%		..	1%		·2%	·3%		·5%		
F. O. T. N. ..	2½%	4½%		..	..		·025%	·03%		·5%		
F. O. Heart ..	2%	3½%		..	..		·025%	·03%		.5%		
F. O. Superfine	1¼%	2½%		..	..		·025%	·03%		·5%		

* Not examined for colour.

Source.—Compiled from " Rules and Regulations and Constitution and Bye-Laws " of the United States Shellac Importers Association Inc. for the year 1937.

APPENDIX 31.

Results of the analysis of 6 samples of seedlac, by Dr. E. J. Parry.

(6th April 1938.)

—	No. 1 Golden *Kusmi* Standard 1937.	No. 2 Fine *Kusmi* Standard 1937.	No. 3 *Kusmi* Standard 1937.	No. 4 Golden *Baisakhi* Standard 1937.	No. 5 Fine *Baisakhi* Standard 1937.	No. 6 *Baisakhi* Standard 1937.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Ash	0·34	0·55	1·04	0·51	0·96	1·50
Moisture @ 42°C	1·38	1·50	1·46	1·33	1·47	1·55
Moisture @ 100°/105°C ..	2·73	2·53	2·64	2·71	2·78	2·85
Insoluble residue in hot alcohol ..	0·87	2·13	2·89	1·80	3·05	4·02
Shellac soluble in cold alcohol ..	94·4	92·1	91·8	92·3	90·7	90·6
The shellac soluble in hot alcohol has the following characters :—						
Iodine value (Hubl)	5·1	5·4	5·9	5·8	6·2	6·3
Acid value	75·5	78·1	76·7	75·0	76·9	77·0
Ester value	144·4	147·0	143·8	145·6	143·9	145·6
Saponification value	219·9	225·1	220·5	220·6	220·8	222·6
Colour Index	2·9	7·5	9·5	7·2	10·6	10·3
Softening Point	69·5°C	69°C	68°C	68°C	68·5°C	69°C
Melting Point	78–79°C	78°C	79–80°C	79°C	78–79°C	80°C

Source.—By courtesy of the Special Officer Lac Enquiry, London.

APPENDIX 32.

Copy of a contract form for seedlac used by a manufacturer at Ranchi.

SEEDLAC.

Contract No.————.

————193 .

Messrs.

DEAR SIR,

We beg to confirm our————· ———you, to-day of the following————

The Seedlac to be equal in quality to the buyer's standard shown by him and to be delivered in good and free condition, but should any of it turn out inferior in condition or quality a fair allowance to be made to buyers.

The Seedlac is sold, subject as mentioned below, free of rosin and other rosinous impurities and on condition that the same contains not more than per cent. of matter insoluble in alcohol ; and buyers shall have the right before and|or at the time of taking delivery to draw samples and have the same examined by Messrs. R. V. Briggs & Co., or Dr. M. L. Tagla at the buyer's option. Should the seedlac be found on such examination to contain any rosin or rosinous impurities, the buyers shall have the option of rejection. Should it be found on such examination to contain more than per cent. of matter insoluble in alcohol an allowance is to be given by the seller and accepted by the buyer at the rate of 1 per cent. of the price stated above for every ½ per cent. of insoluble matter or part thereof above per cent. and up to per cent. Should the seedlac be found to contain more than per cent. of matter insoluble in alcohol or to be inferior in quality or in condition to the buyers standard, buyers shall have the option to reject the goods and ask for a fresh tender within the contract time or to accept them with a quality allowance and|or with an allowance at the rate of 2 per cent. of the price stated above for every ½ per cent. of insolubles in excess of per cent.

Delivery to be given and taken in buyer's godown————

Payment to be made to seller and their receipt to be a complete discharge.

Should any dispute arise under this contract, the same to be settled by arbitrators—each party to appoint one arbitrator engaged in seedlac trade, and arbitrators' award to be final. Should arbitrators be unable to agree they will appoint an umpire, whose decision will be final and binding on all parties.

Terms and Conditions :—Cash on Delivery.

Yours faithfully,

APPENDIX 33.

Copy of a contract form for shellac used by a Calcutta broker.

SHELLAC.

Contract No.————.

Calcutta————193

Messrs.

DEAR SIRS,

We have this day————by your order and for your account

———————————————————————————————

———————————————————————————————

The $\frac{\text{shellac}}{\text{button lac}}$ to be————————————————and to be delivered in good and free condition. Should the above turn out inferior they are to be given and taken with an allowance, to be settled by the undersigned.

The Shellac|Button lac is guaranteed not to contain more than per cent. rosin, but should it be found on examination by Messrs. R. V. Briggs & Co., Ltd., or Messrs. J. & R. Hutchison, to contain more than the above admixture of rosin, the following allowances are to be given by the Sellers and accepted by the Buyers, *viz.*, $\frac{\text{Re. 1}}{\text{Re. 0-8-0}}$ per maund, for every ½ per cent. or part thereof up to 1 per cent. above the percentage allowed and Rs. 2 for each additional ½ per cent. or part thereof.

Should the shellac contain more than 3 per cent. impurities, the following allowances are to be given by the Sellers and accepted by the Buyers, *viz.*, Re. 1 for every ½ per cent. or part thereof above 3 per cent. and up to 4 per cent. and Rs. 2 for each additional ½ per cent. or part thereof.

Tenders to be made by and accepted from us. Payment to be made to us and our receipt to be a complete discharge. Delivery to be given and taken from our godown————————————————————————————

Should any dispute arise under this contract, the same to be settled by arbitrators in Calcutta, each party to appoint one arbitrator engaged in Shellac trade, and their award to be final. Should the arbitrators be unable to agree they will appoint an umpire whose decision will be final and binding on all parties.

TERMS AND CONDITIONS :—The goods to be at the Seller's risk until prompt, unless delivery is applied for previously, in which case, the buyers risk will commence as soon as the goods are weighed off.

CASH ON DELIVERY.

Brokerage @ Re.————per md. to be paid by the Sellers to the undersigned.

We are, Dear Sirs,

Yours faithfully,

APPENDIX 34.

Copy of contract form used for "futures" trading in shellac at Calcutta.

SHELLAC.

Contract No.————

Calcutta, ————194

Messrs.

DEAR SIRS,

I / We have this day sold to / brought from you subject to the terms below and the rules and bye-laws of THE CALCUTTA SHELLAC EXCHANGE, LTD., for the time being in force.....mds. of T. N. Shellac at (Rs.) Rupees.....per bazar maund.

1. The shellac to be of usual quality of the mark and to be delivered in good and free condition but should any of it turn out inferior in condition or quality, a fair allowance to be made to the buyers.

2. Sellers to tender the above goods and buyers to take delivery from godowns (approved by the aforesaid Exchange) between the 25th and the last date of the month of.....194 .

3. The shellac is guaranteed not to contain any percentage of rosin but should it be found on examination at buyer's option by Messrs. R. V. Briggs & Co. or Messrs. J. R. Hutchison or an expert appointed by the Exchange, to contain more than the above admixture of rosin the following allowances are to be given by the sellers and accepted by the buyers, *viz.*, Re. 1 per maund for every ½ per cent. or part thereof up to 1 per cent. and Rs. 2 for each additional ½ per cent. or part thereof.

Should the shellac contain more than 3 per cent. impurities, the following allowances are to be given by the sellers and accepted by the buyers, *viz.*, Re. 1 for every ½ per cent. or part thereof above 3 per cent. and up to 4 per cent. and Rs. 2 for each additional ½ per cent. or part thereof.

4. Each delivery to form a portion of this contract but no lot less than 10 maunds to be tendered.

5. On every Monday or in case of any public holiday on the following business day subsequent to the date of this contract upto the due date either party shall pay to the other (as the case may be) the difference between the contract price and the market rate prevailing at the close of the preceding business day announced by the said Exchange and the contract shall continue at the latter rate. In case of default of such payment the defaulting party shall be deemed to have committed a breach of this contract.

6. Delivery orders and other documents approved by the said Exchange will be accepted by us in performance of this contract.

7. Delivery orders shall be transferable by endorsement and the person or firm originally issuing the delivery order shall be bound to deliver the goods to the ultimate holder against payment of price.

8. When contract falls due on Sunday or other holidays the last date of delivery shall be the preceding business day.

9. Any dispute arising out of or under or in any way relating to this contract shall be decided by the Tribunal of Arbitration of the Calcutta Shellac Exchange, Ltd., under its rules in force at the time of arbitration.

Brokerage at 2 annas per maund.

Yours faithfully,

APPENDIX 35

Results of analysis of seedlac samples.

	Number of samples prepared at the Institute.					Number of commercial samples.						Total of prepared and commercial samples.
	Kusum.	*Ber.*	*Palas.*	Others.	Total.	*Kusum.*	*Ber.*	*Palas.*	*Ber* and *Palas* mixture.	Unspecified.	Total.	
(*a*) Hot alcohol insolubles—												
Upto 1 per cent.	1	..	..	..	1	..	..	..	..	..	..	1
From 1 to 2 per cent.	2	3	1	..	6	6	..	..	..	1	7	13
From 2 to 3 per cent.	4	6	3	2	15	5	..	..	1	2	8	23
From 3 to 4 per cent.	1	3	7	..	11	2	..	3	..	1	6	17
From 4 to 5 per cent.	1	4	7	1	13	1	4	2	3	1	11	24
From 5 to 6 per cent.	3	1	2	..	6	..	2	3	1	2	8	14
From 6 to 7 per cent.	2	1	5	2	10	..	..	..	2	1	3	13
Over 7 per cent.	1	..	1	..	2	..	..	1	..	..	1	3
Total No.	15	18	26	5	64	14	6	9	7	8	44	108
(*b*) Cold alcohol insolubles—												
Upto 6 per cent.	8	2	2	1	13	8	..	..	1	1	10	23
From 6 to 8 per cent.	5	11	10	1	27	5	..	1	1	3	10	37
From 8 to 10 per cent. ..	2	5	10	..	17	1	4	6	4	..	15	32
From 10 to 12 per cent. ..	..	2	2	3	7	..	4	1	1	4	10	17
Over 12 per cent.	..	..	2	1	3	..	..	1	..	..	1	4
Total No.	15	20	26	6	67	14	8	9	7	8	46	113

(c) Colour index.—													
Upto 6	3	..	..	..	3	6	..	..	..	..	6	9
From 6 to 8	5	4	2	2	13	3	..	1	..	1	5	18
From 8 to 10	6	5	7	..	18	2	..	..	1	1	4	22
From 10 to 12	1	3	7	1	12	1	1	1	2	2	7	19
From 12 to 14	..	3	4	2	9	1	1	1	1	1	5	14
From 14 to 16	..	2	1	..	3	1	2	1	2	2	8	11
From 16 to 18	..	1	3	..	4	..	1	1	1	..	3	7
Over 18	..	2	2	..	4	..	3	4	..	2	9	13
Total No.	15	20	26	5	66	14	8	9	7	9	47	113
(d) Wax—												
Upto 3 per cent.	3	2	5	..	10	1	..	..	..	..	1	11
From 3 to 3½ per cent. ..	..	4	1	3	8	1	..	..	..	..	1	9
From 3½ to 4 per cent. ..	3	5	3	..	11	3	..	3	..	..	6	17
From 4 to 4½ per cent. ..	1	..	1	1	3	1	..	2	..	..		
From 4½ to 5 per cent. ..	..	..	..	..	..	..	..	..	..			
Over 5 per cent.	..	..	..	..	..	..	..	..	..	..	..	..
Total No.	7	11	10	4	32	6	..	5	..	..	11	43
(e) Viscosity of bleached lac—												
Upto 5 centipoises	..	..	..	..	..	5	..	..	..	..	5	5
From 5 to 5·5 centipoises ..	..	1	..	..	1	1	..	..	..	..	1	2
From 5·5 to 6 centipoises ..	11	16	18	2	47	4	2	..	1	1	8	55

APPENDIX 35—*concld.*

Results of analysis of seedlac samples—concld.

—	Number of samples prepared at the Institute.					Number of commercial samples.						Total of prepared and commercial samples.
	Kusum.	*Ber.*	*Palas.*	Others.	Total.	*Kusum.*	*Ber.*	*Palas.*	*Ber* and *Palas* mixture.	Unspecified.	Total.	
(*e*) Viscosity of bleached lac—*contd.*												
From 6 to 6·5 centipoises ..	3	2	6	1	12	1	3	2	1	1	8	20
From 6·5 to 7 centipoises ..	..	..	..	..	..	1	1	1	..	2	5	5
Over 7 centipoises	1	..	2	..	3	..	..	1	..	..	1	4
Total No.	15	19	26	3	63	12	6	4	2	4	28	91
(*f*) Bleaching test. (30 grams of seedlac)—												
Upto 40 C.C.	8	..	..	..	8	9	..	..	..	..	9	17
From 40 to 50 C.C. .. .	7	..	..	..	7	4	..	..	..	..	4	11
From 50 to 60 C.C. .. .	..	4	5	..	9	1	..	..	1	2	4	13
From 60 to 70 C.C. .. .	..	3	4	1	8	..	..	..	1	2	3	11
From 70 to 80 C.C. .. .	..	3	5	..	8	..	1	1	1	2	5	13
From 80 to 90 C.C. .. .	..	3	6	..	9	..	4	2	2	2	10	19
From 90 to 100 C.C. .. .	..	3	4	2	9	..	1	4	1	1	7	16
From 100 to 110 C.C. ..	..	3	2	..	5	..	2	2	..	..	4	9
Over 110 C.C. ..	..	1	..	..	1	..	..	..	1	..	1	2
Total No. ..	15	20	26	3	64	14	8	9	7	9	47	111

APPENDIX 36.

Seedlac Grading and Marking Rules, 1941.

1. *Short title and application.*—(1) These rules may be called the Seedlac G ing and Marking Rules, 1941.

(2) They shall apply to seedlac produced in India from Indian stick lac.

2. *Grade designations.*—Grade designations to indicate the quality of see are set out in column 1 of Schedule I annexed to these rules.

3. *Definition of quality.*—The definition of quality indicated by the grade desig tions is specified in columns 2 to 5 of Schedule I.

4. *Grade designation mark.*—The grade designation mark shall consist of a la bearing a design (consisting of an outline map of India in conjunction with the w AGMARK) resembling that set out in Schedule II, specifying the grade designa and of the following colour :—

Grade designation.	Colour of label.
Mark I (Special)	White.
Mark I	Red.
Mark II	Blue.
Mark III	Yellow.
Mark III (Dark)	Green.

5. *Method of Marking.*—The grade designation mark label shall be secu attached to each container in a manner approved by the Agricultural Marke Adviser. In addition to the grade designation mark, the following particulars s be clearly marked on the label :—

Packing centre.....

Date of packing.....

Net weight.....

6. *Method of packing.*—Only new gunny bags or other containers approved the Agricultural Marketing Adviser shall be used for packing, and these shall, a being securely closed, be sealed in a manner approved by the Agricultural Marke Adviser.

7. *Special conditions of certificate of authorisation.*—In addition to the co tions specified in rule 4 of the General Grading and Marking Rules, 1937, the conditi set out in Schedule III shall be conditions of every certificate of authorisation iss for the purposes of these rules.

SCHEDULE I.

(*See* rules 2 and 3.)

Grade designation and definition of quality of seedlac prepared in India from Indian stick lac.

Grade designation.	Definition of quality.			
	Special characteristics.			General characteristics.
	Hot Alcohol insolubles.	Colour* Index.	Bleach† Index.	
1	2	3	4	5
Mark I (Special) ..	Not more than 3%.	Not more than 10.	Not more than 60.	The seedlac shall be the natural product obtained by washing ‡ fresh § stick lac reasonably dry and free from dirt, wood fibre, and insect remains, and entirely free from bleaching agents, and other colouring matter or other adulterants. The product shall be in free granular condition.
Mark I	Not more than 3%.	Not more than 10.	..	
Mark II ..	Not more than 5%.	Not more than 15.	..	
Mark III ..	Not more than 7%.	Not more than 20.	..	
Mark III (Dark)	Not more than 7%.	Over 20	..	

*.005N, iodine solution, taken as colour index 5. A tolerance of 10 per cent. on the prescribed colour index is permissible.

†In order to provide for any exceptional nitrogenous content which may affect the bleach figure a tolerance of 10 per cent. is permissible on the prescribed maximum.

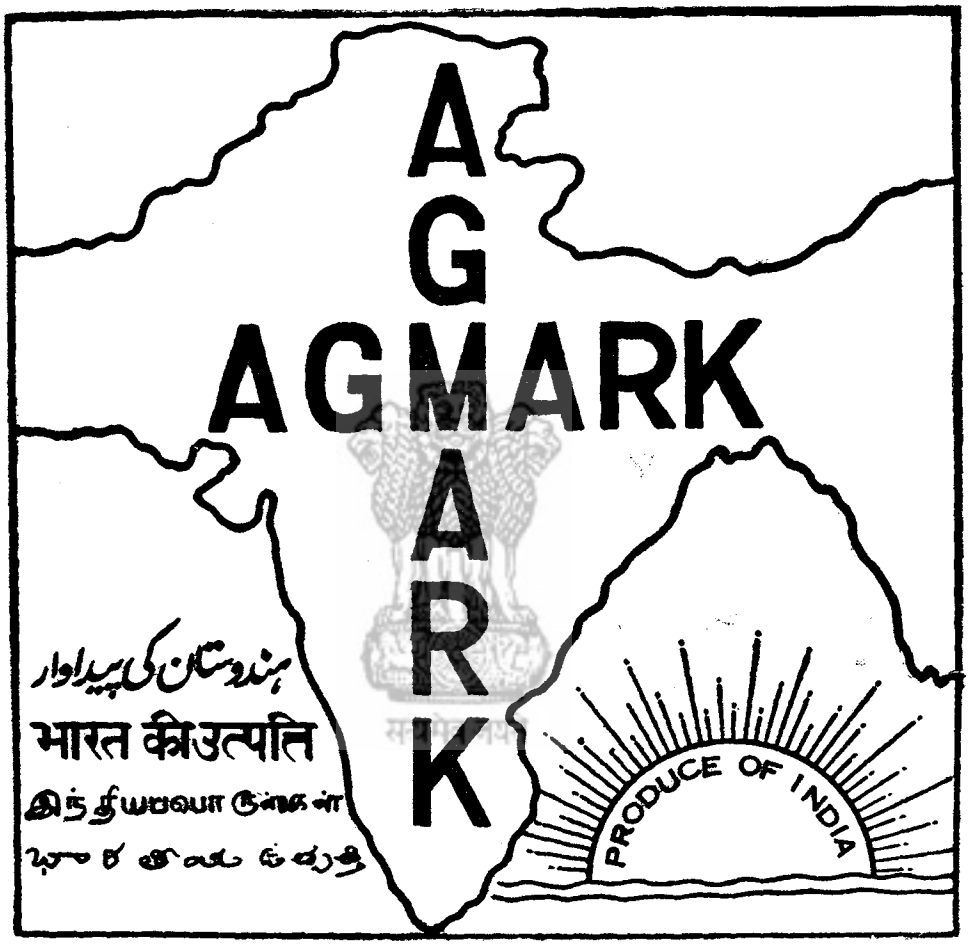
‡A mild alkaline reagent may be added to the washing water provided the final washing is done in plain water. An aqueous solution prepared from the seedlac shall be neutral to Methyl Red.

§The seedlac shall not be regarded as made from fresh stick lac, if a solution made by dissolving 10 gms. seedlac in 100 cc. of 95 per cent. rectified alcohol, filtered at 25°C. through a C. S. and S. No. 595 (or equivalent quality) filter paper fitted on a funnel of 11 cm. internal diameter and 10 cm. height, does not give at least 80 cc. filtrate in 20 minutes.

SCHEDULE II.

Grade designation mark for seedlac.

(*See* rule 4.)



SCHEDULE III.

(*See* rule 7.)

(*a*) An authorised packer shall provide such arrangements for testing seedlac as may be prescribed by the Agricultural Marketing Adviser from time to time.

(*b*) All instructions regarding sampling, analysis, sealing and marking of containers and the maintenance of records, etc., which may be issued from time to time by the Agricultural Marketing Adviser, shall be strictly observed.

APPENDIX 37.

Results of analysis of shellac samples.

	Number of samples prepared at the Institute.					Number of commercial samples.						Total of prepared and commercial samples.
	Kusum.	*Ber.*	*Palas.*	Others.	Total.	T. N.	Standard I.	Fine.	Superfine.	Unclassified.	Total.	
(*a*) Hot alcohol insolubles.												
Upto 1 per cent.	14	17	22	4	57	5	3	2	6	10	26	83
From 1 to 1½ per cent. ..	..	1	..	..	1	2	1	3	7	2	15	16
From 1½ to 2 per cent. ..	..	..	..	..	..	3	1	3	2	2	11	11
From 2 to 2½ per cent. ..	..	..	..	..	..	2	..	1	1	1	5	5
From 2½ to 3 per cent. ..	..	..	..	..	..	..	..	1	..	1	2	2
Over 3 per cent.	..	..	..	..	..	1	..	..	..	..	1	1
Total. No. ..	14	18	22	4	58	13	5	10	16	16	60	118
(*b*) Cold alcohol insolubles.												
Upto 3 per cent.	1	..	..	..	1	..	..	..	..	1	1	2
Above 3 to 4 per cent. ..	13	12	12	3	40	2	..	..	3	5	10	50
Above 4 to 5 per cent. ..	1	5	11	1	18	2	4	4	5	5	20	38
Above 5 to 6 per cent. ..	..	1	1	..	2	6	1	3	9	3	22	24
Above 6 to 7 per cent ..	..	..	..	..	..	3	..	3	..	4	10	10
Above 7 to 8 per cent. ..	..	..	..	..	..	1	..	..	..	..	1	1
Above 8 to 9 per cent. ..	..	..	..	..	..	..	..	..	..	..	..	..
Above 9 to 10 per cent. ..	..	..	..	..	..	..	..	..	..	..	..	..
Above 10 per cer cent. ..	..	..	..	..	..	..	..	..	..	..	..	..
Total No. ..	15	18	24	4	61	14	5	10	17	18	64	125

(c) Colour index.												
Upto 5	2	..	..	..	2	..	..	..	1	1	2	4
From 5 to 10	13	10	8	1	32	..	..	5	9	5	19	51
From 10 to 15	..	7	13	3	23	3	5	3	7	9	27	50
From 15 to 20	..	..	2	..	2	6	..	1	..	1	8	10
From 20 to 25	..	1	1	..	2	3	..	1	..	1	5	7
From 25 to 30	..	..	..	..	..	1	..	..	..	1	2	2
Over 30	..	..	..	..	..	1	..	..	..	..	1	1
Total No. ..	15	18	24	4	61	14	5	10	17	18	64	125
(d) Wax.												
Upto 3 per cent.	1	2	3	2	8	..	..	..	2	3	5	13
Above 3 to 3½ per cent. ..	3	7	9	1	20	1	1	5	4	3	14	34

APPENDIX 37—*contd.*

Results of analysis of shellac samples—contd.

	Number of samples prepared at the Institute.					Number of commercial samples.						Total of prepared and commercial samples.
	Kusum.	*Ber.*	*Palas.*	Others.	Total.	T. N.	Standard I.	Fine.	Superfine.	Unclassified.	Total.	
(*d*) Wax—*contd.*												
Above 3½ to 4 per cent. ..	5	4	6	..	15	4	2	4	9	6	25	40
Above 4 to 4½ per cent. ..	3	3	3	..	9	3	1	1	2	5	12	21
Above 4½ to 5 per cent. ..	2	2	2	1	7	4	1	..	..	..	5	12
Above 5 to 5½ per cent. ..	..	..	..	..	..	2	..	..	..	1	3	3
Above 5½ per cent.	..	..	..	..	..	..	..	..	..	..	..	..
Total No.	14	18	23	4	59	14	5	10	17	18	64	123
(*e*) Viscosity.												
Upto 5 Centipoises	..	..	..	..	..	..	..	..	..	..	..	..
From 5 to 5·5 Centipoises ..	1	1	2	..	4	..	..	..	..	..	..	..
Above 5·5 to 6 Centipoises ..	13	7	9	1	30	..	..	..	..	..	..	..
Above 6 to 6·5 Centipoises ..	..	..	2	..	2	..	..	..	..	..	..	..

Above 6·5 to 7 Centipoises ..	..	..	..	..	..	..	..	..	..	..	..	..	..
Above 7 Centipoises	..	..	..	1	..	1	..	..	..	..	..	..	..
Total No.	14	8	14	1	37	..	..	..	..	..	..	..	
(*f*) Fluidity in seconds.													
Upto 50	1	..	..	..	1	..	..	..	..	..	..	1	
Above 50 to 75	8	3	1	..	12	..	1	..	2	..	3	15	
Above 75 to 100	5	3	6	..	14	..	..	1	1	1	3	17	
Above 100 to 125	..	5	6	1	12	..	..	2	2	3	7	19	
Above 125 to 150	1	1	3	2	7	6	2	2	6	1	17	24	
Above 150 to 175	..	3	2	1	6	2	1	2	3	7	15	21	
Above 175 to 200	..	2	3	..	5	2	..	..	1	3	6	11	
Above 200 to 225	..	..	1	..	1	..	1	..	1	..	2	3	
Above 225 to 250	..	..	..	..	..	1	..	2	..	..	3	3	

APPENDIX 37—*concld.*

Results of analysis of shellac samples—concld.

—	Number of samples prepared at the Institute.					Number of commercial samples.						Total of prepared and commercial samples.
	Kusum.	*Ber.*	*Palas.*	Others.	Total.	T. N.	Standard I	Fine	Superfine.	Unclassified.	Total.	
Above 250 to 275	..	..	..	..	..	..	..	..	1	..	1	1
Above 275 to 300	..	..	..	..	..	..	..	1	..	1	2	2
Over 300	..	1	2	..	3	3	..	..	..	2	5	8
Total No.	15	18	24	4	61	14	5	10	17	18	64	125
(*g*) Life under heat in minutes.												
Upto 20	..	..	..	..	..	1	..	..	..	..	1	1
Above 20 to 25	..	..	2	..	2	..	..	..	..	1	1	3
Above 25 to 30	..	..	3	2	5	..	1	1	1	4	7	12
Above 30 to 35	4	8	3	1	16	1	1	3	5	5	15	31
Above 35 to 40	5	6	15	1	27	9	1	1	5	7	23	50
Above 40 to 45	6	4	1	..	11	1	1	4	2	1	9	20
Above 45 to 50	..	..	..	..	..	2	1	1	4	..	8	8
Over 50	..	..	..	..	..	..	..	..	..	..	..	..
Total No.	15	18	24	4	61	14	5	10	17	18	64	125

APPENDIX 38.

Minimum standards of quality for various grades of shellac.

Grades.	Moisture.	Hot alcohol impurities. (Maximum)	Cold alcohol solubles. (Minimum)	Water soluble.	Colour Index. (Maximum).	Rosin.	Orpiment.	Wax.
Pure	Not more than 2 per cent.	Per cent.	Per cent.	Not more than 0·5 per cent.			Absent *	Not more than 5·5 per cent.
Superfine ..		1	94		10	*Nil*		
Fine		1½	92		15	*Nil*		
Standard ..		2	92		20	*Nil*		
T. N.		3	90		25	*Nil*		
Rosinous								
T. N. Rosinous I ..		3	90		25	3%		
T. N. Rosinous II		4	88		30	12%		
Arsenicated								
Superfine ..		1¼	92		10	*Nil*	0·2%	
Fine		1¾	92		15	*Nil*	0·3%	

*Orpiment would be considered absent if it does not exceed ·005 per cent

APPENDIX 39.

List of important publications on lac.

(1) PUBLISHED BY THE INDIAN LAC RESEARCH INSTITUTE, NAMKUM

Bulletins—

Bulletin No. 4.—Properties of Shellac Films. Resistance of shellac films from various varnishes to action of water and chemicals. By M. Venugopalan and M. Rangaswami. Reprinted from Industrial and Engineering Chemistry, Vol. XXII, No. 8, Industrial edition, August 1930.

Bulletin No. 5.—Humidity and Storage of Button Lac. By R. W. Aldis. Price 8 annas.

Bulletin No. 10.—The Influence of Orpiment in Shellac on the Protective Properties of the Varnish. By M. Rangaswami. Price 8 annas.

Bulletin No. 18.—Modification of Shellac, Part I. The effect of sulphur. By M. Venugopalan. Price Re. 1.

Bulletin No. 19.—The Heat Curing of Shellac, Part II. Depolymerisation. By M. Rangaswami and R. W. Aldis. Price Re. 1.

Bulletin No. 29.—Contribution to the study of the Bleaching of Lac, Part I. The action of the chlorine-bleach on hot resin constituents of lac. By Narasimha Murty. Price 2 annas.

Bulletin No. 30.—Shellac Plastics, Part I. By S. Ranganathan. Price 2 annas.

Bulletin No. 32.—Contribution to the Study of the Bleaching of Lac, Part II. Factors which influence the keeping quality of bleached lac. By Narasimha Murty.

Bulletin No. 35.—Contribution to the study of the Bleaching of Lac, Part III. Factors affecting bleaching quality of seedlac. By Narasimha Murty, B. Gross and Wm. Howlett Gardner.

Bulletin No. 38.—Seedlac. Factors which affect the flow. By Wm. Howlett Gardner, L. Koprowsky and Narasimha Murty.

Bulletin No. 45.—A Comparative Study of Principal Flow Tests on Shellac. By M. Rangaswami and S. K. Gupta.

Bulletin No. 27.—A Technical Process for Washing and Refining Stick lac. By A. K. Thakur. Price 3 annas.

Research Notes—

Research Notes on Lac, Nos. 1—18—

Treatment of Shellac Varnish with Thiourea and Urea. By M. Venugopalan, S. Ranganathan and R. W. Aldis.

Utilisation of Kiri for Plastic Mouldings. By S. Ranganathan and R. W. Aldis.

Research Note No. 19.—Injection Moulding of Shellac Plastics. By S. Ranganathan.

Research Note No. 20.—Preliminary Note on the Modification of the Soft Resin in Shellac. By M. Venugopalan and H. K. Sen.

Research Note No. 21.—Shellac-Casein Moulding Powder. By M. Venugopalan and H. K. Sen.

Research Note No. 22.—Modification of Shellac and Shellac Components with Melamine and Formaldehyde. By Y. Sankaranarayanan and H. K. Sen.

Research Note No. 23.—Shellac-Coal-Tar Moulding Powder. By M. Venugopalan and H. K. Sen.

Research Note No. 25.—Manufacture of Shellac Moulding Powders. By M Venugopalan, S. Ranganathan and H. K. Sen.

Research Note No. 26.—A Note on the Use of Baking Shellac Varnishes for coating Graphite-on-Glass Resistances in the Laboratory By G. N. Bhattacharya.

Technical Notes—

Technical Note No. 1.—Some Analytical Data for Pure Shellacs.

Technical Note No. 3.—Preparation of Bleached (White) Lac. By Narasimha Murty. Price 1 anna.

Technical Note No. 4.—Improved Method of Seedlac Manufacture by the Country Process. By Ananta Krishna Thakur, Tarapado Bhowmik and H. K. Sen.

Technical Note No. 5.—Shellac Plastics. By M. Venugopalan, S. Ranganathan and H. K. Sen.

Technical Note No. 6.—Shellac-Nitrocellulose Lacquers. By M. Rangaswami.

Technical Note No. 7.—A Simple Method of Preparing Pure Resin from Shellac. By S. R. Palit.

Articles printed in other Papers and Journals—

1. The Determination of Orpiment in Shellac. By M. Rangaswami and H. K. Sen. Reprinted from the Analyst, Vol. LXIII, No. 742, pp. 36-37. January 1938.
2. Separation of Hard Lac Resin by Cold Polymerisation and Fractional Precipitation. By M. Venugopalan and H. K. Sen. Reprinted from the Journal of the Society of Chemical Industry, October 1938.
3. Shellac in Moulding and Varnishing Industries. By H. K. Sen. Industrial and News Edition of the Journal of the Chemical Society, Vol. II, No. 3, 1939.
4. Utilisation of Kiri, Part I. Black baking varnish. By Y. Sankaranarayanan and H. K. Sen.
5. Modified Shellac for Improved Moulding Powders and Varnishes. By M. Venugopalan and H. K. Sen. Reprinted from British Plastics and Moulded Products Trader, April, 1939.

Utilisation, cultivation and miscellaneous—

1. Lac Cultivation in India. (Being a second and revised edition of A Practical Manual of Lac Cultivation. By P. M. Glover, published in 1931). Price Rs. 2.
2. Uses of Lac. By H. K. Sen and S. Ranganathan. Price Rs. 1-4-0.
3. Practical Applications of Recent Lac Research. Edited by H. K. Sen. Price Rs. 1-8-0.
4. Shellac Patent Index. Compiled by R. W. Aldis. Price Rs. 2-8-0.

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(2) Published by the London Shellac Research Bureau, London.

Technical Papers—

Technical Paper No. 1.—Isolation of Pure Lac Resin. By L. C. Verman and R. Bhattacharya.

Technical Paper No. 2.—Identification and Analysis of Lac. By R. Bhattacharya.

Technical Paper No. 3.—Fundamental Physical Properties of Lac. Part I Mechanical Properties. By L. C. Verman.

Technical Paper No. 4.—Fundamental Physical Properties of Lac. Part II Thermal Properties. By L. C. Verman.

Technical Paper No. 5.—Direct Liquid Extraction Process for Pure Lac Resin. By L. C. Verman and R. Bhattacharya.

Technical Paper No. 6.—Sulphitation of Lac. By R. Bhattacharya and L. C. Verman.

Technical Paper No. 7.—Fundamental Physical Properties of Lac. Part III. Electrical Properties. By L. C. Verman.

Technical Paper No. 8.—Darkening of Lac Solutions and the Effect of Oxalic Acid thereon. By L. C. Verman and R. Bhattacharya.

Technical Papers—contd.

Technical Paper No. 9.—Plasticising Lac Films. Part I. By L. C. Verman and R. Bhattacharya.

Technical Paper No. 10.—Fundamental Physical Properties of Lac. Part IV. Optical Properties. By L. C. Verman.

Technical Paper No. 11.—Viscosity of Lac and Hard Lac Resin Solutions. By L. C. Verman.

Technical Paper No. 12.—Modification of Lac with Higher Fatty Acids and their Mixed Glycerol Esters. Part I. By R. Bhattacharya.

Technical Paper No. 13 —A new Process for Hard Lac Resin. By R. Bhattacharya and B. S. Gidvani.

Technical Paper No. 14.—Modification of Lac with Higher Fatty Acids and their Mixed Glycerol Esters. Part II. By R. Bhattacharya and B. S. Gidvani.

Technical Paper No. 15.—Shellac Esters. Esterification of Hydroxyl Groups of Lac with Acids. By R. Bhattacharya and B. S. Gidvani.

Technical Paper No. 16.—Fractionation of Lac. By R. Bhattacharya and G. D. Heath.

Technical Paper No. 17.—Ethers and Ether-Esters of Lac and their Polymerisation. By B. S. Gidvani.

Technical Paper No. 18.—Fibrous Lac. By R. Bhattacharya and G. D. Heath.

Technical Paper No. 19.—Lac-Cellulose Lacquers. By B. S. Gidvani and R. Bhattacharya.

Technical Paper No. 20.—Plasticising Lac Films. Part II. By G. D. Heath and B. S. Gidvani

(3) Published by the Shellac Research Bureau of the Polytechnic Institute of Brooklyn, New York, U. S. A.

Technical Papers—

Technical Paper No. 3.—Some Observations on the Development of Opacity in Clear Varnish Films, by Wm. H. Gardner, Ind. Eng. Chem., 23, 1402—04 (1931) ; Farben Ztg., 37, 1549 (1932).

Technical Paper No. 10.—Compatibility of French Varnish with Nitrocellulose Solutions, by Wm. H. Gardner, and B. Gross, Ind. Eng. Chem., 27, 168—170 (1935).

Technical Paper No. 11.—The Thermo-plastic Properties of Shellas, by Wm. Howlett-Gardner, and B. Gross, British Plastics and Moulded Products Trader, 6, 514-515, 529 (1935).

Technical Paper No. 12.—Improvements in the Manufacture of Shellac Insulators, by Wm. H. Gardner, Brit. Plastics and Moulded Products Trader, 6, 524-525 (1935).

Technical Paper No. 13.—Shellac Moulding Powders, by Wm. H. Gardner, B. Gross, C. C. Whipple, and M. Fasig, Brit. Plastics and Moulded Products Trader, 6, 571—574 (1935).

Technical Paper No. 14.—Determination of Insoluble Matter in Shellac, by Wm. H. Gardner, Paint and Varnish Production Mgr., 12, 8, 10, 33 (1935).

Technical Paper No. 15.—Rates of Absorption of Moisture by Shellac Films, by Wm. H. Gardner, and W. Kappenberg, Ind. Eng. Chem. 28, 437, 439 (1936).

Technical Paper No. 16.—Plastic Properties of Shellac, by Wm. H. Gardner, Physics 7, 306—310 (1936).

Technical Paper No. 18.—The Relative Effect of Structure and other Factors on the Permeability of Varnish Films, by H. F. Payne, and Wm. H. Gardner, Ind. Eng. Chem., 29, 893—898 (1937).

Technical Papers—contd.

Technical Paper No. 19.—Spray Technology for Protective and Decorative Coatings by B. Gross, Metal Cleaning and Finishing, 8, 415—418, 489—491 (1936).

Technical Paper No. 20.—A systematic Method for Evaluating Lacquer Plasticizers, by C. F. Silleck, and Wm. H. Gardner Paint Oil Chem. Rev., 99, 6-7, 27 (1937).

Technical Paper No. 24.—Shellac and Some of its Uses in Protective Coatings, by Wm. H. Gardner, Offg. Digest Fed. Paint Varn. Prod. Clubs, No. 180, 473—478, Nov. (1938) ; Drugs, Oils, Paints, 53, No. 12, 438—441, Dec. (1938)

Technical Paper No. 25.—Factors Affecting Bleaching Quality of Seed-Lacs, by N. N. Murty, B. Gross and Wm. H. Gardner, Ind. Eng. Chem., 31, No. 6, 678—680 (1938) ; Bul. 56, Indian Lac Research Institute, Technical Paper No. 25, Shellac Research Bureau Polytechnic Institute of Brooklyn.

Technical Paper No. 26.—Seed-Lac, Factors Which Affect the Flow, by Wm. H. Gardner, L. Koprow, and N. N. Murty, Ind. Eng. Chem., 31, No. 7, 817-818, July (1938) ; Bul. 38 Indian Lac Research Institute ; Technical Paper No. 26, Shellac Research Bureau, Polytechnic Institute of Brooklyn.

Technical Paper No. 27.—Dielectric Tests on Films of Shellac Varnish, by E. Ackerlind and Ernst Weber, Trans. of the Electro-Chem. Soc., 74, 141—170, Oct. (1938).

Technical Paper No. 28.—Packaging of Shellac Varnish, by P. F. Bruins, and Wm. H. Gardner, Ind. Eng. Chem., 31, No. 9, 1178—1181, Sept. (1939).

Technical Paper No. 29.—Development of Superior Shellac Varnishes, by Paul F. Bruins, Paint, Oil and Chem. Review, 101, 9—12 (1939).

Non-technical Papers—

1. How Spirit Varnishes May be Standardized, by Wm. H. Gardner, Chem. Met. Eng., 40, 144—146 (1933).
2. Official Methods of Analysis, Specifications and General Information on Shellac and Bleached Shellac. (In co-operation with the Chemists Committee of the U. S. S. I. A.) 63 pp., U. S. Shellac Importers' Association and the American Bleached Shellac Manufacturers' Association, New York (1934).
3. Bleaching Test for Seedlac. (In co-operation with the Chemists Committee of the U. S. S. I. A.) U. S. Shellac Importers Asson. and the American Bleached Shellac Manufacturers Asson., New York (1934).
4. History of shellac as a Plastic, by Wm. H. Gardner, British Plastics Moulded Trader, 6, 459-460, 484 (1935).
5. The permeability and Structure of Films, by Henry F. Payne, Offg. Digest Fed. Paint Varn. Prod. Clubs, No. 159, 297—304 (1936).
6. Shellac, the Parent of Modern Plastic Resins, by Wm. H. Gardner Paint Oil Chem. Rev., 99, 34—37 (1937).
7. Shellac, A growing Factor in Industry, Wm. H. Gardner, Modern Plastics, 15, 116-117 (1937).
8. Newer Uses for Shellac, by Wm. Gardner, Chem. Industries, Dec. 1939.

Patents—

1. Shellac Pigment Compositions, by Wm. H. Gardner, U. S. Pat. 1918504, July 18 (1933).
2. Shellac Ester Lacquers, by Wm. H. Gardner, U. S. Pat. 1910100,, May 23 (1933).
3. Process for Obtaining Shellac Compositions for Moulding, by Wm. H. Gardner, U. S. Pat. 1994071, March 12 (1935).
4. Improved Shellac Composition Containing Dicyandiamides, by Wm. H. Gardner, U. S. Pat. 2010224, Aug. 6 (1935).

Patents—contd.

5. Shellac Sulfanilic Acid Composition by Wm. H. Gardner, U. S. Pat. 2010225, Aug. 6 (1935).
6. Composition for Moulding and Protective Coating, by Wm. H. Gardner, U. S. Pat. 2010226, Aug. 6 (1935).
7. Improved Shellac Composition Containing a Polycarboxylic Organic Acid or its Anhydride, by Wm. H. Gardner, U. S. Pat. 2010227, Aug. 6 (1935).

GLOSSARY OF INDIAN TERMS.

A

Aghani .. .. Lac crop grown on *kusum* hosts named after the month of *Aghan* (Nov.-Dec.).
Arhar .. .. *Cajanus indicus*—A lac host.
Arhat .. .. Business premises of a commission agent or *arhatiya* ; commission charged by an *arhatiya* ; business carried on by a commission agent.
Arhatiya .. .. Commission agent.
Ari .. .. Lac harvested before the emergence of larvæ.

B

Babul .. .. *Acacia arabica.*
Baisakhi .. .. Lac crop grown on hosts other than *kusum*, named after the month of *Baisakh* (April--May).
Bahangi .. . A pole with arrangement for carrying loads at the two ends, the pole being balanced on the shoulder.
Baniya .. .. Village merchant who primarily trades in agricultural produce, but who is generally the village financier.
Belwaya .. .. Man who spreads the molten lac on the porcelain cylinder and stretches it into thin sheets.
Ber .. .. *Zizyphus jujuba.*
Bhatta .. .. A Dutch, oven-shaped fire for melting lac.

C

Chakki .. .. A stone-mill.
Charpoy .. .. A bedstead.
Chowri .. . Vernacular name for seedlac.

D

Dalal .. .. A broker.
Dalali .. .. Brokerage.
Dandi .. .. A wooden stick from the ends of which the pans of a handscale are suspended.
Dhalta .. .. Draftage or weighment allowance in favour of the buyer.
Dharmada .. .. A deduction for charity.
Dasturi .. .. A rebate paid to the buyer by the seller.

F

Fatka .. .. A "futures" transaction ; speculation.

G

Gaushala .. .. An institution providing free shelter for old, decrepit and invalid cows ; a deduction made for *gaushala.*
Ghasandar .. .. Man who stands in the washing vat and rubs the crushed lac against the sides with his feet.
Ghont .. .. *Zizyphus xylopyra.*
Gur .. .. Unrefined sugar.

H

Hammal .. .. A market labourer.
Hammali .. .. Wages charged by *hammal.*
Hat .. .. A periodical market.
Hundi .. .. A bill of exchange or draft.
Hundikar .. .. A forwarding or clearing agent.

J

Jalari .. .. *Shorea talura.*
Jalpani .. .. Literally light refreshments ; a charge for *jalpani.*
Jethwi } .. .. Lac crop grown on *kusum* hosts named after the month
Jethua } .. .. *Jeth* (May-June).

K

Kachcha	..	Literally "raw" and "unfinished". The word has a wide range of meaning, *e.g.*, a *kachcha* road is an unmetalled road ; *kachcha arhatiya* is a trader of small means dealing in agricultural produce before it is bagged or made ready for final sale.
Kamdar	..	Demonstrator.
Karigar	..	Literally a trained person ; Man who carries out the melting of the seedlac.
Katki	..	Lac crop grown on hosts other than *kusum* named after the month *Katik* (October-November).
Khair	..	*Acacia catechu.*
Khas Mahal	..	Government owned.
Kiri	..	A by-product obtained in melting lac, being the refuse left in the cloth bags.
Kusum	..	*Schleichera trijuga.*
Kusmi	..	Derived from *kusum* ; lac crop grown on *kusum* hosts named after the tree ; synonymous with *Aghani.*

M

Machan	..	A raised platform.
Mahajan	..	Moneylender or banker.
Mana	..	Residue obtained after boiling stick lac with a particular bark and soda to extract colouring matter.
Molamma	..	Finely divided dust like material obtained from stick lac and seedlac.
Muddat	..	Literally "period". A deduction made by the *arhatiya* to cover the loss of interest on money which he pays in advance to his seller-client.
Munim	..	A shop assistant, usually a clerk who handles accounts.
Munimi	..	A deduction made for *munim* (clerk).

N

Nand	..	A cup-shaped stone or cement vat in which the crushed stick lac is washed for the preparation of seedlac.
Note batta	..	Deduction made for making payment in silver and not currency notes.

P

Paikar	..	An itinerant merchant.
Pakka	..	Literally true, mature or real. A *pakka arhatiya* is a true wholesaler. A *pakka* road is a metalled road.
Palas	..	*Butea frondosa.*
Palledar	..	A market labourer.
Palledari	..	Wages charged by a *palledar.*
Passewa	..	By-product obtained from the cloth bag used for melting lac after boiling it in dilute soda solution.
Pathshala	..	A school ; a deduction made for a *pathshala.*
Phirwaya	..	Boy who twists the cloth bag containing seedlac over the *bhatta* during the melting process.
Phunki Phoonki,	..	Lac harvested after the emergence of larvæ.
Pinjrapole	..	See *gaushala.*

R

Rangeen	..	Another name for *katki* crop.

S

Sahukar	..	A moneylender.
Shroff	..	An indigenous banker.

T

Tola	..	A weighman ; (also the weight of a rupee).

Z

Zamindar	..	A landlord.

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