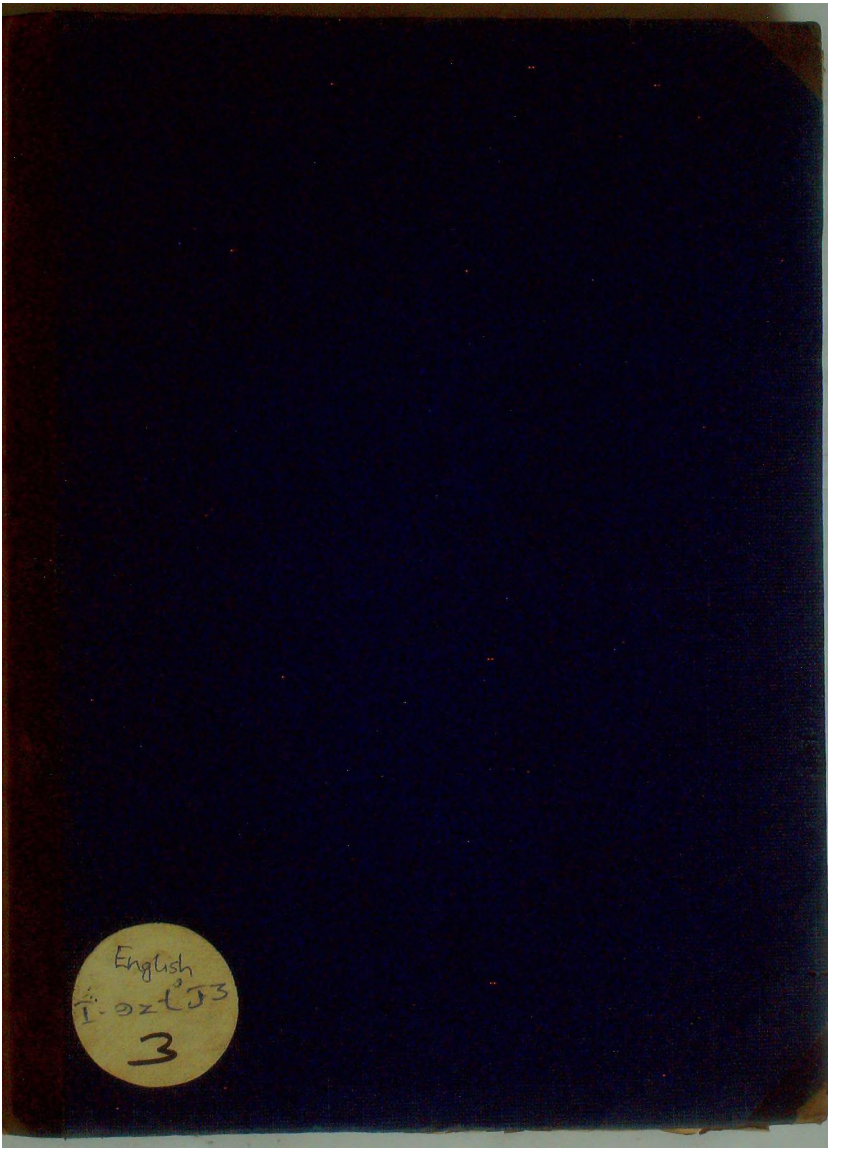

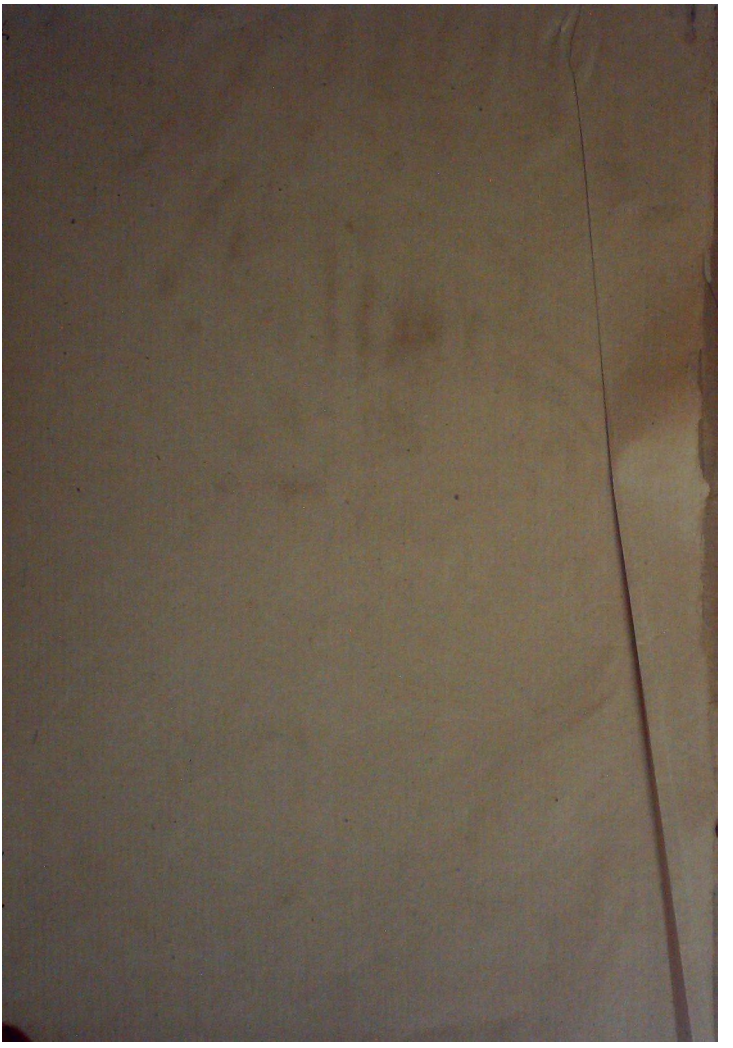

Vol. III. No. 1.
JULY 1953.

THE
INDIAN RUBBER BOARD
BULLETIN

CONTENTS

INDIAN CENTRAL ARECANUT COMMITTEE

Award of a Prize (Rs. 2000/-) for Invention of Time-saving Machinery for Husking and Slicing Arecanuts.

The Indian Central Arecanut Committee has fixed 30th September, 1953, as the last date for submitting entries to the competition for the invention of the time-saving machinery for husking and slicing arecanuts. A panel of judges will scrutinise the machinery at such time and place as the Committee may decide. All competitors may send in their entries to the Secretary, Indian Central Arecanut Committee, Kozhikode, before 30th September, 1953.

THE INDIAN RUBBER BOARD

Members as at July, 1953

Mr. A. V. Thomas, Chairman. Mr. A. V. George, Vice-Chairman. Mr. M. C. Chandy.	Nominated by the Rubber Growers' Association of India to represent Rubber Growing Industry.
Mr. S. Bhoothalingam, I. C. S., Jt. Secretary, Ministry of Commerce and Industry. Mr. S. V. Ayyar, Chief Cost Accounts Officer, Ministry of Finance. Dr. B. N. Uppal, Aggrl. Commissioner with the Government of India.	Nominated by the Central Government to represent the Ministry of Commerce and Industry.
Mr. M. S. Sivaraman, I. C. S., Director of Agriculture, Madras. Mr. A. M. M. Murugappa Chettiar.	Nominated by the Government of Madras to represent that Government.
Mr. S. Govinda Menon, District Collector, Kottayam. Mr. K. Narayana Menon, Addl. Secretary to Government, T. C. State. Mr. C. Thomas, Director of Agriculture, T. C. State. Mr. K. V. Mathew. Mr. T. V. Kochuvareed.	Nominated by the Government of Travancore-Cochin State, to represent that Government.
Mr. B. H. Whitehorn. Mr. K. Srinivasan. Mr. L. Aldred.	Nominated by the United Planters' Association of Southern India to represent the Rubber Growing Industry.
Mr. P. Kurian John. Mr. A. V. John. Mr. A. M. B. Clarke.	Nominated by the Association of Planters of Travancore, to represent the Rubber Growing Industry.
Mr. P. N. Haksar.	Nominated by the A. R. M. I., Calcutta, to represent manufacturers.
Mr. Lalit Mohan Jamnadas.	Nominated by the I. R. I. A., Bombay, to represent manufacturers.
Mr. A. G. Shah.	Nominated by the Central Government to represent manufacturers.
Mr. T. C. Cherian.	Nominated by the Central Government from among rubber dealers.
Mr. C. E. Bharathan. Mr. K. Karunakaran. (vacant)	Nominated by the Central Government to represent labour.
The Rubber Production Commissioner, (Mr. K. N. Kaimal)	Ex-officio

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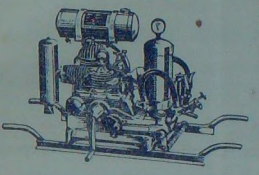

with a 5-6 H.P. petrol/power kerosene air cooled two-stroke engine, high pressure twin pump, horizontal pistons, sturdy construction, fitted on portable stretcher — all parts easily accessible. Weight 173 lbs. Pressure 470 — 515 lbs/sq. in. Capacity 7 — 8 gins/min. Fuel consumption about 2 gallons per 8 hours. Capable of working up to 22 spraying lances. Provision for attaching power take-off pulley, distribution battery and 70 mm pistons for water pumping.

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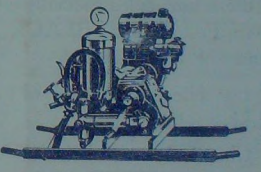
specially designed to meet the requirements of smaller estates and to work in conditions which call for highest mobility — 2 H.P. four-stroke single cylinder petrol engine, high pressure twin pump. Weight 109 lbs. Pressure 367—440 lbs/sq. in. Capacity 3 — 4 gins/min. Fitted on portable stretcher. Fuel consumption about ¾ — 1 gallon per 8 hours. Capable of working 6 — 8 spraying lances.



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THE

INDIAN RUBBER BOARD

BULLETIN

Vol. III. No. 1. JULY 1953.

NOTE ON CHOICE OF RUBBER PLANTING MATERIAL

Thanks to the foresight of many progressive rubber companies and proprietory planters, most of the older proved clones as well as some of the new promising rubber planting materials have been imported from time to time and planted out in different planting districts in South India. Many of these areas are already under tapping, and yield records for short or long periods are available from some of them. In a few estates, yield records of most of the proved and promising materials are available. But in other localities such comprehensive records are not available, and so a strict comparison or evaluation of the performances of the different planting materials is difficult.

An examination of available yield records from the different planting districts, however, show that the performances of the proved clones and clonal seedling families established in India are more or less on similar lines to those in countries like Malaya and Ceylon. For example, the three older proved clones—Tj. 1, P. B. 86 and G. 1 and the P. B. 1. G. and Tj. 1 clonal seedlings recommended for large-scale planting in other countries are, with a few exceptions, found to be the common highest yielding proved material in South India also. In the absence of results of standard tests of the planting materials locally, therefore, the risk involved in choosing the materials recommended in the above countries may not be great.

A number of new promising foreign clones are also available in India some of which may prove superior to the older proved clones. To assess correctly the value of these clones under local conditions, it is essential that these should also be tested on a small scale in future plantings not only in different districts but in each estate. By this, individual estates will, in due course, gain sufficient experience to decide which clone or which family of clonal seedling is best suited to the particular estate land. As regards the proportion of such plantings to proved clones and clonal seedlings, the Rubber Research Institute of Malaya suggests "that 80% of the land to be planted should be allocated to the material recommended for large scale planting and not more than 20% of the land available should be allocated to material recommended for small-scale planting." They also suggest "that as many half acre, or one acre, or one tapping task size blocks be planted with this material as can be arranged up to the limit of 20% of the land being planted; and

that with these blocks, a similar sized one be planted with a clone known either to do the best on the estate, or to be the best in the district. Though this arrangement will not allow statistical comparisons of results, the performance of the proven clone will offer some standard for evaluating the performance of the other material." (R. R. I Circular No. 37).

Clones and Clonal Seedlings.

On this subject, there are two schools of opinion in this country also. One favours budding with proved clones and the other proved clonal seedlings. The recommendations of the Rubber Research Institute of Malaya in this regard are as follows:—

"We recommend clones and clonal seedlings impartially. While it appears from our records that the newer proved clones recommended yield more per acre than the clonal seedlings recommended, yet we are aware that certain advantages are attached to clonal seedlings as a planting material. Furthermore, the results of our hand pollination programmes show that certain clonal seedling crosses, as yet unexploited may be high yielders. We have endeavoured to include sources of these in our small scale recommendations."

In South India, the P. B. I. G. (Plots 'C', 'D' and 'E') seed has been, and is still, very popular and some areas planted with this material are under tapping now. Practically all these plantings are doing well. Early records of Tj. 1 clonal seedlings are also good. We have been in recent years, recommending both these materials for large-scale planting and as the supply of the former, which has to be imported from Malaya is limited, the demand for the latter has increased very considerably. As to whether clones, or clonal seedlings are to be chosen for planting under the climatic conditions obtaining in S. India, no definite recommendations can be made until the many areas planted with them are tapped and their performances closely studied. For the present, however, we recommend clonal seedlings for use by small holders unless they prefer budding with clones which are showing some resistance to leaf diseases, and both clones and clonal seedlings by estates.

Other Considerations.

Climatic and soil conditions vary considerably in the main planting districts which extend from Nagercoil in the South to Coorg in the North. These exert considerable influence on the growth, bark renewal and yield of rubber. Dry conditions are not conducive to normal growth and bark renewal of the rubber tree and the yields of some clones fall sharply during dry spells. Continuous monsoon rains encourage the development and spread of *Phytophthora* leaf disease and also interfere with tapping, resulting in the loss of a large number of tapping days. In the South, rainfall is somewhat more evenly distributed than in the Central and Northern districts. Towards the North, particularly in North Malabar, a longer dry season usually obtains. While the rates of growth and yield are generally the best in some localities of South Travancore, these decrease progressively in the districts towards the north according to the severity of the drought. Further, the main problem in respect of leaf disease in the South is *Oidium*. *Phytophthora* gives little trouble there. Both these diseases occur in somewhat equal degrees in the border localities between the Southern and Central districts. In the Central and Northern districts the attack of *Oidium* is generally

very mild and only sporadic but *Phytophthora* disease is the main problem. Therefore, in the choice of planting material for planting in different districts, due consideration should be given to resistance of the material to the above leaf diseases and to drought. Finally, the important question of eventual processing of the crop, as smoked sheet, crepe or preserved latex, should also be considered. Latex of certain clones which is yellowish is not suitable for processing into pale crepe, unless it is treated for bleaching. Similarly, latex of some clones is mechanically unstable and therefore not suitable for concentration without special treatment.

In the case of clonal seedlings, to obtain good results, it is necessary that they should be planted initially at a higher density, say at 200 to 250 trees per acre, and the stand reduced to 150 per acre in the 6th or 7th year, by thinning out the low yielders. The yielding capacities may be determined roughly by test tapping the trees over a short period, in the 5th or 6th year.

Estates which have planted and have under tapping the older proved clones, clonal seedlings and the new promising clones, should have gained sufficient experience of their performances on their land. For them the problem is simple and they can choose the best material suited to the particular land from among these. Estates in the same locality or district having similar conditions as in the above category but have not had the knowledge of the performances of all or any of the planting material listed here may benefit by consulting the above estates in the choice of clones or clonal seedlings for planting in that locality. Estates which do not come under these categories should be very few. Such estates should exercise great care in the choice of clones.

Those who find difficulty in the choice of suitable planting material may write to the Indian Rubber Board for advice in the matter.

General Recommendations

Clones recommended for large-scale planting.

Among proved clones available in India we recommend the following clones for large scale new-planting and replanting in South India. Notes on the general habits and behaviour of these clones described in the Rubber Research Institute of Malaya Circular No. 36 are quoted first and notes on local experience described next. These together with his own experience should help the planter in choosing the best clone suitable for planting on his land.

(1) *Clone Tjirandji 1—(Tj. 1, also called T. J. R. 1 in South India).*

"This clone is a vigorous grower. Owing to its vigour, and to the development of a heavy fork, it may prove susceptible to wind damage on fertile soil because of its rapid growth. Also, on high water table soils it may be unable to form a sufficient depth of rooting to provide anchorage for the support of its heavy crown in high winds. We thus do not recommend it for planting in exposed positions nor on coastal alluvial soils, unless it is already known to do well at the particular locality. On inland soils, and on the poorer soils generally, this clone still remains one of the best of the older proved clones."

"Its latex is yellow, a disadvantage which may be overcome by a simple bleaching treatment*; untreated crepe is pale yellow, but of good hardness. In its first year of tapping, the latex may have a low D. R. C."

* See Rubber Research Institute of Malaya Circular No. 35, "Application of the R. R. I. leaching process to the preparation of white latex crepe."

In India the rate of growth of rubber, generally, is slower than that in Malaya and Indonesia. Hence the trees are generally found to be stronger and less susceptible to wind damage than in the above countries. However, precautions are necessary. In areas planted at a comparatively higher density, 150–180 trees, a closed canopy of foliage is formed at an early stage. In ordinary storms the dense canopy is able to resist the wind which may, therefore, pass over it. Damage may occur only on the unprotected edges or where gaps in the stand occur. The dense shade from the leaf canopy usually kills some of the lower branches, thus reducing the volume of the crown. Careful pruning of the stronger branches from an early stage should also reduce the risks of wind damage in the case of this clone.

Clone Tj. 1 is found to be very sensitive to differences in climatic conditions, yields declining to a very low level during the hot, dry season. But the yields rise up sharply during the wet and cold seasons so that a high average for the year is generally maintained. In districts of Malabar where long spells of severe drought usually obtain, the choice of this clone should be made after careful consideration.

(2) *Clone Prang Besar 86 (P. B. 86).*

"This clone is of moderate vigour, and should only be planted on the better soils. Subject to this restriction its yields are consistently good, both on inland and coastal estates. Its light crown makes it suitable for planting in exposed places where other clones with a heavier habit might suffer wind damage."

"The latex is white and is favoured for the manufacture of sole crepe, the hardness of this latter being comparable with that from Tj. 1."

In India, clone P. B. 86 has not been planted so extensively as Tj. 1. Yield records are available only from a few districts which show wide variations. This clone is a prolific seeder and begins to produce pods from a comparatively early age. The incidence of *Phytophthora* leaf disease from an early age is, therefore, very high in this clone. Thorough spraying with Bordeaux mixture, more than once, if necessary, will be required to control the disease. Where the disease is not properly controlled, growth and yield have been found to be adversely affected. On the other hand, owing to its early wintering habit, the incidence of *Oidium* leaf disease in this clone is reported to be rather mild. This clone, therefore, appears to be more suitable for localities where *Phytophthora* disease is absent as in South Travancore.

(3) *Clone Glenshiel 1 (G. 1).*

"This is a moderately vigorous to vigorous clone with a graceful well-shaped crown. It is well-suited to alluvial clay soils, but also grows well inland. In its first year of tapping, it is an unusually high yielder, but the yield generally falls in subsequent years, some times to only 50% of its original yield. This tendency has only recently become clear to us, and it appears that the fall in yield may be independent of other factors, and precocity may be inherent in the clone. We await further results to conform our opinion."

"The clone is unsuited to full-spiral tapping, and there is frequently an onset of brown bast on any form of 100% tapping. Good yields, however, have been reported from 67% intensity tapping system, though it is suspected that yields may

still decline on non-periodic 67% tapping system. In view of the suspected inherent precocity and the predisposition to brown bast, it is with some reserve that we continue to recommend this clone for large-scale planting. It may be possible to decide finally the value of this clone within the next two or three years, after further observations."

"The latex is mechanically unstable and not suitable for concentration without special treatment."

In some localities in South India, this clone is reported to have maintained its high yield at 67% intensity tapping systems, but yield records over a sufficiently long period are not available in other districts. This clone is also reported to be slightly sensitive to dry conditions but not to the same extent as clone Tj. 1. Compared to P. B. 86 and Tj. 1, incidence of *Phytophthora* leaf disease is very low in this clone, which is a point in favour of its choice.

However, in view of the reserve with which the R. R. I. of Malaya now recommends it for large scale planting, local estates are advised that this clone should be chosen for large scale planting only if it had maintained its high yield over a number of years in the particular district.

(ii) Clones Recommended for Small Scale Planting.

The following new and promising clones which are available in India or may be imported from their country of origin are recommended for trial on a small scale (observation plots) in all rubber estates.

AVROS 255—Country of origin : Indonesia.

A vigorous growing clone with rather thick smooth bark. Bark renewal of trees tapped for 2 years is found to be very satisfactory. Average yields per tree per tapping recorded on a half-acre plot in the Punalur district in the 8th and 9th years after planting are reported to be outstanding compared to the 3 older proved clones at corresponding ages. The favourable situation of the trees on the estate may be partly responsible for the very high yields.

At the Nivitigalakele (Experiment Station of the Rubber Research Institute of Ceylon) in a clone trial experiment* the yield of this clone over a period of 5 years amounted to the same as R. R. I. 501 and was about 24% more than that of one of the controls : Clone Tj. 1. The brown bast cases recorded were 8 out of 24 trees compared to 4/22 and 5/23 respectively in the case of the latter 2 clones under normal alternate daily (s/2, d/2, 100%) tapping. No such high susceptibility to brown bast has been noticed during the two years of tapping of this clone at Punalur.

This clone is recommended for large scale planting in Sumatra and West Java. It is reported to be 'somewhat' subject to wind damage which is limited to branches only. The damaged branches recover quickly.

AVROS 255 appears to be a shy seeder and the incidence of *Phytophthora* leaf disease in this clone is found to be rather light. It is, therefore, one of the most promising new clones for trial in the *Phytophthora* districts.

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* Report of the Work of Rubber Research Board in 1951. (R. R. I. C.) Table V: Page 21.

(iv) **Clonal Seedlings recommended for small scale planting.**

(*1*) *Prang Besar* (*P. B.*) "*Preliminary Proof*" *Seed and* "*Further Proof*" *Seed.*

The former variety is reported to be seed from selected new clones made from artificial crosses between proved parent clones and the latter from a second selection based mainly on yield and secondary characters of the best clones in the preliminary proof garden areas. These seeds, it is claimed, may prove to be of superior quality. No yield records of these seedlings from commercial plantings are yet available. Until, however the value of the seeds from these gardens are proved by yield records, we can only recommend them for small scale planting.

(*2*) *Chemara Garden* '*B*' *seeds.*

The clones used in this garden are Tj. 1 and AVROS 157, which have been found to be excellent parents in hand pollination experiments at the R. R. I. of Malaya.

(*3*) *Chemara Garden* '*E*' *seeds.*

The parent clones in this garden are BR 2, Tj. 1 , Pil. B. 84, Lunderston N and P. B. 86 ; all except the last one, are good parents.

Orders for the seed should be placed through the Agents, Messrs. Guthrie & Co. Ltd., Kuala Lumpur, Malaya.

Clone Abbreviations.

The R. R. I. of Malaya has recently presented tentative proposals for the standardisation of abbreviations of clone designations (Planters' Bulletin. New Series No. 7. pp. 85—87) for international acceptance. According to this the only changes in the nomenclature of clones mentioned in the above note are : Tjir 1 for Tj. 1 and Gl 1 for G. 1.

STIMULATION OF YIELD OF RUBBER TREES*

It is now an established fact that the yield of rubber trees can be increased either by treatment of the bark below the tapping cut with yield stimulating mixtures containing a hormone or by injection of copper sulphate in holes bored into the trees at the level of the tapping cut. For how long increased yields can be maintained with repeated application of these treatments, without some reaction such as increased brown bast incidence or retardation in growth and bark renewal, cannot be foretold as all experiments are of relatively recent date.

All the experiments but one on the R. R. I. Experiment Station have been carried out on seedling trees and although we have collaborated in estate experiments on budded trees, no general information can yet be given on the reactions of different clones to yield stimulants. Work on this subject is in progress. Interaction of tapping systems with application of yield stimulating mixtures has been studied only in relation to slaughter tapping systems. We have no informa-

(* Reproduced from the Planters' Bulletin of the Rubber Research Institute of Malaya. New Series Number 7, July 1953).

tion yet concerning the effect of yield stimulants on trees tapped on full circumference or periodic tapping systems, as in all our experiments from which results are available the trees have been tapped on the standard system of alternate daily tapping on a half circumference cut (S/2. d/2. 100%).

Stimulation by Injecting with Copper Sulphate

Injection of copper sulphate into rubber trees as a means of increasing the yield has certain disadvantages and cannot be recommended for use in general practice although satisfactory yield increases (albeit smaller than those obtained by treating bark below the tapping cut with certain yield stimulating mixtures) have been obtained by this method. The main disadvantages of the copper sulphate injection method are:

(a) The damage to bark and wood even when the operation of injection is carried out with the greatest possible care. The bark, cambium and wood around and at some distance from the injection hole are killed by the copper sulphate.

(b) The laborious and costly procedure of boring holes into trees by hand auger which on a large scale would not be economic unless it is carried out by means of mechanically operated drilling equipment.

(c) The possible contamination of the latex with copper, the adverse effects of which may have serious and far reaching consequences. Although in a series of carefully controlled experiments carried out at this Institute two injections of 10 grams per tree of copper sulphate made at six months' intervals did not result in an appreciable increase of the copper content of the latex concentrates, which remained well within the limit of 10 parts per million of copper stipulated by the American Society for Testing Materials. Adherence to this specification is a normal condition of a contract to supply latex concentrates to the United States of America.

Danger lies in accidental contamination of the latex by spilling of copper sulphate on to the tapping cut, spout or into the cup in the course of applying the injection treatment on a commercial scale. The Rubber Manufacturers' Association of New York has specified that no RMA grade of rubber may contain more than 8 parts per million of copper because of the catalytic effect that copper has upon the rate of oxidation of the rubber, as rubbers which contain amounts of copper appreciably in excess of the specified limits rapidly soften and become sticky and this effect may persist after the raw rubber has been converted into manufactured articles. Eight parts per million of copper in the finished rubber is equivalent to an addition of only two ounces of copper sulphate to 1000 gallons of field latex.

It is clear therefore that copper treatment of the trees must not result in an increased copper content of the latex beyond the specified limits, no matter what its beneficial effect may be.

Stimulation by treatment of the bark with mixtures containing Hormones

In this brief account only those mixtures which are either readily obtainable or easily prepared are mentioned. A full account of our work on yield stimula-

tion from 1940 onwards will be given in a forthcoming issue of the Journal of the Rubber Research Institute of Malaya but in this note only the main results of our post-war experiments are considered. In addition to the two proprietary mixtures available in Malaya, namely Stimulex and Eureka, we have used in our experiments different concentrations of the sodium salt of 2, 4-dichlorophenoxy acetic acid as water in palm oil emulsions. In more recent experiments we have used the n-butyl ester of 2, 4—dichlorophenoxy acetic acid which, unlike the sodium salt, is readily soluble in palm oil and consequently does not require the rather tedious emulsification procedure. Both the sodium salt and the n-butyl ester of 2, 4-dichlorophenoxy acetic acid in concentrations of 1 to 2 per cent in palm oil have been shown to be effective yield stimulating mixtures.

Method of application—The mixture is normally applied to a three inch wide strip of lightly scraped bark immediately below the tapping cut. Buddings must be scraped very carefully and only the dead outer bark tissues may be removed. Seedlings may be scraped deeper than budded trees but no more than a few pin points of latex should exude as a result of scraping, for our pre-war experiments have shown that too deep scraping may lead to a marked decrease in yield. The beads of latex exuding from the lightly scraped bark are allowed to coagulate (10 to 15 minutes) and the scraped surface is wiped clean before the mixture is applied to it. A flat paint brush of about 2 inches in width has proved convenient in our experiments, and great care should be taken to apply the mixture thinly and evenly. A thick coating not only fails to raise the yield increase but may damage the scraped bark seriously or even kill it.

We have found it satisfactory in practice to use a gang of five labourers with four men to do the scraping and one man to apply the yield stimulant to the scraped bark; the former working along a row of trees, one row to each man, and the latter working across the rows. Depending on the size of the trees such a gang can cope with 400 to 600 trees per day and about one gallon of the yield stimulating mixture is sufficient to treat 800 to 1000 trees.

From these figures the cost of application per tree can be easily calculated if the price of the mixture is known. With half circumference tapping and using a proprietary mixture this works out at 5 to 7 cents per tree depending on the girth of the trees and the cost of labour.

Frequency of application.—Trees in normal commercial tapping should not be treated more often than once in six months as more frequent application may result in a decrease in yield after some time.

Yield increase—The increase of yield as a result of application of a yield stimulant would depend on the clone or seedling family and on the growing conditions. Our experiments have been carried out on the R. R. I. Experiment Station on planting material which yields about 1000 lb./acre/year. Even on this high yielding material good yield increases have been obtained, which in our oldest post-war experiment were, over a period of 1½ years, on the average between 20 to 30% above the normal yield level. No increase of brown bast incidence or other detrimental symptoms have been observed so far in any of our experiments. In one experiment carried out on an estate on old seedling material yielding less than 500 lb./acre/year a mean yield increase of approximately 75% has been obtained over a period of 14 months, by application of a yield stimulant once in seven months.

The effect of an application of yield stimulating mixture does not usually last longer than 3 months after which the yield is back to normal as, indeed, was shown in our pre-war experiments. In none of our experiments on seedling trees has the yield dropped below the normal level.

Late Dripping—The increase in yield is largely due to a longer period of latex flow and consequently it is recommended that the latex be collected at least one hour after normal time of collection, when there may be many trees in which dripping continues at a very slow rate which would not justify a longer postponement of collection.

Effect on bark—Application of all the above mentioned yield stimulating mixtures causes an increase in bark thickness on the lower part of treated strip of bark below the cut. The increased thickness, due to highly active cell division in the bark, shows up clearly two months after treatment in the outer cortical region of the bark which is not latex bearing. This may even result in a loss of crop if the tapper maintains the same depth of tapping so that a larger number of the most productive inner rows of latex vessels are not opened.

Conclusions

1. Copper sulphate should not be used for stimulating the yield of rubber trees.
2. Both proprietary mixtures and the sodium salt or n-butyl ester of 2, 4-dichlorophenoxy acetic acid (2, 4-D) at concentrations of 1 to 2 per cent in palm oil, have given large increases in yield.
3. As long term results are not yet available we advise caution in the use of yield stimulants on high yielding clones or seedling families.

RULES UNDER THE MINIMUM WAGES ACT

[For the information of rubber growers we reproduce below relevant extracts from :—

(1) The Travancore-Cochin Minimum Wages Rules, 1951 ;

(2) Travancore-Cochin Government Notification L. 1—9632/51/DD dated 30th June, 1952 ; and

(3) Travancore-Cochin Government Notification No. L. 1—9632/51/DD dated 1st May 1953.

relating to conditions of employment of workmen in plantations.]

(1) TRAVANCORE-COCHIN MINIMUM WAGES RULES, 1951

RULES UNDER THE MINIMUM WAGES ACT, 1948

(Central Act XI of 1948)

* * * *

CHAPTER IV

Computation and Payment of Wages, Hours of Work and Holidays

20. *Mode of computation of the cash value of wages.*—The retail prices at the nearest market shall be taken into account in computing the cash value of wages paid in kind and of essential commodities supplied at concession rates,

This computation shall be made in accordance with such directions as may be issued by the Government from time to time.

21. Time and conditions of payment of wages and the deductions permissible from wages.—(1) (i) The wage period with respect to any scheduled employment for which wages have been fixed shall not exceed one month and the wages of a worker in such employment shall be paid on a working day—

(a) in the case of establishments in which less than one thousand persons are employed, before the expiry of the seventh day, and

(b) in the case of other establishments, before the expiry of the tenth day after the last day of the wage period in respect of which the wages are payable.

(ii) Where the employment of any person is terminated by or on behalf of the employer, the wages earned by him shall be paid before the expiry of the second working day after the day on which his employment is terminated.

(iii) The wages of an employed person shall be paid to him without deduction of any kind except those authorised by or under these rules.

Explanation.—Every payment made by the employed person to the employer or his agent shall, for the purpose of these rules, be deemed to be a deduction from wages.

(2) Deductions from the wages of a person employed in a scheduled employment shall be of one or more of the following kinds, namely :—

(i) fines ;

(ii) deductions for absence from duty ;

(iii) deductions for damage to or loss of goods expressly entrusted to the employed person for custody, or for loss of money for which he is required to account, where such damage or loss is directly attributable to his neglect or default ;

(iv) deductions for house accommodation supplied by the employer ;

(v) deductions for such amenities and services supplied by the employer as the Government may, by general or special order, authorise ;

Explanation.—The words 'amenities and services' in this clause do not include the supply of tools and protectives required for the purposes of employment.

(vi) deductions for recovery of advances or for adjustment of over-payments of wages :

Provided that such advances do not exceed an amount equal to wages for two calendar months of the employed person and, in no case, shall the monthly instalment of deduction exceed one-fourth of the wages earned in that month.

(vii) deductions of income-tax payable by the employed person ;

(viii) deductions required to be made by order of a court or other competent authority ;

(ix) deductions for subscriptions to, and for repayment of advances from any Provident Fund to which the Provident Funds Act, 1925 (Central Act XIX of 1925) applies or any recognised Provident Fund as defined in Section 58A

of the Indian Income Tax Act, 1922, or any Provident Fund approved in this behalf by the Government during the continuance of such approval;

(x) deductions for payment to Co-operative Societies or to a Scheme of Insurance approved by the Government;

(3) Any person desiring to impose a fine on an employed person or to make a deduction for damage or loss caused by him shall explain to him personally and also in writing the act or omission or the damage or loss in respect of which the fine or deduction is proposed to be imposed or made and give him an opportunity to offer any explanation in the presence of another person. The amount of the said fine or deduction shall also be intimated to him

(4) The amount of fine or deduction mentioned in sub-rule (3) shall be such as may be specified by the Government. All such deductions, and all realisation thereof shall be recorded in a register maintained in Forms I, II and III, as the case may be. A return in Form III shall be submitted annually by the employer.

(5) The amount of fine imposed under sub-rule (3) shall be utilised in accordance with the directions of the Government.

(6) Nothing in this rule shall be deemed to affect the provisions of the Payment of Wages Act, 1936 (Central Act IV of 1936).

22. Publicity to the minimum wage fixed under the Act. Notices containing the minimum rates of wages fixed together with extracts from the Act, the rules made thereunder and the Name and Address of the Inspector shall be displayed in English and in the language understood by the majority of the workers in the employment at such place as may be selected by the Inspector and shall be maintained in a clean and legible condition.

23. Weekly Holidays—(1) Unless otherwise permitted by the Government, no worker shall be required or allowed to work in a Scheduled employment on the first day of the week (hereinafter referred to as the said day) except when he has or will have a holiday for the whole day on any of the five days immediately before or after the said day for which he shall receive payment equal to his average daily wages during the preceding week;

Provided that the weekly holiday may be substituted by another day:

Provided further that no substitution shall be made which will result in any worker working for more than ten days consecutively without a holiday for a whole day;

(2) Where in accordance with the provision of sub-rule (1), any worker works on the said day and has had a holiday on one of the five days immediately preceding it, the said day shall, for the purposes of calculating his weekly hours of work, be included in the preceding week.

Explanation:—For the purposes of this rule 'week' shall mean a period of seven days beginning at midnight on Saturday night.

24. Number of hours work which shall constitute a normal working day. (1) The number of hours which shall constitute a normal working day shall be—

(a) in the case of an adult, 9 hours ;

(b) in the case of a child, 4½ hours.

(2) The period of work of an adult worker each day shall be so fixed that no period shall exceed five hours and that no worker shall work for more than five hours before he has had an interval for rest of at least half an hour.

(3) The period of work of an adult worker shall be so arranged that inclusive of his intervals for rest under sub-rule (2) they shall not spreadover more than ten and a half hours in any day :

Provided that the Inspector may, for reasons to be specified in writing, increase the spreadover to twelve hours.

(4) The number of hours of work in the case of an adolescent shall be the same as that of an adult or a child according as he is certified to work as an adult or a child by a competent medical practitioner approved by the Government.

(5) The provisions of sub-rules (1) to (4) shall, in the case of workers in agricultural employment, be subject to such modifications as may, from time to time, be notified by the Government.

(6) Nothing in this rule shall be deemed to affect the provisions of the Factories Act, 1948.

25. *Extra Wages for Overtime.* (1) When a worker works in an employment for more than nine hours on any day or for more than forty-eight hours in any week, he shall, in respect of overtime work, be entitled to wages.

(a) in the case of employment in Agriculture, at one and a half time the ordinary rate of wages ;

(b) in the case of any other scheduled employment, at double the ordinary rate of wages.

Explanation :—The expression "Ordinary rate of wages" means the basic wages plus such allowances including the cash equivalent of the advantages accruing through the concessional sale to the person employed of foodgrains and other articles as the person employed is for the time being entitled to but does not include a bonus.

(2) A register showing overtime payments shall be kept in Form IV.

(3) Nothing in this rule shall be deemed to affect the provisions of the Factories Act, 1948.

26. *Form of registers and records.* (1) A register of Wages shall be maintained by every employer and kept in such form as may be notified by the Government and shall include the following particulars.

(a) The gross wages of each person employed for each wage period ;

(b) All deductions made from wages, with an indication, in each case, of the kinds of deductions mentioned in sub-rule (2) of rule 21 ;

(c) The wages actually paid to each person employed for each wage period and the date of payment.

(2) Wages slips containing the aforesaid particulars and such other particulars as may be notified by the Government shall be issued by every employer to every person employed by him at least a day prior to the disbursement of wages.

(3) Every employer shall get the signature or the thumb impression of every person employed on the wages book and wage slip.

(4) Entries in the wage books and wage slips shall be authenticated by the Employer or any person authorised by him in this behalf.

(5) A Muster Roll shall be maintained by every employer and kept in Form V.

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(2) GOVERNMENT OF TRAVANCORE-COCHIN

Notification

L. 1-9632/51/DD. 30th June 1952.

In exercise of the powers conferred on them by clause (a) of sub-section (1) of Section 3 read with clause (iii) of sub-section (1) of Section 4 of the Minimum Wages Act, 1948, (Central Act XI of 1948), and after considering the advice of the Committee appointed under clause (a) of sub-section (1) of Section 5 of the said Act, Government are pleased to fix hereby the minimum rates of wages, as specified in the Schedule hereto annexed, which shall be payable to the classes of employees in the Plantations mentioned thereunder.

This Notification shall come into force on and from 30th June 1952.

SCHEDULE

I. *The Minimum Time Rates.*

	Basic wages.	*D. A.*	*Total wages.*
	Rs. as. p.	Rs. as. p.	Rs. as. p.
(a) *Field workers* :—			
Men	0 15 0	0 10 6	1 9 6
Women	0 11 3	0 8 0	1 3 3
Children	0 7 6	0 5 3	0 12 9
(b) *Factory workers* :—			
Men	1 1 0	0 12 0	1 13 0
Women	0 13 0	0 9 0	1 6 0

(c) *Adolescents.* So long as the existing Rules under the Minimum Wages Act are in operation, an adolescent shall be given an adult's wage when working the same number of hours as an adult under a certificate from a competent Medical Practitioner approved by the Government, and shall be given a child's wage when working the number of hours prescribed for children. If and when the Rules are amended in conformity with the provisions of the Plantations Labour Act, 1951, which prescribed 40 hours a week for an adolescent, an adolescent's wage shall be 5/8 of that of an adult male worker in the field or the factory, as the case may be.

II. *Guaranteed Time Rates.* Workers working on piece-rates shall be entitled to receive a guaranteed time rate over and above the piece-rates and irrespective of results. The rates shall be :—

(a) Men	12 as. 6 ps.	per day
(b) Women	9 „ 6 „	„
(c) Children	6 „ 3 „	„

III. *The Minimum Piece-rates* shall be as follows :—

* * * * *

(b) *Tappers in Rubber Estates* shall be paid at the following rates varying with the yield of the estates concerned according to the following classification. In the case of estates where different types of rubber are grown each type may be classified on the basis of the average yield per acre during the previous year :—

Class I —i. e. (yielding below 250 lbs. per acre per annum) 4 as. 10 ps. per lb. for the first 3 lbs. of rubber collected on a day ;

Class II —i. e. (yielding 250 to 400 lbs. per acre per annum) 2 as. 5 pies for the first 6 lbs. of rubber collected on a day ;

Class III—i. e. (yielding 401 to 600 lbs. per acre per annum) 1 anna 5 pies per lb. for the first 10 lbs.; and

Class IV—i. e. (yielding 601 lbs. and above per acre per annum) 1 anna per lb. for the first 14 lbs.

N. B. The term** tapping to which these rates apply shall be understood to mean the job under this head that is customarily done in the localities concerned.

IV. *Adjustment of Minimum Piece-rates.* The minimum piece-rates have been worked out on the basis of a standard output for an average worker for the particulur month for the class of rubber. In the case of rubber, it is 3 lbs per day for a tapper in Class I Rubber, 6 lbs per day in Class II, 10 lbs. a day in Class III and 14 lbs. per day in Class IV. ** **

In the case of Rubber also, when the tapping average in any month falls below the standard output for the particular class of rubber concerned, the actual average should be taken as the standard for that month and tappers should be paid for rubber collected on each day of that month up to the new standard output at a revised piece-rate. This rate shall be such that after deducting 10 per cent from the new standard output, the balance of the quantity will give an amount equal to the difference between the minimum wage and the guaranteed time rate of a male worker. The standard minimum piece-rates, for tapping as well as the revised piece-rates, adjusted to a lower average productivity in a month shall apply equally to men and women workers though the guaranteed time rate will be different as laid down above.

V. *Sliding Scales.* The adjustment to charges in the cost of living of dearness allowance for the time rate workers and guaranteed time rate for piece-rate workers should be effected when the cost of living Index number for Ernakulam

changes by 10 points from 389. The rate of adjustment for every unit of 10 points shall be as follows :—

Men (Field and Factory)	7 pies
Women ,,	5 pies
Children (Field)	3 pies

VI. *Full Employment.* The minimum wage is based on the assumption that employers will provide work for their labour force throughout the year, failing which the labourers will be given their Minimum Wages for the days on which they are involuntarily unemployed. But the obligation of employers is only to offer some kind of work connected with the estate and a worker who refuses to accept that work will automatically forfeit his claim to the wage also.

VII. The rates for factory workers shall apply to women workers also who are employed in the factory except those solely employed in picking and washing pans. The term 'Factory', for this purpose, may be defined as ' any place where a manufacturing process is carried on irrespective of the number of workers employed.'

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(3) GOVERNMENT OF TRAVANCORE-COCHIN

Notification

L. 1-9632/51/DD. 1st May 1953.

In exercise of the powers conferred upon them by Rule 23 read with sub-rule (b) of Rule 25 of the Travancore-Cochin Minimum Wages Rules, 1951, Government are pleased to permit the employment of workmen on the first day of the week in any plantation which is maintained for the purpose of growing rubber subject to the condition that wages at double the ordinary rate shall be paid to the workers employed on such days.

TAPPING—THE EFFECT OF SUNDAY RESTS

By

B. J. EATON & L. E. MORRIS

(Rubber Estates in Travancore-Cochin State are reported to be observing Sunday as a holiday for workers in compliance with rule 23 of the Travancore-Cochin Minimum Wages Rules, 1951. Planters would, therefore, be interested in reading the following article on the effect of Sunday rest on production of rubber which is reproduced from the Journal of the Rubber Research Institute of Malaya, Vol. 4, No. 1, July, 1932).

During 1930 discussion arose concerning the cessation of tapping on Sundays. It was suggested that resting trees on Sundays would reduce the output of rubber by one seventh, but opinions varied, and it was a moot point whether the extra rest day would benefit the trees and so reduce the loss in crop below one seventh, or by disturbing the tapping system would increase it.

Letters were sent to District Planters' Associations, but no data of sufficient value could be obtained, though several estates gave some figures from previous periods with Sunday rest.

A number of estate managers agreed to carry out experiments to compare the results of the usual continuous alternate daily tapping and tapping on Sundays —on one or more tasks for a period of one year. Unfortunately, owing to leave, staff reductions and so on, it was possible to collect from only six estates records of sufficient length to justify the formation of definite conclusions. These few estates, however, represent a variety of conditions, which are summarised in Table 1.

TABLE 1

General Conditions on Experimenting Estates

Estate	Locality	Age of Trees in 1930	Stand per acre	Approx: yield lbs. per acre	Number of control tasks	Number of experimental tasks	Number of trees p. task
B	Selangor	17	65	1100	2	2	245
C	do	17			2	2	260
J							
Section A	Kedah	14	151	630	2	2	300
Section C		14	97	460	2	2	300
K	Malacca	7	104	370	1	2	360
M	do	22	92	540	1	1	275
S	Selangor	21	55	650	3	3	213

The estates are situated in different States, the age of the trees at the start of the experiment varied from 7 to 22 years, the number of trees per acre from 55 to 151, the number of trees per tapping task from 213 to 360, and the yield per acre (reckoned from the experimental tasks) from about 400 to 1100 pounds per year.

Results

Records were received monthly and the totals for each estate are given in Table 2.

TABLE 2

General Results

Estate	Duration months	No. of tasks each	System	Alternate daily Tasks		Sunday Rested Tasks		Sunday Rested 7 Task—Loss	
				Total Crop lbs.	No. of Tappings	Total Crop lbs	No. of Tappings	Crop as per cent of control	Tappings as per cent of control
B	14	2	1	9687	409½	8492	354½	12·34	13·42
C	12	2	1	4333	355	3573	304	17·5	14·45
J									
Section A	6	2	2	1248	161	1142	139	8·5	13·7
Section C	6	2	2	1418	171	1474	152	4·0 gain	11·1
K	12	1	1	1277	165	1092	143	14·5	13·3
			2			1125	144	12·0	12·7
M	5	1	2	670	67	606	56	9·6	16 4
S	12	3	2	7566	179	6037	133	20·2	25·1
Mean								11·3	5·1

The general result of the experiments is that the average loss of crop is slightly less than the proportional reduction in the number of tapping days.

However, owing to variations of rainfall and other factors the actual numbers of tappings and rests vary considerably from one estate to another, and though simple addition of the monthly records gives an average result it does not throw much light on the reaction of the trees to the extra rest days. The figures have therefore been analysed further.

Control and Experimental Tasks

On each estate from one to four experimental tasks, which were rested on Sundays, were compared with the same number of control tasks which were tapped continuously on alternate days. Control and experimental tasks were arranged alternately side by side or divided between two sections of the estate tapped on alternate days. Where conditions were definitely different, as on estate J, the sections have been treated separately in the analysis of results.

Even with adjacent tasks there may be considerable differences in intrinsic yielding ability. For example on estate B four adjacent tasks were used, the first pair (A) was tapped on alternate days, the second pair (B) was rested on Sundays, and in seven months' tapping the crop from the second pair was 25 per cent less than that of the first. The whole area was then rested for 5 months according to the A B C system. Afterwards the "A" tasks were rested on Sundays and the "B" tasks were tapped continuously, but the "A" tasks still gave 2·9 per cent more crop than the "B". Thus there is a definite difference between the yielding capacity of the pairs of tasks, though they are side by side on flat land and apparently similar.

On estate C any such differences were balanced by monthly changes. Two tappers tapped a pair of tasks in Block O on one day and a pair of tasks in Block S, with similar conditions, on the next. In one month, tapper A tapped on Sundays but B did not; in the next month A rested and B tapped on Sundays.

On estate K one control and one experimental task were tapped for 9 months and then changed round for 3 months. The second experimental task was kept on the same system. The yields of the three plots are close enough to justify straight forward addition of crops for the whole year.

On the other estates the tasks were not changed though on estate J the tappers were varied irregularly.

Systems of Resting

Two alternate methods for the arrangement of tapping days were suggested.

In Method 1 a task that is tapped on Monday, Wednesday and Friday is rested on Sunday and tapped again on Monday in the next week. Thus it is tapped on the same days in each week, and in each month (four weeks) there are four periods of two days' rest (Saturdays and Sundays; or with Tuesday, Thursday and Saturday tapping—Sundays and Mondays) and 12 tapping days compared with 14 on the continuous alternate daily system.

In Method 2 a task that is tapped on Monday, Wednesday and Friday is rested on Sunday, and tapped again on Tuesday, that is when it is due for tapping on the regular alternate daily system. Tapping is repeated on Thursday and Saturday. Sunday fits in as an ordinary alternate rest day, and tapping is continued on Monday, Wednesday and Friday again. Thus in each month there are two periods of three rest days, and again 12 tapping days.

In practice the regular rotation is upset by rainy days and holidays and the actual number of tappings of control and rested tasks are not in this theoretical proportion of 14:12, or 14·3 per cent of rests.

Method 1 was employed on estates B and C, and Method 2 on estates J, M and S. On estate K a separate task was tapped on each system.

In Method 1, the regular rhythm of tapping is disturbed every week, and after every third tapping the tapping cut is exposed to two days' drying in place of the regular one. In Method 2, the cut suffers more severe drying, for three days, twice a month, but between the rests there are six tappings at regular intervals. It might be expected then that these two systems would give different results.

The results of these experiments are not sufficiently uniform to settle this point, but differences between the two systems are suggested (See Table 2). On two of the three estates employing Method 1, the percentage loss of crop was greater than the loss of tapping days. All five of the estates on sections using Method 2, gave a loss of crop smaller than the reduction in tapping days. Thus on the whole the loss of crop was greater when the Sunday rests fitted Method 1, than when they fitted Method 2.

Individual Tree Yields

As the numbers of tappings per month and the numbers of trees in a tapping task vary from one estate to another strict comparisons can only be reached by reducing the figures to individual tree yields.

Table 3, shows that the previous conclusions can be reached in another way—the mean yields per tree per tapping are mostly higher for the trees rested by Method 2, than for the control trees, while Method 1, gave yields slightly more on estate B, and rather less than those of the control trees on estates C and K.

TABLE 3

Mean Yield per Tree per Tapping—Pounds

Estate		Control	System 1	System 2
		Block A.	*Block B.*	
B	1st period	0·1064	0·0920	
		Block B.	*Block A.*	
	2nd ,,	0·0823	0·0978	
	Mean	0·0943	0·0949	
C		0·0470	0·0452	
J	Section A	0·0258		0·0274
	Section C	0·0278		0·0323
		Plot 12.	*Plot 13.*	*Plot 14.*
K	1st period	0·0205	0·0205	0·0209
		Plot 13.	*Plot 12.*	*Plot 14.*
	2nd period	0·0258	0·0246	0·0255
M		0·0364		0·0394
S		0·0661		0·0710

Daily Yields

In order to follow the effect of the extra rest days it is necessary to consider the yields for the different days in the week. Only estate C sent in yield figures for each tapping. Two tappers were employed on two blocks tapped alternately, but as the average yield for Block S is considerably higher than for Block O they are first treated separately. In this analysis only the yield of days fitting into the proper sequence are considered; if rain or holidays introduced an extra non-tapping day the yield of the next tapping is not included. The mean figures thus represent from 22 to 26 weeks for alternate day tapping, and 36 to 38 regular week days after the Sunday rest (method 1 was followed) with 9 to 12 weeks when the regular sequence had been disturbed.

There is no reason why the mean yield over a year should be different for any one week day and it is found that for Block O the mean yields vary but little from day to day; the lowest is 2·67 pounds for Wednesdays and the highest for Thursdays is 2·84 pounds. The mean of all is 2·77 lbs. The standard errors of the lowest and highest means are plus or minus 0·13 and plus or minus 0·11 pounds respectively, and their difference (0·17 pounds) is not significant. For the task rested on Sundays the regular tapping days were Monday, Wednesday and Friday, and their mean yields 2·65 plus or minus 0·10, 2·65 plus or minus 0·09 pounds respectively. For the twelve weeks when the tapping order had been varied the means for Tuesday, Thursday and Saturday were 2·81, 3·06 and 3·11 pounds.

TABLE 4

Mean Yield of Week Days (pounds)

	Alternate Daily Tasks					Sunday Rested Tasks				
	Block O		Block S		Total	Block O		Block S		Total
Sunday	2·77	24	3·85	25	6·62					
Monday	2·72	26	3·90	25	6·62	2·65	38	3·78	11	6·43
Tuesday	2·81	24	3·67	24	6·48	2·81	12	3·34	37	6·15
Wednesday	2·67	22	3·73	26	6·40	2·63	38	4·06	10	6·69
Thursday	2·84	25	3·46	23	6·30	3·06	12	3·60	36	6·66
Friday	2·76	23	3·85	25	6·61	2·76	38	3·85	9	6·61
Saturday	2·81	25	3·52	24	6·33	3·11	12	3·61	37	6·72
Mean	2·77		3·71		6·48	2·83		3·71		6·54

The heavier figures are the numbers of weeks included in calculating the mean.

Thus, though the differences are not statistically significant both sets of figures show the same tendency for the mean yield to increase towards the end of the week.

In the same way on Block S the alternate daily yields varied from 3·46 plus or minus 0·20 on Thursdays to 3·90 plus or minus 0·18 on Mondays with a mean of 3·71 lbs. There is also an apparent tendency for yields to fall off through the week. The other tasks were tapped mostly on Tuesdays, Thursdays and Saturdays and gave mean yields of 3·34 plus or minus 0·155, 3·60 plus or minus 0·14 and 3·61 plus or minus 0·17 lbs. In the other weeks the mean yields on Mondays, Wednesdays and Fridays were 3·78, 4·06 and 3·85 lbs. That is, as on Block O, the yields were lower just after the rest than later in the week.

Addition of the yields from both blocks eliminates any possible difference due to the two tappers, and shows clearly that yields on Mondays and Tuesdays are lower on the rested than on the control tasks, but from Wednesday till the end of the week are equal or greater. The mean yield per tapping of the control tasks is slightly lower than that of the tasks rested on Sunday, and so the loss of crop should be slightly less than in proportion to the loss of tapping days. The reverse result obtained from the total crop figures has been influenced by the tapping days after rain days and holidays, which were not included in this analysis.

It is interesting to compare these figures with those received from four estates for previous periods without Sunday tapping.

TABLE 5

Yield of Week Days as Differences (per cent)

Estate	Locality	Date of Experiment	Duration Month	Friday to Monday as % of Friday	Saturday to Tuesday as % of Saturday	Week's mean Monday as % of week	Week's mean Tuesday as % of week
C	Selangor	1923	7	4·2	3·6		
		1930	12	2·7	8·5	1·7	6·0
G	Perak	1924 1925	6	2·1	2·4		
S	Selangor	1929	12	4·5	8·5	1·4	5·5
SR	Selangor	1927	6			7·4	2·7
		Mean		3·4	5·7	3·5	4·7

There were no control fields or tasks on continuous alternate daily tapping, and the figures quoted are the mean yields over various periods for Mondays and Tuesdays compared with Fridays and Saturdays or the whole week. Only for estate S are figures given for all the six days after the rest day. All of these data confirm the conclusion that yields are low immediately after the rest but increase towards the end of the week.

Dry Rubber Content

Only two estates submitted details of the dry rubber content of the latex. On estate C the mean for both blocks for twelve months is 3·77 pounds per gallon for the alternate daily tasks and 3·74 for the Sunday rested tasks, but in nine out of the 24 pairs of figures the dry rubber content is higher for the rested than for the continuous tasks. On estate M in each of the 5 months the mean dry rubber content was greater for the rested than for the control tasks, and the means for the whole period were 4·08 and 3·97 pounds per gallon respectively.

Thus there is no evidence available to show that there is any appreciable difference between the dry rubber content of the latex from the tasks tapped continuously on alternate days and that from the tasks rested on Sundays.

Summary

1. Six estates have carried out experiments to determine the loss of crop from tasks not tapped on Sundays compared with tasks tapped continuously on alternate days.

2. The results vary somewhat, but on the whole the proportional loss of crop is slightly less than the reduction in the number of tapping days.

3. Two systems of resting were employed; one involving two days' rest every week, and the other three days' rest in alternate weeks.

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1. Six estates have carried out experiments to determine the loss of crop from tasks not tapped on Sundays compared with tasks tapped continuously on alternate days.

2. The results vary somewhat, but on the whole the proportional loss of crop is slightly less than the reduction in the number of tapping days.

3. Two systems of resting were employed; one involving two days' rest every week, and the other three days' rest in alternate weeks.

4. There is a suggestion that the loss of crop is less from the second than from the first system, and this is related to a greater yield per tree per tapping.

5. Yields are low just after the rest, and increase towards the end of the week.

6. As far as can be judged from the available figures, the dry rubber content of the latex is not affected.

RUBBER REPLANTING

Ceylon Government's Subsidy Scheme

The Ceylon Government is reported to have approved a scheme of subsidy to encourage the replanting of old and worn out rubber areas with high yielding strains of rubber. Under the scheme 100,000 acres of uneconomic rubber land will be replanted in 5 to 6 years at a cost of about 97 million rupees and this step is expected to increase the Island's rubber production by 40,000 tons or 40 per cent of the present production. The scheme will be financed by a levy of 10 cents a pound on sheet rubber exports but this will not reduce the price of Rs 1·35 a lb. to the producer. The levy will be taken out of the profits now being made by the Government on the China trade. Further, a cess not exceeding 10 cents a pound will also be imposed on crepe rubber as and when its prices rise above the level of Rs. 1·35 a lb. to finance the scheme. The scheme will be administered by the Rubber Rehabilitation Board.

The subsidy, it is reported, is proposed to be paid on the following graded scales :—

(a) If the area to be replanted forms part of an estate 100 acres or more in extent—Rs. 700 per acre replanted ;

(b) If the area to be replanted forms part of an estate 10 acres or more but under 100 acres in extent—Rs. 900/- per acre replanted ;

(c) In the case of small holdings under 10 acres in extent—Rs. 1,000/- per acre replanted.

The subsidy will be paid in four equal instalments in the case of categories (a) and (b) and in five instalments in the case of (c) as follows :—

(i) the first instalment after the eradication of the existing rubber ;

(ii) the second instalment after the replanting has been satisfactorily carried out ;

(iii) the 3rd, 4th and 5th instalments, one, two and three years respectively after replanting if the replanted area has been maintained satisfactorily.

The subsidy, according to the report, will be paid only for the replanting or replacement of existing rubber and they will not be paid for new-planting.

It is further reported that rubber small holdings of 1 acre and less, which are estimated to be about 54,000 in number, will not receive any financial assistance under the scheme.

NEWS AND NOTES

1. **Staff:**

Sri P. N. Ramachandran took over charge as Secretary to the Board with effect from 7th February, 1953 (afternoon) on Sri. V. C. Naidu's relief.

Sri T. V. Joseph joined duty as Chief Accountant and Statistical Officer.

Sri K. M. Joseph joined duty as Field Officer.

2. **Membership of the Board :**

The Central Government in the Ministry of Commerce and Industry have notified the nomination of the following Members to vacancies in the membership of the Indian Rubber Board :—

(1) Sri A. M. M. Murugappa Chettiar with effect from 11-2-1953 (nominated by the Madras Government.)

(2) Mr. A. M. B. Clarke with effect from 22-4-1953 (nominated by the Association of Planters of Travancore) *vice* Mr. F. Hawkings (resigned).

(3) Sri C. Thomas, Director of Agriculture, Government of Travancore-Cochin, with effect from 16-6-1953 (nominated by the Travancore-Cochin Government) *vice* Sri M. Sankara Menon (retired).

(4) Sri B. K. Nair, Organiser, Indian National Trade Union Congress, Alleppey, and President, Eastern Estate Workers' Union, Vadaserikara, to represent Labour, *vice* Sri. K. V. Mathew (resigned).

3. **Meetings of the Board :**

During the first half of 1953, two meetings of the Board were held, one on the 5th February and the other on the 27th April, 1953.

4. **Extension of term of office of the Members of the Board.**

By virtue of an amendment to sub-rule (1) of Rule 3 of the Rubber (Production and Marketing) Rules, made by the Central Government under notification No. 23(4)-Plant/53 dated 18th June, 1953, the term of office of the present members of the Board has been extended by six months with effect from 15th August, 1953.

5. **Publications of the Rubber Research Institute of Malaya.**

Readers of this Bulletin in India should be familiar with the names of some of the publications of the Rubber Research Institute of Malaya from which we have been and are reproducing from time to time selected articles. The Institute has now issued a pamphlet entitled " R. R. I. Publications " which lists all current literature now available with their revised prices, copies of which may be obtained free on application to the Director, Rubber Research Institute of Malaya, P. O. Box 150, Kuala Lumpur, Malaya. The two principal publications of the Institue are its *Journal* and its *Planters' Bulletin*. The Journal publishes the scientific record of work of the Institute at irregular intervals in the form of single communications, and is priced at Malayan $ 1 per issue. The Planters' Bulletin is a medium of the R. R. I's service to estates and publishes articles of direct practical use to planters in non-technical language. The New Series of the bulletin which commenced publication in May, 1952, is published on the first of each alternate month at the price of $ 1 per issue. In addition to these two principal publications, the Institute issues Annual Reports and there are a number of series of special publications which have appeared in the past—Circulars, Planting Manuals, Bulletins, Information Cards and Booklets designed to meet the special requirements of rubber small-holders. A 16 mm. sound film *Getah* in six parts with a commentary in Malay is also available. Subscribers may deposit $ 15 to receive all future publications. For *Planters' Bulletin* only, a deposit of $ 10 is necessary.

6. Rubber Inquiry in Malaya.

An independent fact-finding Committee selected from persons not resident in Malaya is to investigate the "competitive position" of the Malayan Rubber Industry and make recommendations. An official announcement in Kuala Lumpur on May, 12, said the Federal Government of Malaya and the Rubber Producers' Council of Malaya had agreed to this investigation. It would be carried out with reference to:—

(1) Taxation of the industry in relation to costs of production;

(2) Maintenance of existing capital in the industry and the attraction of fresh capital for development;

(3) Replanting;

(4) Marketing and processing of small-holders' rubber;

(5) Unemployment in the industry in the event of a recession in prices.

The announcement said the Rubber Producers' Council had agreed to co-operate with the Government by setting up a joint working party to assemble and collate relevant information. It added: "Issues involved in this investigation are of such importance that the Government considers it should be carried out by a body independent of the Government and industry. The Rubber Producers' Council have agreed to this course". The Government would, therefore, arrange to invite an independent body consisting of a small number of suitable persons not resident in Malaya to evaluate facts and make recommendations. This body, the announcement continued, would assess evidence furnished by the joint working party and "will be free to seek elsewhere as well as in Malaya such further evidence as it may require". (*India Rubber Journal, May 16th, 1953*).

7. Manufacture of Tennis Balls.

Among licences granted by the Government of India during the period September, 1952, to February, 1953, for the manufacture of new lines under the Registration and Licensing of Industrial Undertakings Rules, 1952, applicable to scheduled industries, is a licence granted for the manufacture of Tennis Balls. This licence has been obtained by Messrs. Nanco Rubber and Plastics, Ltd., Coimbatore, South India, one of the members of the Association of Rubber Manufacturers in India. Indigenously manufactured Tennis balls, when they make their debut shortly, will be a valuable addition to the various lines of manufacture that the Rubber Manufacturing Industry here has already established.

(*Indian Rubber Bulletin, No. 54, July, 1953*).

8. Tenth Meeting of the International Rubber Study Group.

The tenth meeting of the International Rubber Study Group held in Copenhagen under the Chairmanship of Mr. H. T. Karsten, Head of the Danish Delegation ended, on the 15th May, 1953. According to a Press Communique issued by the Group after the meeting, the Group estimated that the world production of natural rubber for 1953 would be around 1,788,000 long tons, while production of synthetic rubber in member countries would be around 989,000 long tons. The world consumption was estimated at 1,595,000 long tons of natural rubber and approximately 909,000 long tons of synthetic rubber. In regard to the expansion of world consumption the Group considered that the use of rubber in roads was one of the most important potential outlets for rubber, but that its full developmet was a matter for further intensive study and promotional effort. They also agreed that recent developments in the adoption of latex foam for upholstery and its firm establishment in popularity encouraged the view that this was probably the most immediate new avenue for the consumption of large quantities of rubber. In dealing with the Report of their Working Party on a buffer stock scheme the Group, says the Press Communique, agreed on the following conclusions:—

"The International Rubber Study Group, having considered whether measures, designed to prevent burdensome surpluses and serious shortages of rubber are necessary, found that a difference of opinion existed. The majority of countries and some consuming countries considered such measures necessary and practicable, whereas other countries either were not convinced of the present necessity of such a scheme or were not yet in a position to decide upon their attitude. The Group also noted that certain Governments had not yet been able to formulate their views on the points outstanding in the draft buffer-stock agreement. Consequently the Group felt that it could not recommend at this stage that the Secretary General of the United Nations should be asked to summon an international commodity conference.

"In the circumstances the Group instructed the Managing Committee to hold a special meeting in September or October of this year for the purposes of

(a) reviewing the facts of the rubber situation as they might then be;

(b) Securing accord on the outstanding points in the draft buffer-stock agrement;

(c) Examining whether any agreed view between member countries appeared possible with regard to the necessity for such an agreement."

The Group accepted the invitation of the Ceylon Government to hold its next annual meeting in Ceylon at a date to be decided later.

INDIAN RUBBER STATISTICS

TABLE 1

Monthly Production, Dry Weight in Tons, 1948 to 1953 (June)

Months	1948	1949	1950	1951	1952	1953
January	1,425	1,326	1,291	1,307	1,651	1,992
February	270	257	208	260	325	390
March	956	798	988	902	1,127	1,031
April	1,498	1,563	1,640	1,664	1,973	2,045
May	1,646	1,240	1,450	1,808	1,533	1,893
June	694	854	836	562	1,153	1,425
July	844	904	758	1,258	1,510	
August	1,068	1,245	1,053	1,654	1,167	
September	1,646	1,410	1,414	1,756	2,596	
October	1,796	1,944	1,937	1,807	1,972	
November	1,742	2,011	1,975	1,981	2,450	
December	1,837	2,035	2,049	2,189	2,406	
Total	15,422	15,587	15,599	17,148	19,863	

TABLE 2

Monthly Consumption of Raw Rubber (Indigenous and Imported) by Rubber Goods Manufacturers (Tons) 1948 to 1953 (June)

Months	1948	1949	1950	1951	1952	1953
January	1,587	1,548	1,162	1,868	2,059	1,621
February	1,494	1,414	1,295	1,894	1,980	1,637
March	1,587	1,284	1,320	1,821	1,954	1,698
April	1,668	1,981	1,435	2,134	1,598	1,770
May	1,432	1,847	1,372	1,576	1,514	1,871
June	1,875	1,770	1,517	1,131	1,757	2,021
July	1,801	1,785	1,800	2,077	2,035	
August	1,902	1,819	1,670	2,007	1,840	
September	1,753	1,638	1,506	1,953	1,633	
October	1,109	1,068	1,253	1,788	1,330	
November	1,700	1,697	1,737	2,061	1,686	
December	1,811	1,341	1,668	2,117	1,675	
Total	19,719	19,192	17,735	22,427	21,061	

TABLE 3

Production, Consumption and Stocks of Rubber by Groups January/June, 1953

GROUPS	Production Jan./June 1953 (Tons)	Consumption of rubber by manufacturers, Jan./June '53 (Tons)	Stocks with estates and dealers as on 30-6-1953 (Tons)	Stocks in transit sold to manufacturers as on 30-6-1953 (Tons)	Stocks of rubber with manufacturers as on 30-6-1953 (Tons)
Group 1	3,443	2,974	1,667	335	777
Group 2	1,740	2,557	603	575	545
Group 3	840	1,532	263	392	471
Group 4	610	438	390	78	189
Group 5	404	1,405	252	86	234
Group 6	289	681	192	111	234
Group 7	13	82	29	8	29
Scrap Grades	1,002	110	595	18	79
Latex (D.R.C.)	253	281	216	41	86
Sole Crepe	182	83	104	25	36
Estimated unspecified	...	475*	...	...	75*
Total	8,776	10,618	4,311	1,669	2,755

* Estimated consumption by and stocks with some manufacturers from whom returns have not been received.

Note :—

Group 1	is composed of	RMA IX and I.
Group 2	,,	RMA 2, 3 and Cuttings No. 1.
Group 3	,,	RMA 4, 5 and Cuttings No. 2.
Group 4	,,	Precoagulated Crepe, PLC IX, 1, 2 and 3.
Group 5	,,	Estate Brown Crepe IX, 2X, Smoked Blanket and Remilled Crepe 2.
Group 6	,,	Estate Brown Crepe 3X, Remilled Crepe 3 & 4.
Group 7	,,	Flat Bark.

TABLE 4

Imports of Raw Rubber into India during 1948 to 1953 (June)

Months	1948	1949	1950	1951	1952	1953
January	...	501	339	945	447	47
February	...	354	41	1,377	638	50
March	...	954	44	1,124	217	150
April	...	691	...	850	544	...
May	...	9	132	521	187	10
June	315	71	44	477	315	...
July	705	...	...	843	...	
August	444	...	...	115	235	
September	941	3	...	185	300	
October	649	2	75	243	388	
November	595	66	175	136	336	
December	684	116	232	105	244	
Total	4,333	2,767	1,082	6,921	3,851	

TABLE 5

Exports of Raw Rubber from India (Tons) 1950—1953 (June)

Month	*1950*	*1951*	*1952*	*1953*
January	...	...	4	2
February	...	...	6	...
March	89	...	1	5
April	383	...	5	2
May	373	...	...	7
June	1	...	...	16
July	112	16	6	
August	27	20	4	
September	17	23	2	
October	12	38	4	
November	16	36	...	
December	8	12	64	
Total	1,038	145	96	

WORLD PRODUCTION & CONSUMPTION OF NATURAL AND SYNTHETIC RUBBERS (IN TONS)

TABLE i

Production of Natural Rubber in Principal Territories.

COUNTRIES	1948	1949	1950	1951	1952
Malaya	698,189	671,503	694,090	605,346	584,238
Indonesia	432,349	431,841	696,472	805,167	745,758
Ceylon	95,000	89,500	113,500	105,000	96,500
Vietnam and Cambodia	43,935	43,010	48,482	52,136	63,134
India	15,424	15,587	15,599	17,148	19,863
Sarawak	39,680	39,461	55,615	42,359	31,844
Other Asia*	127,500	125,000	151,500	143,500	153,750
Africa*	42,000	45,000	54,500	72,000	72,500
Brazil	20,158	21,318	19,402	20,777	26,457
Others (Latin America and Oceania)**	10,452	6,859	9,827	11,709	11,154
Total (rounded off)	1,525,000	1,490,000	1,860,000	1,875,000	1,785,000

Source—Rubber Statistical Bulletin, May 1953 (Vol. 7, No. 8)

*Estimated. **Partly estimated.

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Source—Rubber Statistical Bulletin, May 1953 (Vol. 7, No. 8)

*Estimated. **Partly estimated.

TABLE ii

Production, Consumption and Stocks of Natural Rubber (in tons)

YEAR	Production	Consumption	Total stocks in producing & consuming countries and stocks afloat	Increase (+) or decrease (–) in total stocks
1948	1,525,000	1,422,500	770,000	-75,000
1949	1,490,000	1,437,500	720,000	-50,000
1950	1,860,000	1,705,000	767,500	+55,000
1951	1,875,000	1,500,000	812,500	+45,000
1952	1,785,000	1,450,000	817,500	+5,000

Source—Rubber Statistical Bulletin, May 1953 (Vol. 7, No. 8.)

TABLE iii

Production, Consumption and Stocks of Synthetic Rubber (in tons)

Year	Production	Consumption	Stocks	Decrease (–) or increase (+) in stocks
1948	532,186	480,000	125,000	+47,500
1949	440,332	450,000	110,000	- 15,000
1950	534,624	580,000	60,000	- 50,000
1951	908,381	812,500	142,500	+82,500
1952	877,769	885,000	140,000	- 2500

Source–Rubber Statistical Bulletin, May 1953 (Vol. 7, No. 8)

TABLE 6

Total Planted Area, Estates and Holdings, corrected up to 31st December, 1952 and Planting Materials used

	ESTATES (acres)				SMALL-HOLDINGS (acres)				GRAND TOTAL (acres)			
	Ordinary seedling	Budded	Clonal seedling	Total	Ordinary seedling	Budded	Clonal seedling	Total	Ordinary seedling	Budded	Clonal seedling	Total
Planted earlier than 1938	59,040·22	7,286·78	327·78	66,654·78	38,944·77	47·25	1·25	38,993·27	97,984·99	7,334·03	329·03	105,648·05
in 1938	351·65	1,264·71	..	1,616·36	158·27	12·26	5·02	175·55	509·92	1,276·97	5·02	1,791·91
„ 1939	276·72	2,062·14	499·08	2,837·94	896·11	267·62	27·66	1,191·39	1,172·83	2,329·76	526·74	4,029·33
„ 1940	227·21	1,639·28	471·60	2,338·09	1,107·89	223·24	35·12	1,366·25	1,335·10	1,862·52	506·72	3,704·34
„ 1941	11·79	1,255·19	81·00	1,347·98	718·43	57·60	5·67	781·70	730·22	1,312·79	86·67	2,129·68
„ 1942	988·76	2,114·48	413·57	3,516·81	2,210·16	149·02	95·14	2,454·32	3,198·92	2,263·50	508·71	5,971·13
„ 1943	2,721·47	1,976·18	1,285·50	5,983·15	7,491·03	769·68	504·58	8,765·29	10,212·50	2,745·86	1,790·08	14,748·44
„ 1944	3,081·63	1,153·03	762·49	4,997·15	6,099·79	297·78	339·53	6,737·10	9,181·42	1,450·81	1,102·02	11,734·25
„ 1945	2,420·65	423·90	2,247·88	5,092·43	4,351·91	192·24	134·70	4,678·85	6,772·56	616·14	2,382·58	9,771·28
„ 1946	949·08	500·49	531·22	1,980·79	2,149·78	44·98	121·92	2,316·68	3,098·86	545·47	653·14	4,297·47
„ 1947	330·65	822·48	313·73	1,466·86	1,147·98	73·28	79·32	1,300·58	1,478·63	895·76	393·05	2,767·44
„ 1948	398·98	507·12	95·51	1,001·61	227·00	6·50	47·24	280·74	625·98	513·62	142·75	1,282·35
„ 1949	445·19	299·03	160·31	904·53	136·94	..	59·84	196·78	582·13	299·03	220·15	1,101·31
„ 1950	764·76	245·76	337·36	1,347·88	109·50	8·00	17·00	134·50	874·26	253·76	354·36	1,482·38
„ 1951	107·00	559·48	392·01	1,058·49	57·43	..	54·40	111·83	164·43	559·48	446·41	1,170·32
„ 1952	189·96	580·20	267·19	1,037·35	73·50	1·25	44·22	118·97	263·46	581·45	311·41	1,156·32
Total	72,305·72	22,690·25	8,186·23	103,182·20	65,880·49	2,150·70	1,572·61	69,603·80	138,186·21	24,840·95	9,758·84	172,786·00

TABLE 7

Area, in acres, of New-planting and Replanting—1938 to 1952 and Planting Materials used

YEAR OF PLANTING	NEW PLANTING				REPLANTING				GRAND TOTAL
	Ordinary seedling	Budgrafts	Clonal seedling	Total	Ordinary seedling	Budgrafts	Clonal seedling	Total	
Planted earlier than 1938	97967	5372	329	103,668	17	1963	..	1980	105,648
Planted in 1938	505	486	5	996	5	791	..	796	1792
,, 1939	1090	1465	527	3082	83	865	..	948	4030
,, 1940	1229	1070	507	2806	106	792	..	898	3704
,, 1941	730	113	31	874	..	1200	56	1256	2130
,, 1942	2980	364	449	3793	219	1899	60	2178	5971
,, 1943	10020	2633	1790	14443	192	113	..	305	14748
,, 1944	8654	1046	1102	10802	528	405	..	933	11735
,, 1945	6678	616	2316	9610	94	..	67	161	9771
,, 1946	2865	375	638	3878	234	170	15	419	4297
,, 1947	1402	468	393	2263	77	428	..	505	2768
,, 1948	426	149	72	647	200	364	71	635	1282
,, 1949	532	88	171	791	50	211	49	310	1101
,, 1950	317	..	74	391	558	254	280	1092	1483
,, 1951	156	165	190	511	8	395	256	659	1170
,, 1952	74	279	92	445	190	302	219	711	1156
TOTAL	135,625	14,689	8,686	159000	2,561	10,152	1,073	13,786	172,786

TABLE 8

Weekly Singapore Rubber Market Prices

Ribbed Smoked Sheet Standard Quality for 100 lbs. ..Jan.–June, 1953

Week ending	*Value per 100 lbs. in Rupees*	*Week ending*	*Value per 100 lbs. in Rupees*
7—1— 1953	Rs. 138·76	1—4—1953	Rs. 106·57
14 ,, ,,	,, 132·48	9 ,, ,,	,, 102·44
21 ,, ,,	,, 132·48	15 ,, ,,	,, 106·76
28 ,, ,,	,, 126·20	22 ,, ,,	,, 106·18
4—2—1953	,, 122·27	29 ,, ,,	,, 113·83
11 ,, ,,	,, 118·54	6—5—1953	,, 117·36
19 ,, ,,	,, 120·11	13 ,, ,,	,, 107·94
25 ,, ,,	,, 123·06	20 ,, ,,	,, 111·86
4—3—1953	,, 121·68	28 ,, ,,	,, 109·12
11 ,, ,,	,, 115·60	4—6—1953	,, 104·80
18 ,, ,,	,, 112·46	10 ,, ,,	,, 105·19
25 ,, ,,	,, 115·40	17 ,, ,,	,, 104·22
		24 ,, ,,	,, 104·41

ANNOUNCEMENTS

(1) Foreign Trade Enquiries

Trade enquiries have been received from foreign firms in respect of Rubber, foam rubber goods like cushions, matresses etc. Exporters of these goods in India may obtain particulars of the address of the firms concerned from—

The Secretary,
Indian Rubber Board, Kottayam,
S. India,

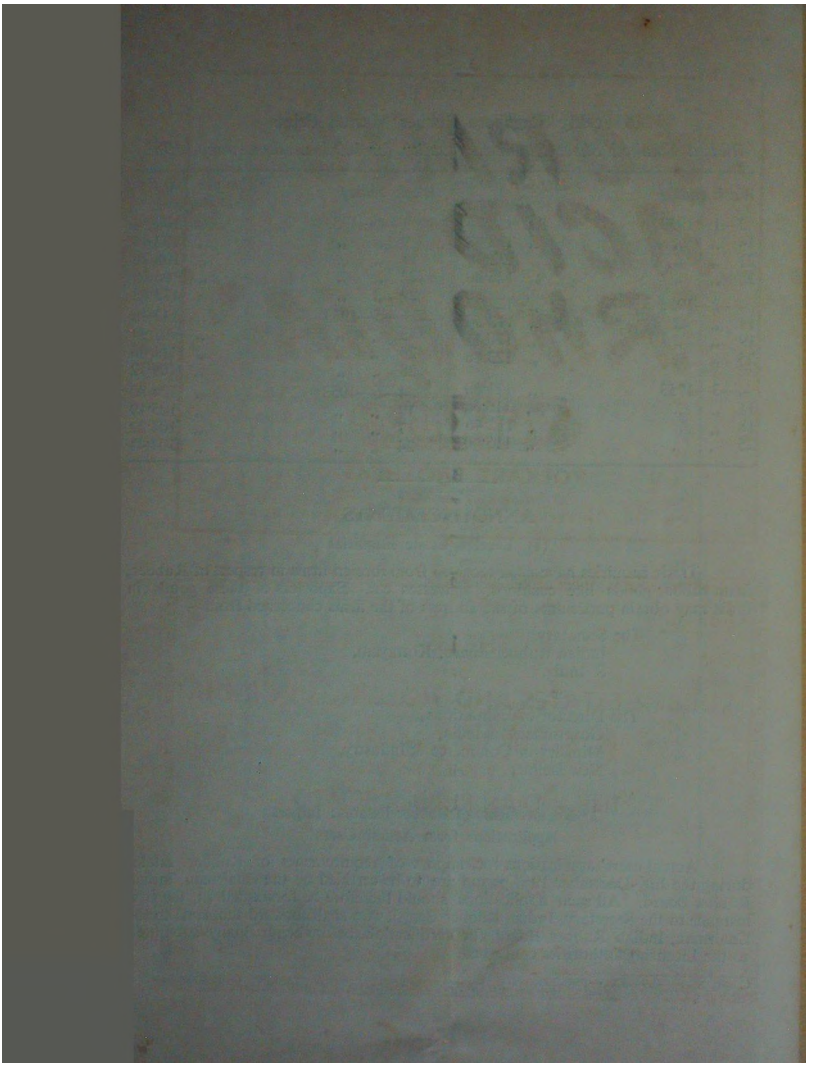
or

The Director of Exhibitions,
Government of India,
Ministry of Commerce & Industry,
New Delhi.

(2) Requirements of Rubber Estates: Import Applications from Actual Users

Actual users' applications for import of requirements of Rubber estates during the July-December 1953 period are to be certified by the Chairman, Indian Rubber Board. All such applications should therefore be forwarded in the first instance to the Secretary, Indian Rubber Board, who shall forward the same to the Chairman, Indian Rubber Board, for certification, before being finally submitted to the Licensing authorities concerned.

C. M. S. P. 439—2000—13-8-1953



THE INDIAN RUBBER BOARD BULLETIN

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NOTES ON SOME COMMON DISEASES OF THE RUBBER TREE IN SOUTH INDIA*

By K. N. KAIMAL

The rubber tree *Hevea brasiliensis* is susceptible to the attack of a large number of fungus diseases under cultivation, in the tropical rain forest regions of South-East Asia. Sharples in his classical work 'Diseases and Pests of the Rubber Tree' has listed 95 species of fungi recorded on rubber trees in Malaya. The number in other rubber growing countries is probably no less formidable. Of course, the vast majority of them are generally harmless. Nevertheless the small proportion of them which are capable of virulent attacks is a real menace to the rubber growing industry.

Climatic conditions usually exert great influence on the incidence of the fungus diseases in different countries or even in different districts in the same country. A typical example is *Phytophthora Meadii* which causes abnormal leaf-fall. Even though this fungus occurs in practically all the rubber growing countries of the east, serious outbreaks of the disease are confined to areas where heavy and continuous rain falls during the South-West monsoon. Climatic conditions in most planting districts of South India are characterised by a prolonged dry season followed by a severe South-West monsoon. These factors might be responsible in a large measure for the relatively greater freedom from root disease and for the severe incidence of *Phytophthora* in the country.

No comprehensive surveys of the disease-causing fungi on rubber have ever been undertaken in India. Therefore, many such fungi are likely to have been undetected and unrecorded in the past. The following notes are not a specialist's treatise on the subject but mere observations and comments on certain aspects of the common diseases of the rubber tree in South India which might, it is hoped, be of some interest to rubber planters present to-day.

The diseases of rubber tree may be classified according to their origin under two main heads—parasitic fungus diseases and physiological diseases. According to the part of the tree attacked they may again be divided into (1) leaf and fruit diseases, (2) branch and stem diseases, and (3) root diseases.

To consider first the diseases of the Leaves and Fruits, the most serious and widespread disease of the rubber tree in South India is the leaf blight caused

* Text of a paper read at the UPASI Scientific Conference on 27th August, 1953.

by *Phytophthora Meadii*. Though this disease has been recorded in some districts of Java, Sumatra, Malaya and Ceylon, its incidence in those regions with the exception of Ceylon, has been very light or negligible. The more or less extreme monsoon climate obtaining in most parts of the planting districts in South India is the main factor responsible for the severe outbreak of this disease here. The fact that even here, the rubber plantations in and adjoining the district of Kulasekharam, where the S. W. monsoon is light, are practically free from this disease gives strong support to this.

Investigations into the cause of this abnormal leaf-fall disease was first undertaken in India by McRae who, in 1916, announced that it was caused by the attack of a species of *Phytophthora*. In the following year the specific name of *Meadii* was given to the fungus. The parasite was believed to stay dormant in the tissues of the dead branches and the dry pods which remain on the tree, and to develop and spread during the monsoon. Measures recommended for the control of the disease at that time consisted in the removal of dead branches and half-developed pods. Immature green pods were believed to be the targets of first attack of the fungus from which it passed on to the branches and leaves. The disease is disseminated mainly by the pods. Clones or individual trees which produce pods prolifically are the worst victims of the disease while those which produce few or none at all are practically free from its attack.

In 1923 Ashplant who has been concentrating his attention more on control measures, announced that spraying the trees with Bordeaux Mixture would completely control the disease. In the following year spraying was undertaken on a large scale on estates which produced satisfactory results. The D. S. P. spray pump was recommended for the purpose. This method of spraying, evolved and recommended by Ashplant, was subsequently adopted as the standard treatment for the control of *Phytophthora*. But for this valuable contribution the rubber producing industry in S. India would have been worse off than it is today.

Since the final closing down of the Rubber Experiment Station at Mundakayam in 1932, very little scientific research on rubber production has been undertaken in India. However, it is a pleasure to note that progressive planters have been watching with keen interest the progress made in other countries and trying to adopt modern scientific methods of cultivation in their estates. Spraying large rubber areas is a rather slow operation and requires a large labour force. While the cost of spraying before the last war was round Rs. 20 per acre, it has now risen to about Rs. 65. Further, many hilly rubber areas were reported to have been left unsprayed in recent years owing to severe drought and water scarcity during the spraying season. Faced with these problems, some planting companies have been and are undertaking valuable trials with new fungicides in the form of dust, using modern portable dusting machines. Even though the results so far obtained have not been uniformly satisfactory, the indications are that a satisfactory dusting method can be evolved. By such methods, great speed in the operation and very large savings in expenditure would be possible.

Another line of approach to the solution of the problem of *Phytophthora* leaf disease is to develop resistant varieties of rubber. In the case of this disease, resistance depends not on any special qualities of the leaf but on non-production of fruits. As already mentioned, there is a high correlation between the rate of fruit setting and incidence of this disease. A high yielding clone which does not bear fruits is the objective in this line of work now being undertaken by the Rubber

Board. Trees which produce few or no fruits have been found occasionally in mature and old seedling areas. But unless they prove to be high yielders they can only be used for crown budding on proved high yielding stocks. This, however, involves greater care, additional expenditure and a delay of 1 to 2 years in bringing the trees into tapping with the consequent loss of crop.

Pioneer work in this regard has already been undertaken by a planter at Mundakayam. He has observed that clone B. D. 10 is a shy seeder in monoclone plantings, that the retention of leaf on those trees in the absence of any control measure, is rather high and that a light application of Bordeaux Mixture gives adequate protection against the attack of the disease at substantially cheaper costs. The reason for obtaining from this moderate yielding clone relatively higher yields than Tj. 1 on his estate is ascribed to the relatively higher resistance and leaf retention of the former against *Phytophthora*. He has already crown-budded high yielding stocks with this clone and selected some non-seeding seedling trees found on his estate for the same purpose.

Among the proved older clones available in the country Glenshiel 1 is found to be fairly resistant to this disease. A new clone, AVROS 255, which we are recommending for small-scale planting is a very shy seeder and is also resistant to this disease. It is also a promising high yielder.

Hevea Mildew.

Another leaf disease which is common in S. India is the Hevea Mildew caused by the fungus *Oidium heveae*. While *Phytophthora* attacks mature leaves, *Oidium* can attack only tender leaves. Light showers followed by cool and cloudy weather during refoliation favour the outbreak of this disease. Serious attacks of this disease are usually confined to late-wintering trees which may result in secondary leaf-fall. On hilly areas, at altitudes of 1,000 ft. and above, this disease occurs in a virulent form causing successive leaf-falls.

In South India outbreaks of Mildew disease on a moderate to serious scale have in the past been confined to rubber at high altitudes and to plantations situated in South Travancore, the normal climatic conditions obtaining in the Central and Northern districts normally being rather unfavourable for its development. This year, however, conditions deviated widely from the normal in most districts, causing irregular wintering and favouring the outbreak of this disease. Observations showed that its incidence was only moderate in many districts and that actual leaf-fall varied from 10 to 20 per cent. This year's experience may be taken as a warning that under favourable conditions, serious outbreaks of *Oidium* can occur, in all planting districts. There is, however, no reason to be alarmed about this exceptional experience and control measures to combat the disease may become necessary only if it is found to recur in a more virulent form.

Bird's Eye Spot disease.

This is a very common disease of young plants in the nursery. It may also affect young plants in newly planted fields. The causal fungus is *Helminthosporium heveae*. The infection causes circular spots in the leaves, 1 to 3 mm. in diameter, with a transparent papery centre and distinct, narrow, brown margin, resembling birds' eyes. Dissemination of the disease is largely by spores. Immaturity of the leaves and sunshine should coincide for the development of this disease. Lack of water at the time of planting or during early shoot development are reported to

aggravate the disease. In districts where prolonged drought obtains and in well-drained sites where the water level is too low for the tap root to reach, the disease might occur freely. Leaf-fall has been noticed only in some extreme cases.

No specific treatment for the effective control of this disease has yet been found out. Weekly spraying of new shoots with a weak Bordeaux Mixture or Perenox provides some control against severe attacks. Shading the nursery with a tall *pandal* may prevent this disease but it may prove to be rather costly where large nurseries are concerned.

To turn now to the diseases of the Stem and Branches let us consider first Pink Disease.

This is one of the commonest stem and branch diseases of rubber in most rubber growing countries and is caused by the fungus *Corticium salmonicolour*. It occurs on jungle trees and cultivated woody plants. The first disease reported on rubber in S. India by Anstead, in 1910, was the Pink disease. It is a wind-borne disease and usually originates at a branch fork. After attacking and killing the bark the fungus may penetrate the wood beneath. A kind of ring barking of the branch results and the parts above die off. The fungus usually develops during the wet season and remains inactive during the dry season. As it is not a conspicuous disease and its effects not so spectacular as those of the abnormal leaf-fall diseases, it is frequently unnoticed and neglected by many planters particularly in the earlier stages of its development. Some pass it off as a case of the common die-back disease. In long-neglected cases the disease has been found to descend down the stem and kill the whole tree.

It is possible that routine spraying of Bordeaux Mixture for the control of *Phytophthora* affords some measure of control over the rapid spread and development of Pink disease. But its widespread incidence, even in regularly sprayed areas, indicates that further measures are necessary to control the disease. Generally speaking, treatment of this disease seems to have been neglected and the injury it is capable of doing to the rubber tree not fully realised by many planters. Details relating to the symptoms and control of Pink disease have been published in the Board's Bulletin, Vol. I, No. 4.

Die-back disease.

This term is loosely applied to most cases of the death of shoots and branches irrespective of their origin. Besides parasitic fungi, ecological and physiological conditions may cause die-back. Water-logged conditions of the soil, presence of rocks or hard 'pans' close to the soil surface (which obstruct and prevent the tap root from penetrating deep into the soil to absorb water), nutrient deficiencies, or any combination of these factors might cause die-back. These conditions which weaken the tree may also favour and facilitate attacks by parasitic fungi. Species of *Phytophthora*, *Diplodia* and *Gloeosporium* are known to cause die-back diseases of the shoots and branches. Generally such infections are more common in unsprayed than in regularly sprayed areas, which indicates that parasitic fungi are responsible in a larger measure for it. To carry out suitable treatment it is essential that the origin of the disease in each case should be determined.

A common Die-back disease of new shoots of young seedling and budded rubber up to the age of about 3 years, in nurseries and fields, was investigated recently. The outbreak of this disease usually coincides with that of Phytophthora

during the S. W. monsoon. Probably it may be on account of this that the disease was generally believed to have been caused by *Phytophthora* in this country. Closer observations, however, revealed that the attack of the disease differed in certain respects from that of *Phytophthora*. Specimens of affected shoots from field plantings and from nurseries have been examined by the Government Mycologist, Agricultural College, Coimbatore. In the former specimens *Gloeosporium* and *Phyllosticta* were found and in the specimens collected from the nursery which adjoined mature seedling trees affected by *Phytophthora Meadii*, only *Gloeosporium* was present. Further examination on this Die-back disease will be undertaken during its next outbreak for confirmation.

Mouldy Rot.

This is a disease of the tapping panel and the causal fungus is *Ceratostomela fimbriatum*. Infection usually takes place on the exposed soft tissues of recently tapped bark under damp conditions. The affected bark rots completely in 3 to 4 weeks' time, forming wounds and exposing diseased and discoloured wood. The dead tissue scales off on drying and islands of callus may be seen forming beneath in an attempt to heal over the exposed wounds. The healing process is rather slow and in severe cases the renewed bark may be knobby, uneven and difficult to tap.

In South India the most favourable season for the outbreak of Mouldy Rot disease is the S. W. monsoon. Precautionary measures against it have become a routine practice in most estates and many small holdings. This consists of the application of 'Burma Paste' or weak Izal preparations by painting on the recently tapped bark. Owing to this precautionary measure the degree of incidence of this disease in this country cannot be assessed. Widespread infections have, however, been reported on small holdings where no precautionary measures were taken.

In this connection, it may be mentioned that there is another practice of applying some protective coating on the renewing bark for protection from sun scorch during wintering and in the subsequent dry season. The protective coatings usually applied are white clay or clay-cowdung mixtures with or without a fungicide. These routine practices are now well established in most estates even though their benefits and economy have not been investigated and assessed correctly. The Indian Rubber Board is now planning some field experiments to investigate whether the incorporation of bark stimulants with fungicides and scorch resistant preparations would encourage better rates of bark renewal under South Indian conditions.

Among other parasitic diseases of the stem and tapping panel which are not so common but are reported to have occasionally caused much trouble are *Ustulina zonata*, Strioe-Canker and Patch Canker. The fungus *Ustulina* attacks not only the stem but also roots. It is essentially a disease of the wood and infection generally takes place through splits at the forks of the main branches and wounds on the stem and exposed lateral roots. A frequent point of attack is the bole of trees in tapping at ground level. If the bole is not periodically cleared of Scrap rubber and earth scrap, this causes fermentation and ultimate death of the bark beneath through which the fungus appears to penetrate with ease. Unless this disease is detected and treated at the early stages of its development, it may kill the tree. In South India casualties from it are reported to be greater among old trees and the parts attacked more frequently are the collar and roots. Application of fungicidal paints at the splits, pruned surfaces, wounds and periodical

cleaning of the bole at ground level and the soil around should normally protect the tree from the attack of this disease.

'Patch Canker' and 'Black Stripe' diseases of the bark and tapping panel are believed to be caused by species of *Phytophthora* and *Pythium*. In low lying areas dense foliage and damp conditions favour the outbreak of these diseases. On hilly areas they are associated with lightning strike during stormy weather. Black Stripe of the tapping panel is known to develop into Patch Canker below the tapping cut if treatment is neglected. The fungicides applied against Mouldy Rot, mentioned above, should also check the attack of Black Stripe disease on the tapping panel. With the exception of one case, no serious cases of Patch Canker have been reported during the past few years.

Now let us for a moment consider Root diseases. While the above-ground diseases which affect the fruits, leaves, branches and stem of the rubber tree can be detected at more or less during the early stages of their development and necessary treatment undertaken before much injury is caused, the problem of detection and treatment of root diseases is more difficult and expensive. External symptoms of the effects of root diseases usually become apparent only when they had reached an advanced stage when recovery is often practically impossible. The external symptoms generally are discolouration of leaves accompanied by upward curling of the margins and tips which finally turn yellowish brown and fall off as in wintering. Where the disease had affected only some of the main lateral roots, the branch or branches of the tree which draw their water supply mainly through those roots may be affected. Where the tap root is seriously affected either the whole or the top of the crown may show the above symptoms. For early detection, therefore, periodical tree-to-tree inspection which involves some digging up of the soil round the collar is necessary.

Fortunately, nature has been kind to us in South India in keeping these elusive underground enemies under check and letting loose only some of the above-ground enemies for us to wage war against. Had we both types of enemy to fight, the problem would have been terrific and economic production of rubber in the country very difficult.

The major root diseases of rubber in other countries are the White Root Disease caused by *Fomes lignosus*, the Red Root-Disease caused by *Gandoderma pseudoferreum*, Brown Root Disease caused by *Fomes noxious* and the Dry Root Disease caused by *Ustulina*. These are frequently present in tropical and sub-tropical jungles. When the jungle is cleared and planted with rubber, infection of healthy trees takes place by root contact with diseased roots of the original jungle left in the soil. The affected roots of rubber trees in turn spread the disease to the neighbouring tree roots which come into contact with them. It has also been suggested that stumps of rubber or jungle trees may become infected through the exposed cut surfaces, by windborne spores of some of these diseases and these might become sources of infection of healthy trees by root contact.

Even though these diseases are present on many estates in South India they have seldom caused any serious destruction. Cases which required attention and treatment have been rather rare. Local conditions do not seem to be quite favourable for the development of these diseases However, we cannot completely ignore the disease which may show up under favourable conditions in any plantation particularly in replanted areas.

Finally there are the *Physiological Diseases.* One of the commonest diseases of the rubber and one which should receive greater attention is the Brown-bast disease of the bark. The disease was first noticed in S. India by McRae in 1918. In the following year he stated that *Phytophthora* took second place to Brown-bast and suggested that the latter was caused by physiological disturbances in the bark tissues. It is now generally accepted that this disease is not caused by any fungus or bacteria but that over-extraction of latex is the fundamental cause of the affection. Exceptional cases of Brown-bast in untapped trees caused by mechanical damage or strain of the latex vessel tissue have also been reported. As the symtoms and other characteristics of this disease are well known to planters in S. India, they are not described here.

A very undesirable character of the disease is that it develops usually on quicker growing and high yielding trees. Preventive treatment in the case of clones and seedling families where the incidence is about 10% or more is to reduce the intensity in the frequency of tapping, for example, from alternate daily tapping to third daily tapping. For the recovery of the affected trees the old method of isolation and removal of the affected patch of bark by scraping, planing etc., is not being followed now. Cessation of tapping is now recommended as the main treatment. If the disease is detected at the early stages of its development, 3 to 6 months' rest from tapping might result in the disappearance of the disease. If resting is effected at a later stage, the diseased region of the bark may die off and new bark will develop underneath. This may become tappable only after a few years. Very advanced cases may not recover at all but produce protuberances which make tapping difficult.

Diseases may also be caused by nutrient deficiencies of the soil. Some of these can be identified by symptoms which show on the leaves. Application of the deficient element or elements should cure the disease.

Details of symptoms, treatment, etc. of the diseases are not described in the above notes. The Indian Rubber Board will be glad to supply these details to planters who need them and also to render assistance in determining the cause of diseases of rubber on their plantations.

REPORT ON THE DISTRIBUTION OF SELECTED CLONAL SEEDS AND CLONAL SEEDLING STUMPS BY THE INDIAN RUBBER BOARD IN 1953

The distribution of selected high yielding varieties of clonal rubber seeds procured from selected plantings in S. India is one of the main items of extension work being undertaken by the Indian Rubber Board. Until 1953 the material distributed consisted of illegitimate seeds of clone Tjir. 1. But this year seedlings of this clone which had been planted in the Board's two nurseries in 1951, were also distributed to rubber growers as stumps.

Distribution of Clonal Seed

There has been a progressive increase in the demand for clonal seeds from rubber growers in recent years as will be noticed from the figures given below:

Year	Total quantity of seed distributed by the Board	Total number of recipients
1949	8,000	13
1950	160,000	71
1951	550,000	212
1952	798,580	365

As the seed distribution scheme is subsidized entirely by the Board, which derives its revenue from all classes of plantations—estates as well as small holdings—the distribution is not restricted to any particular class of rubber growers. However, the vast majority of applicants for seed under the above scheme consisted of small holders and owners of medium estates among whom this type of planting material has become very popular. As the demand for seed increased and in order to distribute the available supplies of seed in the country among as many rubber growers as possible, a ceiling for the maximum supply to any individual, at concessional and at cost prices, was fixed according to the estimated availability.

During this year the demand was expected to be much higher than in previous years but the prospect of a good seed crop appeared to be rather poor owing to the attack of *Oidium* disease during wintering in the areas from which seeds were usually obtained. However, these sources had made a tentative promise to supply about 1,400,000 seeds. As the supply position did not appear to be very bright the maximum allotment of seed to any individual (with the exception of an application from Andaman Islands) was fixed at 4,000, half of which to be supplied at the concession price of Rs. 20 per thousand and the rest at about the cost price of Rs. 30 per thousand seeds. Applications were invited on the above basis and as the total demand did not reach the estimated availability within the specified period the period was extended by another month. Within this extended period applications for 1,200,000 seeds were registered for supply. A large number of late applications were also registered provisionally for supply, if sufficient quantities of seeds became available. The total demand including this amounted to 1,900,000 seeds from 1095 applicants. The late applicants as well as applicants for larger quantities than was allowed under the Board's scheme were advised to book their requirements with approved seed suppliers to ensure supplies.

As the seedfall season approached, elaborate arrangements were made as usual to handle the distribution of seeds. Unfortunately, however, the seedfall was very irregular as the late monsoon interfered with the ripening of the pods and a proportion of the unripe pods in some areas were reported to have been blown off by stormy wind. In the end, therefore, only about half the quantity of seed promised by the suppliers became available for distribution. The quality of seed obtained from some sources was rather unsatisfactory and these were laid out in germination beds and distributed as sprouted seeds.

Thus, the total quantity of seeds which could be distributed this year was only 610,800 of which 144,050 were distributed as sprouted seeds. A total of 375 parties, in the order of priority of their application, received the seeds.

The Board regrets that owing to unforeseen causes beyond its control quite a number of applicants for clonal seed had to be disappointed and inconvenienced this year.

Distribution of clonal seedling stumps

In 1951 the Board had established two nurseries for growing clonal seedlings, one at Rajagiri Estate in Central Travancore and the other at Poonoor Estate in Malabar, the land for which at the above estates were kindly leased to the Board on a nominal rent by Messrs. A. V. Thomas & Co., the Agents. These were planted with illegitimate seed of clone Tjir. 1 during the seedfall season August and September 1951. The monsoon practically ended by the 1st week of September and the rest of the month was rather dry with little rainfall. In October and November there were a few irregular rainfalls (N. E. monsoon) and the seedlings had grown up fairly satisfactorily. Since then the rate of growth was rather slow particularly during the dry summer months of March, April and May in spite of mulching the beds with dry leaves and periodical watering. With the onset of the S. W. monsoon in June 1952 the plants picked up very vigorous growth but with the exception of a small number of vigorous plants, the rest did not attain the standard size for stumping and transplanting during the 1952 planting season. It was, therefore, decided to leave the plants in the nurseries and distribute them only during 1953 planting season. This was not unexpected because the general experience in S. India is that seeds planted in nurseries late in August and September do not attain the required size for transplanting as stumps by the next planting season (i. e., in a period of 9 to 10 months) owing to retardation in growth during the subsequent long dry season.

By the 1953 planting season the plants had grown very well and had an average diameter of more than one inch at the collar. As the nursery scheme was also a part of the extension work, the Board decided to distribute the plants at a reduced price of 3 annas per plant for quantities up to 100 plants and at 4 annas per plant for quantities above this number supplied to any individual. The approximate cost per plant was estimated at 4 annas. As the demand could not be estimated, no ceiling for supply to any individual applicant was fixed. It was also decided that allottees should take delivery of the plants ex-nursery and make their own arrangements to transport them to their destinations.

Applications were invited for purchase of the clonal seedling stumps on the above terms within the specified period.

The demand exceeded the estimated availability in both the nurseries. Applications received late were registered in a provisional list for supply, subject to availability. To facilitate easy transport, applicants from Malabar were allotted seedlings from the Poonoor nursery and those from Travancore-Cochin, from the Rajagiri nursery.

The total number of clonal seedling stumps distributed from the two nurseries amounted to 119,791. The total number of recipients amounted to 93.

YIELD MAINTENANCE OF MATURE RUBBER TREES*

Complete knowledge has not yet been achieved of the fertiliser requirements of a rubber tree throughout the full course of its life, partly because detailed nutritional studies of the tree have to be made and partly because we do not know the extent of the economic life of a rubber plant. *Hevea brasiliensis* is a healthy, tough, sturdy grower and may be found 'still going strong' after forty, fifty or sixty years of life.

Information is needed on the fertiliser requirements of trees of all ages, and manuring problems of rubber trees resolve themselves into several categories. From the time of replanting, or of planting, to maturity the trees should have sufficient of the right nutrients to maintain steady growth and health in order that at as early a date as possible tapping may commence and an income be obtained from the trees.

During the next stage of their development when the rubber trees are in tapping, first on virgin bark and then on renewed bark, the question is usually posed—'when' should these young mature trees start to receive fertilisers so as to obtain the maximum yield for the maximum length of time?

The third and final period when fertilisers may be needed in the tree's existence is in its old age, and then it must be decided whether it should receive further applications or whether it should be earmarked for replanting. This article will discuss aspects of manuring in relation to yield level which arise during the tappable life of the rubber tree.

The level of yield of dry rubber which a group of rubber trees will produce when tapped depends on many factors including:

genetical characteristics (perhaps most important);
health and vegetative condition (controlled by all the agronomic factors of the plant's environments);
conditions of tapping.

Considering the first of these three factors, it has been convincingly demonstrated by the geneticist and plant breeder, from field trials, that the use of carefully selected, tested and 'proved' planting material can raise the yield from a given area to twice or even thrice that of a similar area of unselected seedling trees. Secondary genetical characteristics which are usually fully considered when testing new planting material, such as quality of bark renewal, tendency to brown bast under tapping, etc., are also factors affecting yield.

We know that different yield levels for the same clone can be obtained in different parts of the country, and that these differences are largely due to environment, including variations in the nutrient status of the soil. The magnitude of the yield differences within one clone, however, is relatively small, and far below the yield improvements that plant breeders have introduced.

Finally, the yield performance of rubber trees may be altered appreciably according to the type of tapping cut and its height up the trunk of the tree, by frequency of tapping and rate of bark consumption, by the condition of the bark and its rate of renewal. Other variables in the conditions of tapping are the tapper's skill and the size of his task and weather conditions.

* Reproduced, with acknowledgements, from the Planters' Bulletin of the Rubber Research Institute of Malaya, New Series No. 8.

Economics of Replanting

It is usually no straight forward task to answer the simple question of a planter: "Should I manure my rubber trees?" Even if adequate technical knowledge is available to permit a reasonably definite forecast of the yield trend after manures are applied to the trees, the ultimate decision on manuring will depend on the replanting policy and on the financial condition of the company.

The economics of replanting of old rubber trees can be reduced to a general formula, if a few reasonable assumptions are made. In effect, costs are set out to compare (A) replanting with (B) retaining and manuring the old trees, over a period of years until the replantings come into tapping:

A. **Replanting.**

Estimated replanting costs (5 years) — $ 400 per acre (a)

Combined yields for 6th & 7th years—1,000 lb. per acre.

Yield for 8th year—1,000 lb. per acre

Total yield after 8 years — 2,000 lb. per acre (b)

B. **Retaining and Manuring Old Trees.**

Cost of fertilisers after 8 years at $ 25 per acre per annum. — $ 200 per acre (c)

Total yield after 8 years at 500 lb. per acre per annum. — 4,000 lb. per acre (d)

Thus, at the end of 8th year the replanted area has an adverse balance composed as follows:

Cash expenditure $ (a—c) plus (d—b) lb. rubber lost

which, on the figures and amounts assumed above, amounts to $ 200 expenditure and 2,000 lb. rubber per acre.

The net increased yield of rubber per acre per annum which the replanted trees will give is 500 lbs. which will offset the deficit of 2,000 lb. after four years. The expenditure deficit will require two or three more years before it is liquidated, depending on whether the net profit per lb. of rubber is 10 cents or 20 cents, or some other figure.

Hence, on the assumptions regarding expenditure and yield which have been made above, there is a clear advantage in replanting old rubber trees as opposed to manuring them, in that after approximately 15 years the capital expenditure involved in obtaining a new stand of high yielding trees will have been completely recovered. The new trees, being younger, have a much longer expectation of life at a higher yield level than old ones. There are other advantages which should be credited to the replanted rubber which have been excluded by the assumed levels of yield and expenditure given in the example shown above. Thus (a) the maximum yield of the replanted trees is likely to be in excess of 1,000 lb. per acre which was assumed; (b) the yield of the old trees would, in spite of regular manuring, probably decrease gradually with age; (c) the manuring requirements of the replanting, after it matures and is tapped, are likely to be less than those of the old trees (the assumption made in the example was that the manuring rates for the two lots of trees would be equal from the 8th year onwards).

Manuring Experiments

Manuring experiments have been carried out in the rubber growing areas of the East over a number of years and most of the published results which are available refer to trials on seedling trees. A brief summary of experiments and results follows.

Experiments started in Sumatra in 1919 on 8 to 9 year old seedlings growing on a poor 'white' alluvial soil, and at that time yielding 200 to 300 lb. per acre per annum, showed double the yield of the control in the 3rd year; biennial dressings of nitrogen gave a maximum of 670 lb. per acre in the 10th year. On the other hand, prolonged experiments on certain 'red' volcanic soils, which showed no initial response, began to give economic returns for manuring after 15 years, at which age deterioration normally sets in on this soil type.

Dunlop nitrogen trials (*Malaya*) started in 1930, as a simple test of sulphate of ammonia on fields of rubber past their prime, gave an average improvement in yield of 34% in the 6th year (annual manuring) on trees which were initially yielding some 350 lbs. per acre per annum.

I. C. I. Experiments (*Malaya*) started in 1931 (biennial manuring) on rubber which at that time ranged from 8 to 19 years old giving from 450 to 700 lb. per acre per annum; of the seven experiments recorded, one gave very quick response in yield (12 years old rubber growing on poor quartzite loam and yielding 450 lb.), three gave economic response in the 3rd year, two in the 4th and 5th year and one no response. The increase obtained in the different experiments up to the 5th year varied from about 10 to 25%.

Dunlop 25 plot experiments (*Malaya*). Annual manuring started in 1930–31 on rubber 8 to 22 years of age and yielding from 300 to 650 lb. per acre per annum. Of the eleven trials, four fairly quickly gave responses which were considered economic, two began to respond after 3 to 4 years whilst five failed at the 5th year (1936) to give adequate return. Of these five trials four were started before there was obvious need for manuring, leaving one with unexplained poor response. The outstanding successful trial concerned 14 year old backward rubber giving 250 to 350 lb. the yield of which rose to 544 lb. in the 5th year.

Manuring experiment at R. R. I. Experiment Station, where continuous manuring from the time of planting was given to seedling trees on a very sandy soil, showed the best effects from a 'complete' fertiliser.

The histories of the pre-war fertiliser experiments on mature seedling rubber show:

(*a*) that foliage improvements are general and rapid, but that a quick response in the form of increased yields occurs only with younger stands of badly deteriorated trees growing on depleted, previously cultivated sites.

(*b*) that the yield advantages in older and better grown rubber are realised not so much in raised yield levels as in a relative maintenance of yields against an otherwise inevitable deterioration.

(*c*) that the effects of manures upon girth increment are more immediate and definite than upon yield. Effects on bark which has renewed

within the period of manuring may be appreciable; little is known regarding the effect on bark which has renewed prior to fertiliser application but it is evident that the effect is neither appreciable nor immediate.

(*d*) that nitrogen is the fundamental need and except on very sandy soils, the addition of minerals to nitrogen or the use of organic forms of fertilisers gives no advantage commensurate with the extra cost.

(*e*) that the economic fundamentals of a field of rubber trees change but slowly, and manuring must be regarded as a long term policy.

These pre-war experiments were mostly with comparatively young mature trees, and in those years, with the low costs of tapping and of fertilisers, the yield stimulus to the poorer trees and the maintenance of vigour and yielding capacity of the better trees fully justified the expenditure on manuring.

The Situation Now

Continuing our consideration of seedling rubber trees of ill defined parentage, the situation has changed appreciably; apart from the greatly increased costs of fertilisers and labour, the trees may now be 25 or 30 years of age, stands per acre are lower and the bark being tapped is often thin, hard and uneven and of varying degrees of renewal. Nowadays, the long term rejuvenation of low yielding old rubber should not be contemplated, but it will be for consideration whether the younger seedling plantings and the earlier budgrafted areas, still in apparently good condition, should be manured.

Such trees appear to have received a substantial boost in vigour because of the enforced rest during the war years. The reduction of competition provided by the clearing of heavy undergrowth coincided with the resumption of tapping in 1946–47 and produced the high 'flush' yields of that period. These yields have now stabilised under organised tapping at a normal level but as many estates will find it necessary to tap this type of rubber for some considerable time, the application of fertilisers must at least receive consideration as a means of maintaining these areas as competitive units.

Yield limits cannot be precisely stated below which expenditure on manuring should not be entertained, but general opinion puts the figure in the region of 600 lb. per acre per annum. Clearly this limit will be closely related to fluctuations in the price of rubber, and other factors, apart from yield and vigour of the trees, will need to be considered in assessing the desirability of manuring, such as the age of the trees, the quality and amount of bark available, the rate of bark renewal, and the costs of the fertilisers, which involve type, rate and frequency of the applications.

The rate of growth of a tree falls rapidly as it ages and, for a rubber tree, particularly after it comes into tapping. Normally bark renewal depends largely on the processes of girth expansion and, if girthing is greatly reduced, bark is unlikely to renew to tappable thickness.

The younger the trees at the commencement of treatment, the more likely will it be possible to maintain their vigour, normal growth rate and renewal of bark, which are essential for their exploitation over an extended period.

The yield of latex from a seedling tree normally increases gradually as the cut moves down the trunk, and there is invariably a drop—sometimes substantial —in yield on turning over to a high cut. Yield fluctuation with height of cut will obtain during the economic life of the tree irrespective of whether or not fertilisers are applied; it is possible that fertilisers may, by gradually improving the quality of the bark, raise the level of high cut yields.

Whilst the use of fertilisers will undoubtedly improve or help to maintain foliage condition, single applications will do no more than produce temporary stimulation and the best results will be obtained if fertiliser application is regarded as a long term policy for which more or less permanent provision must be made. Sulphate of ammonia is the most economic nitrogen fertiliser, and for old rubber it is usually expected to be the most effective fertiliser if applied regularly over a period of six or seven years at 3 cwt. to 4 cwt. per acre every two years. Should there be any possibility of the trees coming into a replanting programme in less than 10 years, the maximum fertiliser effects are not likely to be obtained and a scheme of manuring should not be started.

The Middle Aged Tree

Another category of rubber trees which is increasingly coming under consideration for manuring is that which includes the middle aged trees of up to date high yielding material, both budgrafts and clonal seedlings. Many such areas were replanted after 1930, and during immaturity the trees received generous applications of fertilisers. Even plantings from jungle may have had phosphate fertilisers at the time of planting, but, whether the trees were replanted or not, their agricultural treatment has been much superior to that given to trees planted before, say, 1920. The use of leguminous ground covers and, on steeper land, the provision of contour earth works (terraces and bunds) and contour planting rows, have not only largely eliminated the harmful effects of soil erosion but the continuous existence of soil protecting covers has helped to maintain and build up the physical condition of the surface soils.

The standard of maintenance of these middle aged areas has been good, except during the war period. For the early years of the plant's life the weeding policy, to keep clean the planting rows and terraces, was intended to provide adequate protection to the main area of soil without interfering with the optimum development of the maturing rubber tree. Careful attention to the problem of root disease has been given in replanting operations, prior to removing the old stand of trees as well as later on by regular inspection and treatment of the new trees and unnecessary losses of trees have been largely avoided. By judicious thinning out at agreed intervals the density of the trees in the new plantings and replantings has been reduced so as to prevent overcrowding and loss of girth. Finally these trees have been so tapped as to avoid heavy consumption of bark.

Thus the approach to manuring in areas of middle aged, high yielding rubber is often one of maintenance of an existing condition and the prevention of its deterioration.

The background of field experiments is still incomplete for this type of rubber tree. The trials in progress have mostly reached the stage where the trees, about 15 years of age, have had three biennial applications of fertilisers and have at least another year of tapping on virgin bark before renewed bark is reached.

The effects of the fertilisers cannot yet be fully assessed but the picture so far obtained is that the changes in girth and yield which have resulted from the applications of manures have been few and small. The conclusion at this stage, therefore, is that for trees which have been planted or replanted under normal conditions and treatment, the use of fertilisers after maturity does not appear to be necessay during the first tapping cycle on virgin bark.

The Older Tree

For older high yielding budgrafts and clonal seedlings 15 to 20 years of age, there is no new information available from manuring experiments, but in such plantings recommendations for treatment are frequently requested to counteract unexpected and apparently unexplainable falls in yield. In seeking to account for these yield decreases and before deciding whether the use of fertilisers is required, the possibility must first be examined whether obvious factors are involved, such as weather conditions, prolonged wintering or secondary wintering, abnormal loss of crop through wet days, change of tapping system, height of tapping cut and its approach to renewed bark etc.

In asessing the desirability of using fertilisers to improve yields it is as well to remember that practically nothing is known of the physiological relationship between the nutrition of the rubber tree and the production of latex. Tests with young seedlings show that the benefits in growth of the rubber plant which follow the use of the major nutrient elements only produce extra rubber hydrocarbon in proportion to the extra vegetative growth. The yield improvements obtained in the older manuring experiments have always followed growth improvements. These observations suggest that the level of production of latex in a rubber plant is a genetical or inherent characteristic which cannot be influenced by nutrient factors, except in so far as the best yield will come from the plant of best vegetative development, other things being equal.

In an untapped tree, the d. r. c. of the latex is high, and it is generally agreed that there is no circulation or movement of latex in the latex vessels; little or no replacement then of latex is required and the tree is able to put the greater part of its energy into growth. With repeated tapping, the rubber content falls and after a short interval of time, when the rate of manufacture of new latex is balanced by the rate of extraction by tapping, it reaches a constant composition depending on the type of tree and the tapping system. With tapping, therefore, the growth rate of a tree is invariably retarded for the reason that part of the food materials which it manufactures is used in the formation of latex to take the place of that removed. Again it is known that an increase in tapping intensity leads to a lower concentration of the latex in the vessels, but, as a greater yield is generally realised in practice, this implies that the tree is manufacturing rubber at a greater rate. In young trees this increase in rubber formation is at the expense of growth, but in old trees—which are growing only slowly—it must be made presumably at the expense of food materials already stored. Under conservative methods of tapping old trees there is a lag between the beginning of starvation and its final result in diminishing yields (and a corresponding lag in the observed effects of fertiliser applications as reflected in increased yields), but this period will be substantially reduced by increasing the intensity of tapping.

Conclusion

The need for manuring and the results to be expected from fertiliser applications to mature rubber trees should be viewed along the following main lines:

(*a*) Fertilisers can, at the best, raise yields only to the capacity of the trees as determined by their genetical constitution.

(*b*) Manuring of rubber trees does not appear directly to stimulate the secretion of latex, but merely brings about a gradual improvement in the condition of the trees. Such improvement subject to the non-operation of other factors detrimental to growth, may react favourably on the rate of bark formation which in turn may eventually lead to better yields.

(*c*) A single application of chemical fertiliser may result fairly rapidly in improved foliage, but continued manuring will usually be necessary to maintain the initial stimulating effect.

It is impossible to say how the costs of fertiliser equate with the improved or maintained yield of latex which may result. In areas giving substantial yields of latex, the use of fertilisers should be regarded as a form of upkeep intended not necessarily to improve production but to maintain it by retarding both the general deterioration of the trees and the rate of fall of yield over the envisaged period of tapping. Old age will inevitably reduce performance, whether human or botanical specimens are being considered, and an old rubber tree must deteriorate and show some reduction in yielding capacity irrespective of maintenance treatment. Apart from tapping methods and soil conditions, numerous other factors will operate in determining the amount of rubber per acre being produced, and in effect all that can be confidently expected from manuring old rubber trees is that they should produce more rubber over a ten year period than would be obtained without the use of fertilisers.

From an agricultural point of view, the principle of applying fertilisers to retard deterioration and to maintain a level of production is perfectly sound, but the problem becomes for old seedling trees, an economic one to be considered in terms of expected yields and cash returns over a ten year period, the yielding capacity of the estate as a whole, and the finances of the company. At the back of these considerations come the policy of the company regarding replanting, and the future of natural rubber in relation to world prices and competition with synthetic—neither of which is a subject to be discussed here.

The fertiliser treatment of somewhat younger, but middle aged, high yielding areas has to be considered on the same principles, but, because of the higher level of yield and with replanting a much more distant project, it is a better and safer proposition. If there is any doubt when to commence the use of fertilisers, it will be better to start too early than to delay too long until a fall in yield has occurred, because it is easier to maintain yields at a certain level than to build them up to a higher level.

INDIAN RUBBER STATISTICS

TABLE 1

Monthly Production, Dry Weight in Tons, 1948 to 1953 (September)

Months	1948	1949	1950	1951	1952	1953
January	1,425	1,326	1,291	1,307	1,651	1,992
February	270	257	208	260	325	390
March	956	798	988	902	1,127	1,031
April	1,498	1,563	1,640	1,664	1,973	2,045
May	1,646	1,240	1,450	1,808	1,533	1,893
June	694	854	836	562	1,153	1,425
July	844	904	758	1,258	1,510	882
August	1,068	1,245	1,053	1,654	1,167	1,894
September	1,646	1,410	1,414	1,756	2,596	2,368
October	1,796	1,944	1,937	1,807	1,972	
November	1,742	2,011	1,975	1,981	2,450	
December	1,837	2,035	2,049	2,189	2,406	
Total	15,422	15,587	15,599	17,148	19,863	

TABLE 2

Monthly Consumption of Raw Rubber (Indigenous and Imported) by Rubber Goods Manufacturers (Tons) 1948 to 1953 (September)

Months	1948	1949	1950	1951	1952	1953
January	1,587	1,548	1,162	1,868	2,059	1,621
February	1,494	1,414	1,295	1,894	1,980	1,637
March	1,587	1,284	1,320	1,821	1,954	1,698
April	1,668	1,981	1,435	2,134	1,598	1,770
May	1,432	1,847	1,372	1,576	1,514	1,871
June	1,875	1,770	1,517	1,131	1,757	2,021
July	1,801	1,785	1,800	2,077	2,035	2,124
August	1,902	1,819	1,670	2,007	1,840	1,986
September	1,753	1,638	1,506	1,953	1,633	2,274
October	1,109	1,068	1,253	1,788	1,330	
November	1,700	1,697	1,737	2,061	1,686	
December	1,811	1,341	1,668	2,117	1,675	
Total	19,719	19,192	17,735	22,427	21,061	

TABLE 3

Imports of Raw Rubber into India during 1948 to 1953 (September)

Months	1948	1949	1950	1951	1952	1953
January	..	501	339	945	447	47
February	..	354	41	1,377	638	50
March	..	954	44	1,124	217	150
April	..	691	..	850	544	..
May	..	9	132	521	187	10
June	315	71	44	477	315	..
July	705	..	..	843	..	15
August	444	..	..	115	235	..
September	941	3	..	185	300	..
October	649	2	75	243	388	
November	595	66	175	136	336	
December	684	116	232	105	244	
Total	4,333	2,767	1,082	6,921	3,851	

TABLE 4

Exports of Raw Rubber from India (Tons) 1950-1953 (September)

Month	1950	1951	1952	1953
January	..	..	4	2
February	..	..	6	..
March	89	..	1	5
April	383	..	5	2
May	373	..	..	7
June	1	..	..	16
July	112	16	6	..
August	27	20	4	..
September	17	23	2	45
October	12	38	4	
November	16	36	..	
December	8	12	64	
Total	1,038	145	96	

C. M. S. P. 21—2000 3-11-1953

MEETING OF THE INTERNATIONAL RUBBER STUDY GROUP: RUBBER PRICE STABILISATION PLAN

London, Nov. 2.

The Rubber Study Group has put forward a three-point plan to ease recent price developments which had placed the natural rubber industry "in a serious position."

The group, which has been considering the desirability of setting up a rubber buffer stock to even out price fluctuations since it met here on October 12, listed these suggestions: 1. Acceleration of replanting programmes; 2. Creation of new natural rubber stocks or additions to existing stocks, whether Governmental or commercial; 3. Action by the United States Government to increase the price of GRS (general purpose synthetic rubber) to re-examine its practices in stock-pile rotation, and to revoke a directive issued in 1952 about the level at which mandatory consumption requirements for synthetic rubber might be reimposed.

In a communique the Group said it had been agreed that recent price developments were placing the natural rubber industry in a serious position. It put forward its plan for information and possible action by member Governments and private commercial interests.

The communique said "the meeting re-examined the draft buffer stock agreement prepared by the working party in January 1953, but did not find any substantial change since the meeting of the Group, last May, in the view-points of the delegations at the special meeting as to the necessity for a buffer stock agreement.

Surplus Stocks

"After reviewing the facts of the rubber situation, the meeting foresaw a statistical surplus of natural rubber of 169,000 long tons by the end of 1953, contrasted with the surplus of 193,000 long tons foreseen after the May meeting of the full study group.

"The meeting noted the actual surplus will be considerably less than the revised estimate because of additions during 1953 to governmental and consumers stock.

The meeting noted that the representative of the Rubber Manufacturers' Association reaffirmed that the United States manufacturing industry representatives believed that the position set out in their communique at Copenhagen on May 15, 1953, would in fact be realised."

The communique added that the United States delegate agreed to transmit the Group's ideas for easing price fluctuations to his Government.

The findings of the Group's meetings are being forwarded to member governments.

Delegates from 17 nations and from their colonial dependencies have taken part in the meetings.

Far Eastern countries which produce most of the world's rubber, were represented by Indonesia, Thailand, Viet Nam, Ceylon, Cambodia and British Malaya. Representatives of rubber consuming countries, the biggest of which are the United States and Britain, also attended the meetings.

—The Hindu dated 3-11-1953.

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THE INDIAN RUBBER BOARD BULLETIN

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MEMBERS OF THE INDIAN RUBBER BOARD

Mr. A. V. Thomas, M. P., Chairman. Mr. A. V. George, Vice-Chairman. Mr. M. C. Chandy.	Nominated by the Rubber Growers' Association of India to represent the Rubber Growing Industry.
Mr. S. Bhoothalingam, I. C. S., Jt. Secretary, Ministry of Commerce and Industry. Mr. S. V. Ayyar, Chief Cost Accounts Officer, Ministry of Finance. Dr. B. N. Uppal, Agricultural Commissioner with the Government of India.	Nominated by the Central Government to represent the Ministry of Commerce and Industry.
Mr. M. S. Sivaraman, I. C. S., Director of Agriculture, Madras. Mr. A. M. M. Murugappa Chettiar.	Nominated by the Government of Madras to represent that Government.
Mr. S. Govinda Menon, District Collector, Kottayam. Mr. V. V. Joseph, Addl. Secretary to Government, Travancore-Cochin State Mr. C. Thomas, Director of Agriculture, Travancore-Cochin State. Mr. K. V. Mathew. Mr. T. V. Kochuvareed.	Nominated by the Government of Travancore-Cochin State, to represent that Government.
Mr. B. H. Whitehorn. Mr. K. Srinivasan. Mr. L. Aldred.	Nominated by the United Planters' Association of Southern India to represent the Rubber Growing Industry.
Mr. P. Kurian John. Mr. A. V. John. Mr. A. M. B. Clarke.	Nominated by the Association of Planters of Travancore, to represent the Rubber Growing Industry.
Mr. P. N. Haksar.	Nominated by the Association of Rubber Manufacturers in India, Calcutta, to repesent manufacturers.
Mr. Lalit Mohan Jamnadas.	Nominated by the Indian Rubber Industries Association, Bombay, to represent manufacturers.
Mr. A. G. Shah	Nominated by the Central Government to represent manufacturers.
Mr. T. C. Cherian.	Nominated by the Central Government from among rubber dealers.
Mr. C. E. Bharathan. Mr. K. Karunakaran. Mr. B. K. Nair.	Nominated by the Central Government to represent labour.
The Rubber Production Commissioner, (Mr. K. N. Kaimal)	Ex-officio.

ANNOUNCEMENTS

Supply of Selected Clonal Seed through the Indian Rubber Board during the 1954 seeding season.

The Indian Rubber Board at its last meeting decided to continue the seed distribution scheme in 1954.

The seeds proposed to be distributed are being obtained from selected monoclone plantings of Tjir. 1 and may be a mixture of 'selfed' and 'illegitimate' seeds in varying proportions. In the latter case the male parent might be buddings of a different clone. In cases where seedling trees are present on any of the boundaries of the selected plantings the seeds are arranged to be collected from outside a belt of five chains width from the seedlings, at which distance, the chances of cross pollination and the presence of crossed seed with the seedling trees are considered to be very little.

According to the scheme, the maximum quantity which may be supplied to any one party at the concessional rate of Rs. 20 per thousand has been fixed at 2000 ungerminated seeds. Seeds in germinated condition, if required, may be supplied up to a limited quantity at an extra cost of Rs. 5 per 1000. Limited additional quantities of ungerminated seeds may also be supplied at actual cost if sufficient seeds become available for distribution after making the above basic allocation. Those who require larger supplies than this are requested to book them direct with seed suppliers. A list of suppliers of 'selfed' and 'illegitimate' clonal seeds of Tjir. 1 may be obtained, on application, from this Board.

Those who wish to obtain supplies of selected clonal seed of Tjir 1 through this Board under the above scheme should apply to this Board so as to reach here on or before the 15th May 1954.

If the seeds applied for are required for replanting, the Reg. No. assigned by the Board to the holding or estate should be mentioned in the letter. If it is for newplanting, the locality and survey number of the land earmarked for it should be mentioned.

It may be noted that the quantity of seeds that may ultimately be allotted to registered applicants will depend on the total availability.

Advisory Visits to Small Holdings

The Field Officer Sri P. P. Cherian will be available for visits particularly to rubber small holdings for the purpose of advising owners on improved methods of new planting, replanting, choice of high yielding planting material, tapping, manufacture of smoked sheets, disease control etc. Those who wish to avail themselves of this service provided by the Board are invited to write to the Secretary, Indian Rubber Board, Kottayam, for the same.

There will be no charge for this service.

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OIDIUM HEVEAE

Leaf Mildew Disease of Rubber Trees

The widespread though mild outbreak of *Oidium* leaf disease in practically all the planting districts of South India during the wintering of rubber trees last year caused some concern and anxiety among planters. In some localities it was considered to be a new disease. The general climatic conditions obtaining in the low and midland plantations of the Central and Northern planting districts are not favourable for the development of the disease into any virulent form. Only mild attacks even under unusual weather conditions as in 1953, are expected here. In parts of the Southern districts where climatic conditions are slightly different, on the other hand, the disease had been causing more damage in recent years and might be expected to do so in future as well. Even though the general situation is not so serious as in countries like Ceylon and Indonesia, it is worth watching so that appropriate measures to control the disease might be undertaken when and where the situation demands the same. The following notes on the occurrence, symptoms, etc. of this disease are compiled and published for the information of planters in India.

Occurrence and Origin.

The occurrence of a leaf mildew disease on *Hevea* rubber trees was first reported from Indonesia in 1918, under the name "Powdery Mildew." The causal fungus was described and named *Oidium heveae* by Steinmann in 1925. In the same year, its occurrence was reported from Ceylon and Malaya. Later it had been recorded in Indochina in 1929 and in Belgian Congo in 1937. According to an unpublished source (Mr. K. L. Kershaw, Mundakayam) this disease was first noticed and identified in South India in the year 1947 when it was reported to have caused some secondary leaf-fall during wintering on some highland estates. No records as to whether this fungus was present in the country before 1947 are available.

According to Dr. Young (R. R. I. of Ceylon) the powdery mildew on *Hevea brasiliensis* and *Euphorbia pilulifera* are identical and readily transferable from one species to the other. As this disease has never been recorded on *Hevea* in its native habitat in South America, it appears, according to this author, that *Oidium heveae* was present in the rubber growing countries of the East prior to the introduction of Hevea and that it probably spread from *Euphorbia pilulifera*, a common weed in these countries, to its new host.

Symptoms.

Oidium is most active when the trees are growing new leaves immediately after wintering, i. e. generally during February and March in South India. Young growing leaves are usually attacked on the under side of the midrib. They shrivel from the point of infection to the tip, turn purplish and then black, curl up and fall off. The leaves at this stage are usually less than half grown, tender and brownish in colour. By looking along the midrib on the underside of a leaf attacked by *Oidium* it is possible to see with the naked eye glistening white specks or patches of the fungus. Under a microscope the strands of the fungus mycelium can easily be seen. On the strands are short upright rods which bear spores. These spores are blown away by the wind and so spread the infection to other trees.

The secondary leaf fall caused by *Oidium* and the natural leaf fall of ordinary wintering can easily be distinguished. In the leaf fall caused by *Oidium*, the leaves are usually less than half grown, they are curled up and darkly discoloured, and *when they fall off they leave their leaf stalks on the tree.* In ordinary wintering the leaves are mature and full sized, although dead they are not curled up and darkened, and *when they fall their leaf stalks fall too.*

A more or less similar fall of young leaves as that of *Oidium* is sometimes caused by tiny whitish insects known as *Hevea Thrips*. The distinguishing feature of the leaf attacked by Thrips is that *it curls downward* on each side of the midrib whereas a leaf attacked by *Oidium curls upwards.*

The *Oidium* fungus grows far more readily on the flowers of the rubber tree than it does on the leaves, although not so obviously. The flowers usually develop after the new leaves are nearly full grown and passed the stage of infection. Even if the leaves had escaped the attack, therefore, the flowers may get it if favourable conditions obtain for the outbreak of the disease and the disease may pass unnoticed. Flower stalks, buds and flowers when attacked have a greyish mouldy look and fall off the tree without setting seed. It is probable that *Oidium* is more often to blame for the frequent failures of the seed crop than is generally supposed. The failure of the seed crop in South Travancore in 1953, for example, was mainly due to the attack of this disease on the flowers.

Influence of climate.

Oidium flourishes in dull, cool, showery weather. Such conditions not only help the fungus to grow and spread but also delay wintering and refoliation and thus give the fungus more chance of attacking the trees. The ideal weather for wintering is warm, dry and sunny. This hastens both the falling of the leaves and the growing of the new and so the dangerous period during which *Oidium* could attack the young leaves is quickly passed.

In South India, the planting districts can be divided into two zones according to the incidence of the principal leaf diseases—the *Oidium* zone and the *Phytophthora* zone. The former comprises mainly of the Southern district of Trivandrum, and the latter the Central districts of Quilon and Kottayam and the Northern districts of Trichur, Malabar etc. Climatically the two zones are the N. E. monsoon region and the S. W. monsoon region respectively. In the South the N. E. monsoon is more active than in the other districts and the S. W. monsoon is less so, the former contributing about 60 per cent of the total annual rainfall. Even

though the total rainfall in this region is less than that in the S. W. monsoon districts, it is more evenly spread throughout the year. In this, as well as most other districts, the month of February is generally the driest period of the year having the maximum number of days of perfectly clear sky. Wintering of rubber trees in the South Travancore district usually takes place in March, about 4 to 6 weeks later than in other districts. Dull showery weather usually obtains here during this period. These conditions are favourable for the development of *Oidium* and so the disease breaks out very frequently in a mild or serious form in this District.

In the Central and Northern planting districts, on the other hand, the N. E monsoon is not so active and frequently fails. The S. W. monsoon during June to September provides nearly 80 per cent of the total rainfall, the first spell of continuous rains causing the outbreak of *Phytophthora*. Wintering in most of these districts usually takes place during January—February or even earlier, particularly in the Northern districts if the N. E. monsoon ends earlier or fails The dry weather with clear sky obtaining during February therefore favour a good wintering and refoliation. A few showers may or may not occur during this period. When they do, the showers are usually in the late afternoons or nights but rather dry, hot, sunny weather will obtain during the day. The latter conditions check *Oidium* and hasten the development of the new leaves. Any attack that occurs in such weather is usually mild and confined to the lower shaded branches. The year 1953 was rather exceptional when a few showers and dull cloudy weather prevailed for some days during wintering. This interfered with the normal wintering and the late wintering trees in most districts suffered from a mild attack of the disease, causing in some localities a slight secondary leaf-fall. This year, so far, the weather conditions have been very unfavourable for the outbreak of the disease in these districts and no reports of any outbreak have been received. In the South, wintering has just commenced and reports about the incidence of the disease have not come in.

On high land about 1000 feet or more above sea level, the relatively lower temperature and mist besides rain, provide more favourable conditions for the outbreak of *Oidium*. The trees are attacked practically every year causing much damage to them.

Area planted with rubber in the Southern *Oidium* districts and on higher land, however, forms but a small proportion of the total area under rubber in India. Most of the rubber is grown in the Central and Northern districts in the midland region. Here there has been, if at all, only very mild attacks of the disease. The situation so far does not warrant any anxiety on the part of estates about this disease. In the South and also on high land where the disease had broken out regularly, year by year, estates are advised to keep in stock the necessary equipments for its control ready for immediate use at the first indication of an outbreak of the disease. Estates wishing to protect valuable seed crop in budded areas are advised to take necessary control measures from the beginning of the flowering season until its end.

Damage caused by Oidium.

It is generally agreed by all authors that secondary leaf-fall would weaken the tree and consequently affect its growth and yield adversely. For producing new leaves and their development the necessary food supplies are drawn fro n the reserves present in certain tissues of the tree in the form of starch. Normally, the

Symptoms.

Oidium is most active when the trees are growing new leaves immediately after wintering, i. e. generally during February and March in South India. Young growing leaves are usually attacked on the under side of the midrib. They shrivel from the point of infection to the tip, turn purplish and then black, curl up and fall off. The leaves at this stage are usually less than half grown, tender and brownish in colour. By looking along the midrib on the underside of a leaf attacked by *Oidium* it is possible to see with the naked eye glistening white specks or patches of the fungus. Under a microscope the strands of the fungus mycelium can easily be seen. On the strands are short upright rods which bear spores. These spores are blown away by the wind and so spread the infection to other trees.

The secondary leaf fall caused by *Oidium* and the natural leaf fall of ordinary wintering can easily be distinguished. In the leaf fall caused by *Oidium*, the leaves are usually less than half grown, they are curled up and darkly discoloured, and *when they fall off they leave their leaf stalks on the tree.* In ordinary wintering the leaves are mature and full sized, although dead they are not curled up and darkened, and *when they fall their leaf stalks fall too.*

A more or less similar fall of young leaves as that of *Oidium* is sometimes caused by tiny whitish insects known as *Hevea Thrips*. The distinguishing feature of the leaf attacked by Thrips is that *it curls downward* on each side of the midrib whereas a leaf attacked by *Oidium curls upwards.*

The *Oidium* fungus grows far more readily on the flowers of the rubber tree than it does on the leaves, although not so obviously. The flowers usually develop after the new leaves are nearly full grown and passed the stage of infection. Even if the leaves had escaped the attack, therefore, the flowers may get it if favourable conditions obtain for the outbreak of the disease and the disease may pass unnoticed. Flower stalks, buds and flowers when attacked have a greyish mouldy look and fall off the tree without setting seed. It is probable that *Oidium* is more often to blame for the frequent failures of the seed crop than is generally supposed. The failure of the seed crop in South Travancore in 1953, for example, was mainly due to the attack of this disease on the flowers.

Influence of climate.

Oidium flourishes in dull, cool, showery weather. Such conditions not only help the fungus to grow and spread but also delay wintering and refoliation and thus give the fungus more chance of attacking the trees. The ideal weather for wintering is warm, dry and sunny. This hastens both the falling of the leaves and the growing of the new and so the dangerous period during which *Oidium* could attack the young leaves is quickly passed.

In South India, the planting districts can be divided into two zones according to the incidence of the principal leaf diseases—the *Oidium* zone and the *Phytophthora* zone. The former comprises mainly of the Southern district of Trivandrum, and the latter the Central districts of Quilon and Kottayam and the Northern districts of Trichur, Malabar etc. Climatically the two zones are the N. E. monsoon region and the S. W. monsoon region respectively. In the South the N. E. monsoon is more active than in the other districts and the S. W. monsoon is less so, the former contributing about 60 per cent of the total annual rainfall. Even

though the total rainfall in this region is less than that in the S. W. monsoon districts, it is more evenly spread throughout the year. In this, as well as most other districts, the month of February is generally the driest period of the year having the maximum number of days of perfectly clear sky. Wintering of rubber trees in the South Travancore district usually takes place in March, about 4 to 6 weeks later than in other districts. Dull showery weather usually obtains here during this period. These conditions are favourable for the development of *Oidium* and so the disease breaks out very frequently in a mild or serious form in this District.

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depleted food reserves are built up as soon as new leaves have developed by leaf assimilation. If the young, new leaves fall off before this is accomplished, the tree will have to draw the food materials again from the already depleted reserves for producing leaves a second time. The depleted reserves may not ordinarily be sufficient to build up the normal canopy of leaves. As a result of this, the leaves developed might be found rather unhealthy and the final canopy more or less sparse. If leaf-fall occurs repeatedly, as does occasionally in some countries, the food reserves might be completely exhausted, resulting, in due course, in the death of the brances and the stem.

In Java (Indonesia) the reduction in crop due to one attack of *Oidium* has been estimated by different authors as 10—22 % for the year with further decrease in yield in the second year following a succeeding attack.

In Ceylon, Murray obtained a 16 % increase in yield in a mildew affected area in the dusted plots in the first dusting season and a 75 % greater increase in the next season. There was also a 39 % increase in renewed bark in the protected (sulphur dusted) plots over the undusted plots. This effect was carried on in the next season when no mildew appeared.

Another author, Schweitzer, showed by hand-plucking that a defoliation after refoliation always gives a considerable reduction in yield, a loss of 11—34 % of annual production being recorded when 50 % of leaves are removed. There was shown to be a strong correlation between leaf area and latex yield. After a defoliation the new leaves produced are smaller and with continued defoliations branch dieback occurs.

Susceptibility and Resistance to Oidium Attack.

Trees which refoliate very early in the wintering period do not get much attack from this disease because there is supposed to be insufficient fungus inoculum available then to cause a heavy attack. As the season advances, obviously, the *Oidium* population is built up, causing increased damage to the later refoliating leaves. In mixed seedling populations wintering is not uniform, some trees wintering early and others later at different periods. In mono clone budded areas, on the other hand, wintering will be practically uniform. But the time of wintering of different clones vary very widely. Individual seedling trees or clones which winter early and escape the attack of the disease for reasons stated above should not, therefore, be mistaken as resistant trees or clones. Only those trees which form new leaves in the period of most severe attack and of which the newly formed leaves and inflorescences are not attacked can be considered immune or resistant.

If a clone is found to possess regular early wintering habit, and thus escape the attack of the disease every year, that clone may be taken as resistant for practical purposes, even though technically it is not. Thus, for example, the Rubber Research Institute of Ceylon recommends selection of those high yielding clones which have been found to be regular early winterers and to escape severe attacks of mildew there for planting in *Oidium* districts.

The only clone which has been found to be resistant to mildew disease as a result of research made in Indonesia is the clone L. C. B. 870. In Ceylon, no resistant local tree was found but the R. R. I. confirmed that the above clone is definitely resistant to the disease. The reason for its resistance was shown by Dr. Young of the R. R. I. of Ceylon to be due to the rapid development of the

cuticle as compared with other clones. This allows of only a short period during which infection can occur and does not allow of sufficient time for much damage to occur even when infection does take place. The flowers and flower shoots of this clone are not resistant however.

This clone, however, is comparatively low yielding and therefore, unsatisfactory as an estate tree. Experiments have been commenced in Indonesia and Ceylon using the resistant crown of L. C. B. 870 budded on to high yielding tapping panels which may be buddings or clonal seedlings. The idea is to obtain a high yielding tapping panel and a mildew resistant crown. Early results obtained in Indonesia are reported to indicate that an L. C. B. 870 crown depresses the yield of the tapping panel unless the bud union is about 150 cm. above the tapping cut, i. e., nearly 8½ feet above ground level, when no bad effect occurs.

Control

Sulphur-dusting is considered to be the most practicable way of controlling *Oidium*. Nurseries and young trees can be treated using hand-operated dusters, but for mature areas a power-driven dusting machine is essential. In Malaya, the R. R. I. recommends from five to seven weekly rounds of dusting to effect control, depending on how long wintering and refoliation last. About five pounds of sulphur dust per acre are applied on each round. As serious and widespread outbreaks of *Oidium* do not occur every year in Malaya, dusting is usually carried out only when the early attack of young leaves takes place indicating the possibility of a widespread epidemic.

In Ceylon, dusting with machines which have twin bend outlet ducts which produce a turbulent cloud of dust has proved satisfactory. Of these machines two types are reported to be available and have been used, the "Whirlwind" and the new type "Nodium" dusters. According to the Rubber Research Institute of Ceylon the latter is the most satisfactory owing to its lighter weight which is a very important factor where the machine has to be carried by labour. The type of sulphur used is of importance particularly in regard to fineness. The standard U. S. A. 325 mesh or British 300 mesh specification is proving satisfactory in dusting properties. The R. R. I. C. recommends dusting at the rate of 10—12 lbs. per acre per round done at 7—10 day intervals until refoliation is complete. Dusting, according to the R. R. I. C. must commence before leaf renewal commences, i. e., on bud break after defoliation, as otherwise it is too late to prevent most of the trouble.

Further information on details of dusting etc. practised in other countries may be had on request to the Indian Rubber Board.

References—(1) Oidium—The R. R. I. Planters' Bulletin, Malaya, No. 1, 1939.

(2) H. E. Young—Leaf Mildew of Rubber: A Review; First and Second Quarterly circulars of the R R I. of Ceylon, 1951.

STIMULATION OF YIELD OF RUBBER TREES

Points of practical importance regarding the correct method of scraping of bark and application of stimulants like 'Stimulex' and 'Stimulatex.'

1. Correct scraping of the bark is of primary importance to obtain satisfactory results. Scraping should neither be too deep nor too superficial. Deep scraping might lead to disastrous results. It might result in abnormal yield increase for a short period followed by a fall below even the normal. This yield depression might eventually be followed by the total drying up of the tapping panel. Mere superficial scraping, on the other hand, fails to produce any appreciable increase in yields. Depth of scraping should, therefore, be such that further strokes would cause pin-points of latex to appear. This is generally reached when the successive outer cork layer, the greenish soft tissue beneath and the next hard, thin stone-cell layer only are removed. Care is most required for scraping this hard stone-cell layer. If more force is used, to scrape it, a thickness of the soft tissue beneath may also be removed which should be avoided. If the stone-layer is left intact, the stimulant paste may not penetrate easily through it. It is better to scrape this layer of bark half-way in than taking the risk of scraping deeper into the soft bark, particularly in the case of budded trees and virgin bark. In the case of older seedling trees, so much care may not be required. An ordinary tapper can do the scraping correctly with a little practice.

2. It is better to do the scraping and treatment just below than above, or both above and below the tapping cut. Yield is actually found depressed when the treatment is done above the tapping cut and only slight increases in yield are recorded when the application is done both above and below the cut. Application immediately below the cut has given the best results so far.

3. As the effect of one application of these stimulants on yield is believed to last not more than about 3 months, only a narrow strip of bark just sufficient to last 3 months' tapping, i.e., 1½ inches, should be treated at one time. When the treated bark has been tapped away the application, if desired, can be repeated. Application more frequently than twice a year, however, is not advisable.

4. An interval of at least 10 to 15 minutes is desirable between scraping and painting the stimulant which should be completed within the hour. Any slight exudation of latex which is allowed to coagulate during this interval is first wiped off with a rag.

5. A small quantity of the stimulant only should be applied using a 1" paint brush in a thin and uniform layer. A thick coating not only fails to raise the increase in yield but may damage the scraped bark seriously or even kill it. Excessive application of the stimulant on a deeply scraped bark is likely to cause permanent damage to the trees. The stimulants sold in drums are often found to be too thick in which condition a thin and uniform coating is difficult to obtain. It may then be heated and thus rendered more liquid to facilitate easy application lightly and evenly. It should not be applied, however, until it has again cooled down. One gallon of Stimulex weighs about 10 lbs. and should be sufficient to treat 12 to 16 acres with a stand of 100 average sized trees per acre tapped on half circumference cuts on 1½ inch wide strips of bark. Larger quantities will be required for old seedling trees of bigger size.

6. Bark scraped and treated once should not be treated again.

7. The application can be done even during the rainy season, but the operation should not be attempted when the trees are wet or when rain is possible within three hours of application. The stimulants should not be applied during wintering and until the new leaves are fully developed A convenient schedule in India for two applications is March or April for the first treatment and September or October for the second, according to early or late wintering and the S. W. monsoon.

8. Poor to average yielding trees respond better to stimulants than high yielding ones.

9. Seedling trees comparatively have given better results than budgrafts.

10. Treatment with stimulants is fully effective only where the tapping intensity does not exceed 10%. It is, therefore, problematical whether the treatment would be an economic proposition on intensely tapped or slaughter tapped trees.

11. Trees with panel diseases such as mouldy rot or brown bast and budded trees with cuts within 6" of the union cannot effectively be treated with stimulants. Very old trees with very thin and knotted bark also cannot be successfully treated, as it is impossible to scrape the bark without causing injury.

12. Late collection or, if possible, an additional second collection later of latex in areas treated is highly necessary as the high yields obtained by stimulants are largely due to the prolonged dripping caused by the stimulating effect of the artificial hormones contained in the stimulants.

13. The periodic falls in the increases of the yield after the treatment should not be misunderstood as lack of response to the treatment. The rise and fall are very characteristic of the yield increases due to the stimulants. Immediately after the treatment there is a good increase which reaches the maximum in a week or so. Then there is a steady fall which continues for about 6 weeks after which a second maximum is reached at the end of about 2 months. Later on, the yield falls slowly over a period of 6 months but never seems to drop below normal.

14. The effect of stimulation may last for a longer time even after all the treated bark has been tapped away.

15. Subsequent applications after about 4 months do not produce results identical with the first, the initial maximum is not so high but the minimum and the second maximum are both higher so that the yield obtained over the later 4 months period are the same as that over the first 4 months.

General.

As the after effects of yield stimulation on the tree in the long run are still undetermined, the caution advised in previous bulletins to restrict the general application of stimulants to low yielding old rubber is again repeated here. It would be appreciated if estates having suitable areas and necessary facilities would try the treatment in a few tapping tasks as an experiment and report results to this Board on a basis of yield per task compared to a few untreated tasks of the same size in the vicinity. The Board shall arrange to demonstrate the correct technique of scraping the bark and application of the stimulant to it, if desired.

NOTES AND NEWS

The Rubber Research Institute of Ceylon—Rubber Conference.

The third Rubber Conference convened by the R. R I. of Ceylon, was held at the Planters' Association building, Colombo, on the 16th November, 1953.

Mr. D. P. H. Dias, Chairman, Rubber Research Board, who presided at the Conference, welcoming the Hon. Minister and Visitors, said in the course of his address that from last year rubber had shown a steady downward trend without any hope of immediate recovery. Nevertheless, a reasonable wage had to be maintained for the workers in the industry, a profitable return assured to the small holder and the interests of the small shareholder who invested his life's savings in the industry safeguarded. It was, therefore, impossible for producers to exist without a fair and reasonable price for their rubber. Mr. Dias referred to the Government's Rubber replanting Scheme as the greatest boon to the rubber industry of Ceylon since rubber was first planted. The flood of applications for subsidies which had poured in, he said, revealed the true plight of the industry. The President then invited Mr. J. R. Jayewardene, Minister of Agriculture and Food, to declare the Conference open.

Declaring the Conference open, the Minister spoke on the problems of the industry arising out of the emergence of the synthetic rival, and their solution, and assured all possible assistance in this regard. The most urgent problem which the natural rubber industry had to face was the challenge of synthetic rubber from U. S. A., he said. The testing time would come about the end of 1954 when Government-owned synthetic factories would be transferred to private enterprise in the U. S. A. and for the first time there would be fair and free competition between natural and synthetic rubber in world markets. He had no doubt, said the Minister, of the correctness of the view that natural rubber would be able to compete effectively with synthetics provided new high-yielding strains could be evolved, and new and cheaper manufacturing methods developed to produce better types of natural rubber. "Research, then, is the Key to the future prosperity of Ceylon's rubber industry and organisations like the R. R. I. have an even more important part to play in the future of the industry, than in the past," declared the Minister. The objective of this research should be the development of new varieties of high-yielding rubber to be used in replanting large areas of worn-out old seedling rubber, thus slashing the cost of production; the improvement of yields by controlling rubber diseases and developing disease resistant strains; and the improvement of the present unsatisfactory methods of grading and packing and developing what is called "Technically classified (T. C.) Rubber." The Ministry of Agriculture and Food was considering legislation for an Export Registration Board to control the rubber exports which would be empowered to withdraw shipping and packing licenses, if necessary, as in Malaya. Regarding the progress of replanting, the Minister said that it was not possible to replant more than 8000 acres this year (1953) under the rehabilitation scheme but it is hoped that at least 18,000 acres would be replanted in 1954. There was a proposal to increase the extent of small holdings replanted under the scheme in 1954. This had been made possible by the opening of large Government nurseries which would be able to supply all the planting material required by small holders in 1954 and thus remove the difficulties which beset them this year.

Dr. Young, the Director of the Rubber Research Institute of Ceylon, then spoke on the progress of research carried out at the Institute. A number of

interesting scientific papers were then read at the Conference, followed by discussions at the end of each. These mainly dealt with the various aspects of the problem of rubber replanting in Ceylon.

The papers read at the Conference were :—

(1) "Replanting and Control of Powdery Mildew," by J. H. Van Emden, Mycologist. R. R. I. C.

(2) "The Work of Small Holdings Department with Special Reference to the Rubber Rehabilitation Scheme," by W. I Pieris, Small holdings Propaganda Officer. R R. I. C.

(3) "Planting Materials," by C. A. de Silva, Botanist. R. R. I. C.

(4) "Fomes Lignosus in Replanted Areas," by A. Newsam, Head of the Pathological Division, R. R. I. of Malaya.

(5) "Some Aspects of the Relation between Replanting and Manufacture," by E. J. Ridson, Chemist. R. R. I. C.

(6) "The Diagnosis of Manurial Requirements of Hevea," by D. H. Constable, Agronomist. R. R. I. C.

(7) "Tapping and Tapping Systems," by C. A de Silva, Botanist. R R I.C.

Institution of the Rubber Industry (London)—Indian Section.

The Fifth Annual General Meeting of the Indian Section of the Institution of the Rubber Industry (London) was held at Calcutta on 16th January, 1954 under the chairmanship of Mr. Cecil Stack, Managing Director of Dunlop Rubber Co. (India) Ltd. Dr. Meghnad Saha, F. R. S , was the chief guest on the occasion. The Institution of the Rubber Industry was founded in England in 1921 to promote the advancement of the Rubber Industry in all parts of the world by bringing together all those engaged or interested in the various branches of science and technology on which the industry is based. In his opening address Mr. Stack said the Indian Section of the Institution formed in 1948 had in the short time of its existence rendered considerable assistance in the important task of raising the technical standards of the Rubber Manufacturing Industry in the country. Referring to the rubber industry in India Mr. Stack said, "We were in a unique position as compared with other manufacturing countries in that a large proportion of our raw rubber requirements was obtainable from indigenous sources." The importance of India becoming self-sufficient in raw rubber was recognised by both Government and the producers. From an average of 15,500 tons a year for the years 1948—'50, production of raw rubber had increased to 17,000 tons in 1951, 20,000 tons in 1952 and in 1953, it is expected to be 21,000 tons. Rubber consumption figures for the years were 19,000 tons average for 1948—'50, 22,500 tons tons in 1951, 21,000 tons in 1952 and about 22,000 tons in 1953. The progress made over the last three years was most satisfactory and the rubber growers in South India, Mr. Stack said, deserved praise for what they have done. At the same time he made a plea to some of the producers of rubber latex, which is now being used by manufacturers in increasing quantities, to improve the quality of their supplies. Colour, odour and the presence of dirt and other extraneous matters, he pointed out, were the chief causes of complaint. The increase in the use of latex is part of the general progress being made by the Rubber Industry, and

looking to the future Mr. Stack was of the opinion that the prospects for the industry were distinctly encouraging. He paid a tribute to the Indian Standards Institution for its work on standardising indigenous rubber chemicals and manufactured rubber goods. If India is to take its place on equal terms with other manufacturing countries, it must produce goods of comparable quality and the Indian Standards Institution was working very hard, indeed, towards that end. In conclusion, Mr. Stack thanked Dr. D. Banerjee, Hon. Secretary of the Indian Branch of the Institution, and Mr. A. Natarajan, Hon. Secretary, Calcutta Branch, for their valuable assistance in the work connected with the activities of the Institution.

—*Indian Rubber Bulletin, No. 61, Feb. 1954.*

International Rubber Study Group: Special Meeting of the Management Committee.

According to a Press Communique issued by the International Rubber Study Group, the Special Meeting of the Management Committee of the I.R.S.G. which began in London on 12th October ended on 30th October. The meeting re-examined the draft buffer stock agreement prepared by the working party in January 1953 but did not find any substantial change, since the meeting of the Group last May, in the viewpoints of the delegation at the Special Meeting as to the necessity for a buffer stock agreement. After reviewing the facts of the rubber situation the Meeting foresaw a statistical surplus of natural rubber of 169,000 long tons by the end of 1953 contrasted with the surplus of 193,000 long tons foreseen after the May meeting of the full Study Group. The meeting noted that the actual surplus will be considerably less than the revised estimate because of additions during 1953 to Governmental and consumers' stocks. The meeting agreed that recent price developments were placing the natural rubber industry in a serious position at the present time. Accordingly, it set out for the information of, and possible action by, member Governments and private commercial interests some remedies which a number of delegations suggested might help to alleviate the current position. Briefly, these suggestions were :

1. Acceleration of replanting programmes.
2. Creation of new natural rubber stocks or additions to existing stocks, whether Governmental or Commercial.
3. Action by the Government of the United States to increase the price of G. R. S ; to re-examine its practices in stock-piling rotation ; and to revoke a directive issued in 1952 regarding the level at which mandatory consumption requirements for synthetic rubber might be re-imposed.

Election to the State Legislative Assembly.

Mr. K. Karunakaran, Member, Indian Rubber Board, has been declared elected as a member of the Travancore-Cochin State Legislative Assembly in the recent elections, from Manalur Constituency.

INDIAN RUBBER STATISTICS

TABLE 1

Monthly Production, Dry Weight in Tons, 1948 to 1953.

Months	1948	1949	1950	1951	1952	1953
January	1,425	1,326	1,291	1,307	1,651	1,992
February	270	257	208	260	325	390
March	956	798	988	902	1,127	1,031
April	1,498	1,563	1,640	1,664	1,973	2,045
May	1,646	1,240	1,450	1,808	1,532	1,893
June	694	854	836	562	1,153	1,425
July	844	904	758	1,258	1,510	882
August	1,068	1,245	1,053	1,654	1,167	1,894
September	1,646	1,410	1,414	1,756	2,596	2,368
October	1,796	1,944	1,937	1,807	1,972	2,133
November	1,742	2,011	1,975	1,981	2,450	2,514
December	1,837	2,035	2,049	2,189	2,406	2,569
Total	15,422	15,587	15,599	17,148	19,863	21,136

TABLE 2

Monthly Consumption of Raw Rubber (Indigenous and Imported) by Rubber Goods Manufacturers (Tons) 1948 to 1953.

Months	1948	1949	1950	1951	1952	1953
January	1,587	1,548	1,162	1,868	2,059	1,621
February	1,494	1,414	1,295	1,894	1,980	1,637
March	1,587	1,284	1,320	1,821	1,954	1,698
April	1,668	1,981	1,435	2,134	1,598	1,770
May	1,432	1,847	1,372	1,576	1,514	1,871
June	1,875	1,770	1,517	1,131	1,757	2,021
July	1,801	1,785	1,800	2,077	2,035	2,124
August	1,902	1,819	1,670	2,007	1,840	1,986
September	1,753	1,638	1,506	1,953	1,633	2,274
October	1,109	1,068	1,253	1,788	1,330	1,408
November	1,700	1,697	1,737	2,061	1,686	1,888
December	1,811	1,341	1,668	2,117	1,675	2,075
Total	19,719	19,192	17,735	22,427	21,061	22,373

TABLE 3

Production, Consumption and Stocks of Rubber by Groups January/December 1953.

GROUPS	Production Jan /Dec. 1953 (Tons)	Consumption of Rubber by manufacturers Jan/Dec. '53 (Tons)	Stocks with estates and dealers as on 31-12-1953 (Tons)	Stocks in transit sold to manufacturers as on 31-12-1953 (Tons)	Stocks of rubber with manufacturers as on 31-12-1953 (Tons)
Group 1	8,434	5,932	1,660	226	805
Group 2	4,118	6,030	855	386	552
Group 3	2,039	3,214	484	407	313
Group 4	1,297	955	350	38	200
Group 5	934	2,451	289	130	235
Group 6	743	1,656	317	158	431
Group 7	38	158	26	1	39
Scrap Grades	2,353	268	584	19	64
Latex (DRC)	635	607	398	28	63
Sole Crepe	545	202	151	16	21
Estimated unspecifid		900*			75*
	21,136	22,373	5,114	1,409	2,798

*Estimated Consumption by and Stocks with some manufacturers from whom returns have not been received.

Note:—

Group 1 is composed of RMA 1X and 1
Group 2 „ RMA 2, 3 and Cuttings No. 1
Group 3 „ RMA 4, 5 and Cuttings No. 2
Group 4 „ Precoagulated Crepe, PLC 1X, 1, 2 and 3
Group 5 „ Estate Brown Crepe 1X, 2X, Smoked Blanket and Remilled Crepe 2
Group 6 „ Estate Brown Crepe 3X, Remilled Crepe 3 & 4
Group 7 „ Flat Bark

TABLE 4

Imports of Raw Rubber into India during 1948—1953 (in tons).

Months	1948	1949	1950	1951	1952	1953
January	..	501	339	945	447	47
February	..	354	41	1,377	638	50
March	..	954	44	1,124	217	150
April	..	691	..	850	544	..
May	..	9	132	521	187	10
June	315	71	44	477	315	..
July	705	..	..	843	..	15
August	444	..	..	115	235	..
September	941	3	..	185	300	..
October	649	2	75	243	388	..
November	595	66	175	136	336	..
December	684	116	232	105	244	..
Total	4,333	2,767	1,082	6,921	3,851	272

TABLE 5

Exports of Raw Rubber from India (Tons) 1950—1953.

Month	1950	1951	1952	1953
January ..	..	..	4	2
February ..	..	..	6	..
March ..	89	..	1	5
April ..	383	..	5	2
May ..	373	..	..	7
June ..	1	..	..	16
July ..	112	16	6	..
August ..	27	20	4	...
September ..	17	23	2	..
October ..	12	38	4	10
November ..	16	36	..	1
December ..	8	12	64	22
Total	1,038	145	96	65

TABLE 6

Total Planted Area of Estates and Holdings, corrected up to 31 12-1953 and Planting Materials used

Year of Planting	ESTATES (acres)				SMALL-HOLDINGS (acres)				GRAND TOTAL (acres)			
	Ordinary seedling rubber	Bud-grafted rubber	Clonal seedlings	Total	Ordinary seedling rubber	Bud-grafted rubber	Clonal seedlings	Total	Ordinary seedling rubber	Bud-grafted rubber	Clonal seedlings	Total (acres)
Planted earlier than 1938	57,740·11	7,219·85	327·78	65,287·74	39,503·22	108·67	1·25	39,613·14	97,243·33	7,328·52	329·03	104,900·88
Planted in 1938	351·65	1,264·71	..	1,616·36	142·30	12·26	5·02	159·58	493·95	1,276·97	5·02	1,775·94
,, 1939	276·16	2,062·14	499·08	2,837·38	894·92	260.62	27·66	1,183·20	1,171·08	2,322·76	526·74	4,020·58
,, 1940	227·21	1,639·28	471·60	2,338·09	1,106·93	225·74	35·12	1,367·79	1,334·14	1,865·02	506·72	3,705·88
,, 1941	11·79	1,248·41	81·00	1,341·20	717·43	64·38	5·67	787·48	729·22	1,312·79	86·67	2,128·68
,, 1942	863·76	2,089·48	413·57	3,366·81	2,211·16	174·02	95·14	2,480·32	3,074·92	2,263·50	508·71	5,847·13
,, 1943	2,625·27	1,974·63	1,280·50	5,880·40	7,614·51	769·68	509.58	8,893·77	10,239·78	2,744·31	1,790·08	14,774·17
,, 1944	2,920·49	1,170 03	812·86	4,903·38	6,268·23	280·78	289.16	6,838·17	9,188·72	1,450·81	1,102·02	11,741·55
,, 1945	2,420·65	423·90	2,247·88	5,092·43	4,435·10	192·49	134·70	4,762·29	6,855·75	616·39	2,382·58	9,854·72
,, 1946	891·24	500·49	531·22	1,922·95	2,259·17	44·98	121·92	2,426·07	3,150·41	545·47	653·14	4,349·02
,, 1947	330·65	822·48	313·73	1,466·86	1,162·77	73 28	79·32	1,315·37	1,493·42	895·76	393·05	2,782·23
,, 1948	398·98	507·12	95·51	1,001·61	227·00	6·50	47·24	280·74	625·98	513·62	142 75	1,282·35
,, 1949	445·19	299·03	160·31	904·53	136·94	..	59·84	196·78	582·13	299·03	220·15	1,101·31
,, 1950	764·76	245·76	337·36	1, 47·88	109·50	8·00	17·00	134·50	874·26	253·76	354·36	1,482·38
,, 1951	117·00	546·48	392·01	1,055·49	95·43	..	84·40	179·83	212·43	546·48	476·41	1,235·32
,, 1952	190·46	626·20	377·81	1,194·47	198·75	3·67	114·06	316·48	389·21	629·87	491·87	1,510·95
,, 1953	3·25	377·10	305·06	685·45	165·50	14·62	284·92	465·04	168·79	391·72	589·98	1,150·49
Total	70,578·66	23,017·09	8,647·28	102,243·03	67,248·86	2,239·69	1,912·00	71,400·55	137,827·52	25,256·78	10,559·28	173,643·58

TABLE 7

Area, in Acres, of New Planting and Re-planting—1938—1953—and Planting Materials used (as on 31-12-1953)

YEAR OF PLANTING		NEW PLANTING				RE-PLANTING				GRAND TOTAL
		Ordy. seedling rubber	Budgrafted rubber	Clonal seedlings	Total	Ordy. seedling rubber	Budgrafted rubber	Clonal seedlings	Total	
Planted earlier than	1938	97,226·03	5,365·99	329·03	1,02,921·05	17·30	1,962·53	...	1,979·83	1,04,900·88
Planted in	1938	488·95	486·17	5·02	980·14	5·00	790·80	...	795·80	1,775·94
,,	1939	1,087·80	1,458·14	526·74	3,072·68	85·28	864·62	...	947·90	4,020·58
,,	1940	1,227·71	1,072·71	506·72	2,807·14	106·43	792·31	...	898·74	3,705·88
,,	1941	729·22	113·10	30·67	872·99	...	1,199·69	56·00	1,255·69	2,128·68
,,	1942	2,856·12	364·18	448·81	3,669·11	218·80	1,899·32	59·90	2,178·02	5,847·13
,,	1943	10,047·68	2,631·41	1,790·08	14,469·17	192·10	112·90	...	305·00	14,774·17
,,	1944	8,661·22	1,046·10	1,102·02	10,809·34	527·50	404·71	...	932·21	11,741·55
,,	1945	6,761·28	616·39	2,315·56	9,693·23	94·47	...	67·02	161·49	9,854·72
,,	1946	2,916·91	374·98	638·00	3,929·89	233·50	170·49	15·14	419·13	4,349·02
,,	1947	1,416·42	467·44	393·05	2,276·91	77·00	428·32	...	505·32	2,782·23
,,	1948	425·53	149·00	72·24	646·77	200·45	364·62	70·51	635·58	1,282·35
,,	1949	532·44	88·17	171·15	791·76	49·69	210·86	49·00	309·55	1,101·31
,,	1950	316·56	...	74·00	390·56	557·70	253·76	280·36	1,091·82	1,482·38
,,	1951	193·43	165·17	220·18	578·78	19·00	381·31	256·23	656·54	1,235·32
,,	1952	198·75	311·26	202·31	712·32	190·46	318·61	289·56	798·63	1,510·95
,,	1953	158·29	206·26	476·46	841·01	10·50	185·46	113·52	309·48	1,150·49
TOTAL		1,35,244·34	14,916·47	9,302·04	1,59,462·85	2,583·18	10,340·31	1,257·24	14,180·73	1,73,643·58

TABLE 8

Geographical Distribution of Rubber Planted Area in India

(as on 31-12-1953)

States	No. of Units		Area in Acres
	Estates :	Holdings	
Travancore Cochin State :			
Travancore	159	13,701	1,23,554 24
Cochin	13	199	13,799·04
Mysore State	2	5	396·03
Coorg	5	3	3,226·20
Madras State :			
Malabar	65	253	29,994·22
Canara	3	1	410 00
Nilgiris	3	8	872·52
Coimbatore	2	–	521·10
Salem	–	4	132·00
Madura	1	–	407·00
Andamans	1	–	272·00
Assam	–	1	50·00
Bengal	–	1	9·23
	254	14,176	1,73,643·58
		(14,430)	

TABLE 9

Classification of Small Holdings and Estates according to Size

(as on 31-12-1953)

	No. of units	Area in acres
Small Holdings		
Below 1 acre	2,427	1,391·91
Of and above 1 acre and below 5 acres	8,566	18,858·63
,, 5 acres ,, 10 ,,	1,559	10,378·41
,, 10 ,, ,, 50 ,,	1,417	26,977·46
,, 50 ,, ,, 100 ,,	207	13,794·14
Total Small Holdings	14,176	71,400·55
Estates		
Of and above 100 acres and below 500 acres	196	38,077·29
,, 500 ,, 1000 ,,	31	21,097·80
,, 1000 ,, 1500 ,,	17	20,870·18
,, 1500 ,, 2000 ,,	4	6,981·19
,, 2000 acres	6	14,616·57
Total Estates	254	1,02,243·03
GRAND TOTAL	14,430	1,73,643 58

TABLE 10

Weekly Singapore Rubber Market Prices

Ribbed Smoked Sheet Standard Quality for 100 lbs. Jan.—Dec. 1953

Week ending	*Value per 100 lbs. in Rupees*	*Week ending*	*Value per 100 lbs. in Rupees*
7—1—1953	Rs. 138·76	1—7—1953	Rs. 101·47
14 ,, ,,	,, 132·48	8 ,, ,,	,, 104·22
21 ,, ,,	,, 132·48	15 ,, ,,	,, 102·65
28 ,, ,,	,, 126·20	22 ,, ,,	,, 102·65
4—2—1953	,, 122·27	29 ,, ,,	,, 96·16
11 ,, ,,	,, 118·54	6—8—1953	,, 100·48
19 ,, ,,	,, 120·11	19 ,, ,,	,, 102·65
25 ,, ,,	,, 123·06	26 ,, ,,	,, 101·08
4—3—1953	,, 121·68	2—9—1953	,, 99·70
11 ,, ,,	,, 115·60	9 ,, ,,	,, 101·27
18 ,, ,,	,, 112·46	16 ,, ,,	,, 101·66
25 ,, ,,	,, 115·40	23 ,, ,,	,, 98·91
1—4—1953	,, 106·57	30 ,, ,,	,, 97·94
9 ,, ,,	,, 102·44	7—10—1953	,, 93·42
15 ,, ,,	,, 106·76	14 ,, ,,	,, 87·34
22 ,, ,,	,, 106·18	21 ,, ,,	,, 85·57
29 ,, ,,	,, 113·83	28 ,, ,,	,, 84·57
6—5—1953	,, 117·36	4—11—1953	,, 85·75
13 ,, ,,	,, 107·94	11 ,, ,,	,, 88·71
20 ,, ,,	,, 111·86	18 ,, ,,	,, 88·52
28 ,, ,,	,, 109·12	25 ,, ,,	,, 92·43
4—6—1953	,, 104·80	2—12—1953	,, 94·20
10 ,, ,,	,, 105·19	9 ,, ,,	,, 95·38
17 ,, ,,	,, 104·22	16 ,, ,,	,, 90·86
24 ,, ,,	,, 104·41	23 ,, ,,	,, 89·69
		30 ,, ,,	,, 89·29

LIST OF LICENSED RUBBER DEALERS IN INDIA

[With extracts of relevant sections of the Rubber (Production & Marketing) Act, 1947, and Rubber (Production & Marketing) Rules, 1947, regulating dealings in raw rubber.]

[*NOTE.* According to the Rubber (Production & Marketing) Act, 1947, and the Rules made thereunder, dealings in raw rubber without obtaining a licence from the Indian Rubber Board is illegal and punishable with imprisonment for a term which may extend to one year or with fine which may extend to one thousand rupees or with both.

For the information of rubber growers, dealers and manufacturers, a list of all licensed rubber dealers in India, as on 15th March 1954, is appended. Relevant sections of the Act and Rules, regulating dealings in raw rubber, are also reproduced below.]

I. THE RUBBER (PRODUCTION & MARKETING) ACT, 1947.

Definition of Rubber.

3. (h) "rubber" means—

(i) crude rubber, that is to say, rubber prepared from the leaves, bark or latex of any rubber plant;

(ii) the latex of any rubber plant, whether fluid or coagulated, in any stage of the treatment to which it is subjected during the process of conversion into rubber;

(iii) latex (dry rubber content) in any state of concentration,

and includes scrap rubber, sheet rubber, rubber in powder and all forms and varieties of crepe rubber, but does not include rubber contained in any manufactured article.

Licensing of transactions in rubber and provisions regarding licenses.

14. No person shall sell or otherwise dispose of, and no person shall buy or otherwise acquire rubber except under and in accordance with the terms of a general or special licence issued by the Board.

15. (1) Every general licence issued under section 14 shall be published by by the Board in the Gazette of India and in such newspapers as the Board may direct.

(2) A special licence issued under section 14 shall be valid only for such period as may be specified therein;

Provided that the Board may from time to time extend the period of validity of any such licence.

(3) The Board may at any time for reasons to be recorded by it in writing revoke a special licence granted under section 14, and on such revocation it shall be returned to the Board by the person to whom it was issued.

Restriction on possession of rubber.

16. (1) No person not being the owner or occupant of an estate or a person who has acquired rubber under a general or special licence issued by the Board under section 14 shall have any rubber in his possession.

(2) Any Court trying a contravention of sub-section (1) may without prejudice to the provisions of section 26, direct that any rubber in respect of which the Court is satisfied that such contravention has been committed shall be forfeited to Government.

Fees for special licences.

19. The Board may levy such fees as may be prescribed for the issue and renewal of special licences under section 14, section 15 or section 17.

Submission of returns and maintenance of accounts.

20. Subject to such exceptions as may be prescribed, every owner, every manufacturer, and every holder of a special licence issued under section 14 not being an owner or a manufacturer shall—

(a) submit to the Board such returns at such times, in such form, and containing such particulars, as may be prescribed;

(b) maintain true and correct accounts and other records pertaining to his estate or business, as the case may be, in such form as may be prescribed;

(c) permit any officer authorised by the Board in this behalf to inspect the accounts and records referred to in clause (b).

Inspection of land and premises.

21. Any officer authorised by the Board in this behalf may at any reasonable time inspect any place of storage of rubber, any estate, any place of business of a dealer or any factory or other premises of a manufacturer, for the purpose of verifying any statement or return submitted under this Act or for any other purpose of this Act.

Appeal.

23. Any person aggrieved by an order of the Board refusing to issue or renew, or revoking a special licence under the provisions of section 14, section 15 or section 17 may, within sixty days of the making of the order and on payment of the prescribed fee, appeal to the Central Government and the decision of the Central Government thereon, and subject only to such decision the order of the Board, shall be final and shall not be called in question in any Court.

Powers of Central Government to make rules.

25. (1) The Central Government may, by notification in the official Gazette, make rules to carry out the purposes of this Act.

(2) Without prejudice to the generality of the foregoing power, rules made under this section may provide for all or any of the following matters, namely:—

* * *

(p) the form of application for special licenses under section 14 or section 17, the fees for the grant or renewal of such licences, and the forms of such licences;

(q) the manner in which rubber shall be graded and marketed;

(r) the fee payable on appeals under section 23;

(s) any other matter which is to be or may be prescribed under this Act.

Penalties.

26. If any person—

(a) contravenes any provision of this Act, other than section 11 or section 13, or any rule made under this Act, or

(b) in any report or return to be furnished under this Act makes any statement which is false and which he knows to be false or does not believe to be true, or

(c) obstructs any officer of the Board in the discharge of any duty imposed on or entrusted to him by or under this Act, or

(d) having the control or custody of any account book or other record, fails to produce such book or record when required by any authorised officer to do so,

he shall be punishable with imprisonment for a term which may extend to one year, or with fine which may extend to one thousand rupees or with both.

Procedure for prosecutions.

27. No prosecution for any offence punishable under this Act shall be instituted except by or with the consent of the Central Government or the Board.

Bar of Legal proceedings.

28. No suit, prosecution or other legal proceedings shall lie against the Board or any officer of the Board for anything in good faith done or intended to be done under this Act.

THE RUBBER (PRODUCTION & MARKETING) RULES, 1947.

16. (3) Subject to such instructions as the Board may lay down, the Commissioner shall have power—

* * *

(ii) to issue general or special licences under section 14 of the Act and extend their period of validity of such special licences and revoke them ;

* * *

(iv) to call for information, documents and returns and to inspect or cause to be inspected accounts and places of storage or of business or other places as required or provided by the Act or the Rules.

(4) The Commissioner may delegate any of these powers to the Secretary.

(5) The powers delegated by or under the Rules shall be exercised, subject to the control of the Board.

31. (1) Every person who wants a special licence to purchase, sell or otherwise deal in rubber, shall apply for a licence in Form B. The Board, if it is satisfied with regard to the suitability of the applicant, may issue a licence in Form C.

(2) The licences shall be numbered and shall not be transferable.

34. The Board may at any time revoke or cancel any licence if it is satisfied that the holder of the licence obtained the same by mis-representation or fraud or if he fails to submit the necessary returns.

36. Every estate, when required to do so, and every dealer licenced by the Board shall submit to it a true monthly return of raw rubber held, acquired or disposed of, in Form H.

38. The Board may serve by post a notice upon—

* * *

(b) any dealer licensed or any manufacturer or any other person, if the Board has reason to believe that such person has any rubber in his possession, requiring him to furnish within such period, not being less than 30 days, as may be specified in the notice, such information and documents relating to the stocks of rubber held and sale of rubber or to any other matter as it may deem necessary to enable it to discharge its duties under the Act.

40. The Board shall levy fees at the following scales for licenses issued:—

* * *

(d) for licences to dealers—Rs. 100 per licence per year.

41. For appeals to the Central Government against any order of the Board, under section 23 of the Act a fee of Rs. 25 per appeal shall be levied.

LIST OF LICENSED RUBBER DEALERS IN INDIA

TRAVANCORE-COCHIN STATE

Reg. No.	*Name and Address*	*Date of Expiry of Licence*
D—167	Abraham Chacko, Cheriavadayil, Thottakad, Puthupally	(26-4-'54)
D—227	Abraham P. J., Puthumana, Ponkunnom	(23-11-'54)
D—405	Abraham P. M., Pazhiyamkal, Chirakadavu	(21-5-'54)
D—544	Abraham Eapen & Co., Kottayam	(19-3-'55)
D—592	Abraham Joseph, Asariparampil, Thottakad, Puthupally	(13-11-'54)
D—603	Allied Agencies, Market Landing Road, Kottayam	(7-1-'55)
D—485	Ancheri & Co., Market Landing Road, Kottayam	(14-4-'54)
D—560	Andrews K. J., Pallipeedika, Kaduthuruthy	(8-7-'54)
D—158	Antony P. P., Merchant & Contractor, Municipal Office Road, Trichur	(6-4-'54)
D—481	Antony T., Kooliathu House, Kothamangalam	(3-4-'54)
D—543	Antony K. J. & Co., P. B. No. 58, Mattancherry, Cochin	(16-3-'54)
D—243	Aspinwall & Co. Ltd., Fort, Cochin	(5-8-'54)
D— 4	Associated Agency, Kottayam	(19-12-'54)
D—518	Babjimiah Sahib K., C/o K. B. S. & Co., Punalur	(3-11-'54)
D— 12	Bata Shoe Co. Ltd., Kottayam	(23-12-'54)
D—397	Bata Shoe Co. Ltd., Fort Cochin	(27-4-'54)
D—491	Be Be Rubber Estates Ltd., Punalur	(25-5-'54)
D—567	Bharat Rubbers, K. K. Road, Kottayam	(12-8-'54)
D—474	Central Commercial Corporation, Achammavilasom, Kottayam	(28-1-'55)
D— 31	Chacko Pothen, Rubber Dealer, K. K. Road, Kottayam	(11-1-'55)
D—430	Chacko Chacko, Thannikamattom, Thodupuzha	(24-10-'54)
D—538	Chandysons, P. O. Box No. 44, Kottayam	(3-3-'55)
D—260	Cherian C. J. & Co., Akkara Buildings, Kottayam	(30-10-'54)
D—594	Cherian M. M., Malayil Puthenpurail, Rakkad, Muvattupuzha	(30-11-54)
D—476	Damodharan Nair V. N., Merchant, Paika, Poovarany	(3-3-'54)
D—606	Damodharan Pillai P., Prop.: Oriental Agency, Punchiri Buildings, Kottayam	(21-1-'55)
D— 61	Darragh, Smail & Co. Ltd., Alleppey	(23-1-'55)
D—120	Davies & Co., Kothamangalam	(2-2-'55)
D— 53	Devasia Devasia, Kanjirathumkal, Varikayani, Karinilam, Mundakayam	(13-1-'55)
D—139	Devasia Mathai, Pareekunnel, Kalathoor, Kuravilangad	(18-2-'55)

Reg. No.	*Name and Address*	*Date of Expiry of Licence*
D—384	Devasia P., Pezhumkattil, Erattupettah	(28-3-'54)
D—583	Devasia D., Kottakunnel, Thottakad	(26-10-'54)
D—587	Devasia V. T., Vadasseril, Karinilam, Mundakayam	(28-10-'54)
D—598	Devshi Bhanji Khona, P. B. No. 118, Cochin—2	(4-12-'54)
D—502	Dominic Thomas & Sons, Merchants, Petta, Erumeli	(31-7-'54)
D—154	Dunlop Rubber Co. (India) Ltd., Kottayam	(19-3-'55)
D— 44	Eapen Chacko, Killikottu Puthiaveedu, Nedumon, Parakode	(11-1-'55)
D—360	Eastern Produces Syndicate, Achammavilasom, Kottayam	(28-12-'54)
D—331	Free India Trades, Vellapally Bldgs , Kottayam	(1-11-'54)
D— 25	General Trading Co., Kottayam	(30-12-'54)
D—613	General Supplies Corporation, K. K. Road, Kottayam	(9-3-'55)
D— 9	George A. V. & Co., Ltd., Kottayam	(19-12-'54)
D— 48	George C. M., Kamalavilas Estate, Maroor, Elamannur, Adoor	(12-1-'55)
D—585	George M. J , Muthalathu, Kadathi, Moovattupuzha	(28-10-'54)
D—553	Govindan Nair K., Kavumkal Madom, Nedumkunnom, Kangazha	(29-5-'54)
D— 2	Harrisons & Crosfield Ltd , Quilon	(19-12-'54)
D—143	Harska Ltd., Kottayam	(24-2-'55)
D— 7	Hassan Kunju Rowther, M. C., C/o M. M. Sulaiman Rowther, Pazhayachantha, Mundakayam	(26-3-'54)
D—387	Hassan Rowther P. K., Palayamparampil, Thalapalam, Erattupetta	(9-4-'54)
D—612	Hindustan Rubber Co , K. K. Road, Kottayam	(7-3-'55)
D—396	Hussain Ibrahim, Nellimala Puthuparampil, Kanjirapally	(22-4-'54)
D— 37	Ibrahim Rowther P. K., Pulimoottil, Kanjirapally	(11-1-'55)
D—479	India Rubbers, Kynady Buildings, Kottayam	(30-3-'54)
D—561	Ismail K. M , Kalarickal Market, Kanjirapally	(8-7-'54)
D—206	Ittyavira Varkey, Oramadathil, Rakkad, Moovattupuzha	(22-11-'54)
D— 17	Jacob Thomas & Co , Kottayam	(28-12-'54)
D—545	Jacob K C , (Kunnel), Nidiry Buildings Kottayam	(29-3-'54)
D— 29	John T. V. & Co., Kottayam	(11-1-'55)
D— 43	John John, Mamoottil, New Market, Mundakayam	(11-1-'55)
D—114	John Chandy P. & Co. Ltd., Kottayam	(1-2-'55)
D—174	John Zachariah P. & Co. Ltd., Kottayam	(7-6-'54)

Reg No.	*Name and Address*	*Date of Expiry of Licence*
D—548	John P. Mathews, General Supplies & Agencies, Kottayam	(9-4-'54)
D—554	Jones & Co., Kynady Buildings, Kottayam	(29-5-'54)
D— 77	Joseph C. A., Chettiparampil, Thodupuzha	(29-1-'55)
D—112	Joseph C. C., Chettiparampil, Palai	(1-2-'55)
D—156	Joseph K. C, Kattuparampil, Perunna East, Changanacherry	(28-3-'54)
D—226	Joseph P. T., Puliamkunnel, Kalaketty, Kanjirapally	(18-4-'54)
D—271	Joseph V. T., Vadakel, Merchant, Palai	(30-1-'55)
D—289	Joseph Joseph, Kodianpurayidathil, Marangattupalli	(30-4-'54)
D—381	Joseph K. & Co., K. K. Road, Kottayam	(22-7-'54)
D—537	Joseph & Co., Hill Produce Merchants, Thodupuzha	(16-2-'55)
D—546	Joseph K. T., Kumbalapallil, Elikulam, Poovarany	(29-3-'54)
D—580	Joseph Mathew & Co., Muttuchira, Kaduthuruthy	(13-10-'54)
D—589	Joseram & Co., Thumpasseril Bldgs., No. 2, Punalur	(5-11-'54)
D—588	Kalisseril Rubbers, Market Landing Road, Kottayam	(3-11-'54)
D—608	Kasim T. K., Thenanmakal, Kanjirapally	(22-2-'55)
D—582	Kayencee & Co, C/o K. N. C. Nair, Kizhakethil, Muvattupuzha	(19-10-'54)
D—565	Khan V. P., Vayalumkal, Kanjirapally	(5-8-'54)
D—310	Kochuparampil Bros., Rubber Dealers, K. K. Road, Kottayam	(16-8-'54)
D—584	Kora Ipe, Kynady Buildings, Kottayam	(26-10-'54)
D— 18	Kuriakose M. K., Kalpalakadavu, Trivandrum	(28-12-'54)
D—434	Kuriakose K. J., Kaithakottil, Kattimattom, Amballore	(24-10-'54)
D—480	Kuriakose O. V., Rubber Dealer, Nellimattom	(30-3-'55)
D—578	Kuriakose V. L., Vadakekara, Thodupuzha	(13-10-'54)
D—417	Kurian Abraham, Ooppoottil, Kottayam	(26-7-'54)
D—555	Kurian P. A., Rubber Dealer, K. K. Road, Kottayam	(5-6-'54)
D—610	Kurian V. J., Vettath, Arakunnom, via Tripunithura	(24-2-'55)
D—568	Kunjummen P. T., Panickamuryil, Nadamala, Mallapally	(12-8-'54)
D—478	Kuruvilla P. V. & Sons, Rubber Dealers, Kothamangalam	(30-3-'55)
D—581	Kuruvilla T. O. & Co., Thamarapallil, Eraviperoor	(8-9-'54)
D—195	Kuzhialil Mathai Varkey, Cross Street, Mulanthuruthy	(29-9-'54)
D—541	Lukose P. Y., Parayil House, S. H. Mount P. O., Kottayam	(10-3-'55)
D—244	Malabar Trades Agencies, Kottayam	(18-8-'54)
D—573	Mani N. P., Naduvathu House, Puthupally, Kottayam	(21-9-'54)
D—575	Mammoo Pareeth Sahib, Kaipoorath, Vechoochira, Erumeli, Kanjirapally	(12-10-'54)

Reg. No.	*Name and Address*	*Date of Expiry of Licence*
D—128	Mathai K. T., Merchant, Kottayam	(9-9-'54)
D—250	Mathai V. I., Valavuchirakal, Karapuzha, Kottayam	(18-9-'54)
D—338	Mathai Xavier K., Koovakalayil, Vellapally Bldgs., Kottayam	(29-3-'54)
D— 26	Mathew T. D. & Co., Kottayam	(30-12-'54)
D—109	Mathew V. I., Vattapuraidom, Ranni	(1-2-'55)
D—343	Mathew O. V. & Co., Olassayil Bldg, Kottayam	(1-12-'54)
D—419	Mathaikal M., Merchant, Hospital Road, Alwaye	(21-8'-'54)
D—556	Matteethra Corporation, Muttambalam, Kottayam	(14-6-'54)
D—235	Meeran Rowther, C. N., Chackalakal, Merchant, Erumeli	(22-5-'54)
D—221	Meenathadathil Store, Ranni	(10-3-'55)
D—303	Menon T. N., Prop., Business Emporium, Beach Road, Quilon	(23-7-'54)
D—517	Murphy Estates Ltd., Yendayar Estate, Mundakayam	(31-7-'54)
D—110	Murugappa Sons (Trav.) Ltd., P. B. No. 30, Trivandrum-1	(1-2-'55)
D—486	New India Agencies, Good Shepherd St., Kottayam	(14-4-'54)
D—458	Oommen Mathai, Kanniyakonil, Kuttapuzha, Tiruvalla	(26-11-'54)
D—385	Oriental Trades & Agencies, Punalur	(2-4-'54)
D— 69	Ouseph Devasia, Mattathil, Angadi, Palai	(28-1-'55)
D— 24	Padinjarekara Agencies, Kottayam	(30-12-'54)
D— 23	Palai Mercantile Co. Ltd., Palai	(28-12-'54)
D—576	Panicker G. P., XXIV/17 Varma Buildings, Durbar Hall Road, Ernakulam	(12-10-'54)
D—552	Parackal Itty Koshy, Kalarickal Bazar, Kottayam	(27-5-'54)
D— 19	Paratex Corporation Ltd., Kottayam	(28-12-'54)
D— 3	Peirce, Leslie & Co. Ltd., Cochin	(19-12-'54)
D—551	Philip T. S., B. A., B. L., Thamarapallil House, Kodimatha, Kottayam	(20-5-'54)
D—557	Philip C. T., Kelachandra House, Chingavanam, Kottayam	(29-6-'54)
D—599	Philip V. P., Valayil Peedika, 35th Mile, Mundakayam	(6-12-'54)
D— 34	Pothen Joseph & Sons Ltd., Alleppey	(11-1-'55)
D—569	Pothen Pachi, Prop., Ranni Rubber Co., Munjamakal, Angadi, Ranni	(12-8-'54)
D— 22	Poulose T. P., Merchant, Market, Alwaye	(28-12-'54)
D—611	Rajagopalan K., Gopi Vilas, Kottayam	(24-2-'55)
D—607	Ramsy & Co., Dealers in Rubber & Hill Produce, Vellapally Lane, Kottayam	(19-2-'55)

Reg. No.	*Name and Address*	*Date of Expiry of Licence*
D— 49	Sacred Heart Trading Union, Vypana Buildings, Palai	(13-1-'55)
D— 8	Sayed Mohamed Ibrahim, Puthuparampil (Pazhayaparambil Peedika, Market Road, Erattupetta)	(7-10-'54)
D—566	Sayed Mohamed Rowther V. M., Mangasseril, Kanjirapally	(5-8-'54)
D—597	Samuel & Co., Old Bazar, Kottayam	(4-12-'54)
D—564	Sankarapillai N., Moolakunnel Puthen Veedu, Maniar, Punalur	(23-7-'54)
D— 57	Sasthav Achari V., General Merchant, Old Market, Mundakayam	(14-1-'55)
D—161	Scaria Scaria, Kythamattom, Pampady	(14-4-'54)
D—604	Scaria Thomas, Andath House, Piravom, Moovattupuzha	(7-1-'55)
D— 11	Sreedharan Nair K. N., Achammavilasom, Kottayam	(22-12-'54)
D—527	Standard Rubbers, K. K. Road, Kottayam	(21-12-'54)
D—125	Thoma Kora, Vazhakala, Rubber Dealer, Kottayam	(8-2-'55)
D— 20	Thomas A. V. & Co. Ltd., Alleppey	(28-12-'54)
D— 50	Thomas Thomas, Thanapanal, Thodupuzha	(13-1-'55)
D— 51	Thomas N. K., Perinthakari Peedika, Tirunakara, Kottayam	(13-1-'55)
D— 54	Thomas Markose, Kizhakemuriyil, Iythala, Ranni	(13-1-'55)
D— 72	Thomas M. C., Moozhikal, Pazhavangadi, Ranni	(28-1-'55)
D—225	Thomas E. D., Edakkalathu, Vazhur	(17-4-'54)
D—241	Thomas T. C., Thottiparackal, Paipad, Kuttapuzha, Tiruvalla	(11-7-'54)
D—389	Thomas M. J., Mundakal, Ponkunnom	(9-4-'54)
D—490	Thomas M. K., Meenathottathil, Barton Hill, Trivandrum	(31-3-'55)
D—504	Thomas Thomas K., Kollakompil, Kallukeery, Peruvanthanam, Mundakayam	(29-8-'54)
D—531	Thomas Mathai, Vazhanganamattom, Pampady	(12-1-'55)
D—572	Thomas Immanuel, Kunnuvilla, Muthukunnu, Kurumpanadom, Perumpanachy	(21-9-'54)
D—577	Thomas K. K., Kanjiratharayil, Piravom	(12-10-'54)
D—579	Thomas Chacko, Kallisseril, Chingavanam, Kottayam	(13-10-'54)
D—590	Thomas V. I. & Co., Mamundayil Building, Kurian Road, Kottayam	(10-11-'54)
D—600	Thomas P. K., Puthenpurackal, Kanjirapally	(11-12-'54)
D—614	Thomas Mathew, Valliathu House, Nedumon, Parakode	(9-3-'55)
D—550	Thomasons & Co., Kynady Buildings, Kottayam	(10-5-'54)

Reg. No.	*Name and Address*	*Date of Expiry of Licence*
D—424	United Traders, Nidhiry Buildings, Kottayam	(29-6-'54)
D—429	Varkey John, Kurichiaparampil Peedika, Kaduthuruthy	(21-10-'54)
D—602	Varkey Simon, Malalparampil House, Piravom	(21-12-'54)
D— 30	Varughese M. M., Achammavilasom, Kottayam	(11-1-'55)
D—280	Varughese P. E., Killikode Puthiaveedu, Nedumon, Parakode	(28-3-'55)
D—493	Varughese T. I., Thachil House, Kothamangalam	(29-5-'54)
D—571	Vasu Brothers, P. B. No. 38, Ballard Road, Cochin-1	(9-9-'54)
D—494	Viswanatha Iyer N., T. C. 572, Pattom Palace P. O., Trivandrum	(5-6-'54)
D—540	Viswanathan S, Puthen Veedu, Mundakayam	(5-3-'55)
D—559	Vettoor Brothers, Ltd., Merchants, Kottayam	(7-7-'54)
D—333	West Coast Trades, Kottayam	(5-11-'54)
D—316	Yusuf P. I., Puthuparampil, 1st Mile, Kanjirapally	(4-9-'54)
D—515	Zachariah Chandy, Kochupurackal, Mutholy, Palai	(6-10-'54)
D—596	Zachariah K. J., B. A., B. L., K. K. Road, Kottayam	(4-12-'54)

MADRAS STATE

D—605	Bank of India, Ltd., Silk Street, Kozhikode-1	(15-1-'55)
D—547	Calicut Rubber Co., 9/352 Big Bazaar, Kozhikode	(5-4-'54)
D—586	Devasia M. A., Malathadathil, Angadikadavu, Payam P. O., via Irutty, N. Malabar	(28-10-'54)
D—539	Dhawan & Co., 19 Swami Naicken St., Madras-2	(4-3-'55)
D—359	Globe Trading Agencies, 9 Vepery High Road, P. T., Madras-3	(27-12-'54)
D—570	Hemo Brothers, 54 Perianna Maistry St., Periampet, Madras-3	(9-9-'54)
D—511	Jacob P. Thomas, Rubber Dealer, Oyitty Road, Kozhikode-1	(21-9-'54)
D—528	Jay Cherish & Co. Ltd., 2/21 First Line Beach, Madras-1	(31-10-'54)
D—321	Lakshmanan Chettiar & Co., 1/240 Poonamalle High Road, Periampet, Madras-3	(17-9-'54)
D—189	Murthy T. D. & Co., 1/3 Pat Nool Sandousa St., Near Ripon Building P. O., Madras-3	(2-9-'54)

Reg. No.	*Name and Address*	*Date of Expiry of Licence*
D—574	Murugappa Agencies Ltd., Swastik House, 106 Armenian St., Madras	(21-9-'54)
D—505	Simon P. V., B. A., Prop., Simon & Co., Puthiara, Kozhikode-4	(29-8-'54)
	MYSORE STATE	
D—184	Efar Stores, 232 B Old Poor House Road, Bangalore Cantt.	(23-8-'54)
D—356	Ramachandran C. K., No. 6 A. Bachammal Road, Fraser Town, Bangalore-5	(30-9-'54)
D—615	Reliable Corporation Ltd., No. 2, Sri Narasimharaja Road, Bangalore-2	(17-3-'55)
	BENGAL	
D—183	Allied Industrial Syndicate, 138 Canning St., 1st Floor, Calcutta-1	(22-8-'54)
D—188	Atlas Trade Agency, 66 Canning St., Calcutta	(31-8-'54)
D—268	Bell J. J. C. & Co., E-3 Clive Buildings, 8 Netaji Subhas Road, Calcutta-1	(20-12-'54)
D—194	Friend & Co., 13/15 Lower Chitpore Road, Calcutta-1	(19-2-'55)
D—558	General & Rubber Trading Co., P. 36 Royal Exchange Place, Extention Room No. 52 A, Calcutta-1	(29-6-'54)
D—562	Hanif M. Brothers, 50/6 Pears Lane, Calcutta-12	(9-7-'54)
D—425	Hoare Miller & Co. Ltd., 5 Fairlie Place, P. O. B. 63, Calcutta	(20-9-'54)
D—201	Kymudin Mohamed Shefi S., P/15 Bentick St., Calcutta-1	(4-6-'54)
D— 79	Kuruvilla P. V., Union Rubber & Chemical Co., P/3 Chandni Chowk St, Calcutta-13	(1-2-'55)
D—362	Kazi Kalafat & Co., 12 Lower Chitpore Road, P. O. Box 421, Calcutta-1	(4-1-'55)
D—138	Oriental Import Agency Ltd., 10/1/1 D Lall Bazaar St., Calcutta	(18-2-'55)
D—130	Rostron & Co. Ltd., 10 Govt. Place East, P. O. Box 508, Calcutta-1	(12-2-'55)
D—533	Shafi Ahmed, 66 B Colootola St., 2nd Floor, Calcutta-1	(20-1-'55)
D—601	Union Trading Co., 73 Colootola St., Calcutta-1	(11-12-'54)
D—535	Universal Trading Agency, 31/102 Lower Chitpore Road, Siraj Building, Calcutta-1	(29-1-'55)
D—591	Wohra Sons, 43 Phears Lane, Calcutta-12	(12-11-'54)

Reg. No.	*Name and Address*	*Date of Expiry of Licence*
	DELHI	
D—294	American Rubber Mills Co. (Regd.), 1/359 G. T. Road, Delhi-Shahdara	(13-6-'54)
D—534	Roberts T. (India) Ltd., Barry Market, Sadar Bazar, Delhi	(20-1-'55)
	BOMBAY	
D—549	Alec Siqueria Ltd., 121 Fort St., Bombay-1	(22-4-'54)
D—609	Fairdeal Traders Corporation, 104/108 Clive Road, Dhanabunder, Bombay-9	(24-2-'55)
D— 81	India Coffee & Tea Distg. Co. Ltd., 53/55 Lakshmi Building, Sir P. M. Road, Bombay	(1-2-'55)
D—286	Joshi Trading Co, Byramji Mansion, 3rd Floor, Sir P. M. Road, Bombay-1	(23-4-'54)
D—492	Joshi Trading Co. Ltd., Suryodaya Chatrubhuj Shivaji Building, Tilok Road, Ghatkopar, Bombay	(25-5-'54)
D—152	Oriental Import & Export Agency, 52 Shri Krishna Nivas, New Silk Bazar, Kalbadevi Road, Bombay-2	(14-3-'55)
D—295	Peter Kuruvilla, Merchant & Agent, 59 Forbes St., Bombay-1	(13-6-'54)
D—563	Rubeche Ltd., Byramji Mansion, Sir P. M. Road, Bombay-1	(22-7-'54)
D—300	Shah S. M. & Co., 16 (2) Shankarbari Lane, Cheera Bazaar, Bombay-2	(7-7-'54)
D—451	Swan Trading Co., Old Hanuman First Cross Lane, Building No. 26, 2nd Floor, Kalbadevi Road, Bombay-2	(15-11-'54)
D—522	Union Commercial & Industrial Co. Ltd., P. O. Box 1445, Bombay-1	(24-11-54)
	LUCKNOW	
D—593	Ahmed Jankhan & Abdul Majid, Leather Merchants, Moulvijianj, Lucknow	(24-11-'54)

THE INDIAN RUBBER BOARD BULLETIN

C. M. S. P.—264—1800—30-3-'54.

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OCTOBER 1954.

THE INDIAN RUBBER BOARD BULLETIN

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MEMBERS OF THE INDIAN RUBBER BOARD

Mr. K. V. Mathew, Chairman.	Nominated by the Government of Travancore-Cochin State, to represent that Government.
Mr. A. V. George, Vice-Chairman. Mr. A. V. Thomas, M. P. Mr. M. C. Chandy.	Nominated by the Rubber Growers' Association of India to represent the Rubber Growing Industry.
Mr. S. Bhoothalingam, I. C. S., Jt. Secretary, Ministry of Commerce and Industry. Mr. S. V. Ayyar, Chief Cost Accounts Officer, Ministry of Finance. Dr. B. N. Uppal, Agricultural Commissioner with the Government of India.	Nominated by the Central Government to represent the Ministry of Commerce and Industry.
Mr. M. S. Sivaraman, I. C. S., Director of Agriculture, Madras. Mr. A. M. M. Murugappa Chettiar.	Nominated by the Government of Madras to represent that Government.
Mr. S. Govinda Menon, District Collector, Kottayam. Mr. V. V. Joseph, Addl. Secretary to Government, Travancore-Cochin State. Mr. C. Thomas, Director of Agriculture, Travancore-Cochin State. Mr. T. V. Kochuvareed.	Nominated by the Government of Travancore-Cochin State, to represent that Government.
Mr. B. H. Whitehorn. Mr. K. Srinivasan. Mr. L. Aldred.	Nominated by the United Planters' Association of Southern India to represent the Rubber Growing Industry.
Mr. P. Kurian John. Mr. A. V. John. Mr. A. M. B. Clarke.	Nominated by the Association of Planters of Travancore, to represent the Rubber Growing Industry.
Mr. P. N. Haksar.	Nominated by the Association of Rubber Manufacturers in India, Calcutta, to represent manufacturers.
Mr. Lalit Mohan Jamnadas.	Nominated by the Indian Rubber Industries Association, Bombay, to represent manufacturers.
Mr. A. G. Shah	Nominated by the Central Government to represent manufacturers.
Mr. T. C. Cherian.	Nominated by the Central Government from among rubber dealers.
Mr. C. E. Bharathan. Mr. K. Karunakaran. Mr. B. K. Nair.	Nominated by the Central Government to represent labour.
The Rubber Production Commissioner, (Mr. K. N. Kaimal)	Ex-officio.

THE
INDIAN RUBBER BOARD
BULLETIN

Vol. III. No. 4. OCTOBER 1954.

A RESEARCH INSTITUTE FOR THE INDIAN RUBBER PLANTATION INDUSTRY

We are happy to announce that the Union Government have accorded sanction to a scheme for the establishment of a small Rubber Research Institute and Experiment Station in South India. Schemes for Research and Rehabilitation of the rubber plantation industry, which have been submitted by this Board, have been under consideration of the Government for some time. The latter scheme, it is understood, will be finalised soon after the passage of the Rubber Amendment Bill in the next session of the Union Parliament. The new Institute forms another important link in the chain of research institutes for various agricultural crops in the country.

According to the proposed scheme, the new institute will have four research divisions—Botany, Agronomy, Pathology and Chemistry. Each division will have a research officer and a research assistant. The institute will also have a small experiment station for conducting field experiments. Every effort is being made to implement the scheme as early as possible.

The outstanding services which the Rubber Research Institutes of other rubber growing countries have rendered to the industry are well known to all planters. We have learnt much from them and our small industry may continue to be benefitted much from the results of their researches. Yet we have our own special problems which are entirely different from those of other countries as a result mainly of differences in climatic conditions. These have to be solved by ourselves and on the solution of these depends the healthy survival of our small but vital industry in the future rubber world. This and the provision of scientific advice to the grower on all aspects of the industry from planting to the processing of the crop into the final products are the immediate objectives of the research institute. The two accompanying articles reproduced in this Bulletin may be of interest to readers in this connection.

With the co-operation of all concerned we hope the new institute will come into being according to plan and begin to deliver the goods expected of it.

CAN RESEARCH SAVE NATURAL RUBBER?

It is our impression that people in Malaya do not realise the seriousness of the present situation concerning natural *versus* synthetic rubber. During the past five years, there has been a steady decline in the use of natural rubber in the U. S. A. and a concomitant increase in the consumption of synthetic. This is apparent to all who care to take a look at consumption statistics. But the story doesn't stop there. This vast change in the quantities of natural and synthetic rubber used by the American manufacturing industry follows upon intensive research during the war years. Research was not dropped when GR-S had become well established; it still continues, and it has had as its objective improvement in the quality of synthetic rubbers and the development of materials for specific purposes. Perhaps no one is convinced that GR-S is a better all round material than natural rubber, but there has been a steady increase in special purpose rubbers, oil resistant rubbers like the thiokols, heat resistant materials, as for instance the silicones, leather resembling materials such as Neolite, and many more. We in Malaya have perhaps not taken these developments too seriously; they did not represent a vast consumption of rubber anyway. We may have felt a certain security in the fact that the major part of the world's natural rubber was used for tyres; in spite of many claims by the producers of synthetic rubber there was no striking evidence of real superiority of a synthetic over the natural product. It may be that this situation has now changed.

The development of two series of synthetic copolymers, one using isocyanates and the other epoxy compounds, has now resulted in materials for which the claim of superlative excellence may be justified. It has been stated that a tyre tread, based on one of these materials and one eighth of an inch thick, will outlast the life of an average car; laboratory tests show it to possess truly remarkable properties. These materials are versatile in their application. Not only can they be used for tyre treads, but a German product at present commercially obtainable produces a foam 'rubber' mattress, light and delightful in quality, and simple in the extreme to manufacture. Admittedly these new products are expensive, they are in short supply, they are difficult to process. But give the manufacturers five years, and it is our guess that the picture will be very different. Already scientific papers are appearing in the journals indicating new methods to make processing simpler.

Taking it by and large, the present situation and the outlook are not at all bright for the natural rubber industry. From the purely technological point of view, there is little hope of large quantities of natural rubber being used in the future unless some trenchant measures are undertaken to improve quality beyond all recognition. Fortunately, the technological point of view is not the only important factor: availability of materials alternative to natural rubber and comparative costs will both play a big part in moulding the future.

It is not so much that one fears natural rubber will no longer be used, but that owing to the more desirable properties of synthetic materials, natural will be playing the part of Cinderella. Manufacturers will then use natural rubber because they cannot get enough synthetic and the price they will pay is not likely to be high. Let us quote from the Goodyear Lecture of 1953, given by Mr. John T. Blake in the autumn of that year:

Reproduced from Planters' Bulletin, No. 11, March 1954, with acknowledgments to the Rubber Research Institute of Malaya.

> It would take a fairly large price differential in favour of natural rubber for us to return to its use. Even then, we would do this with great reluctance because we have no wish to manufacture inferior products..... We must improve the quality of synthetics for reasons of national security so that they are the preferred material for all purposes.

The present eminence of synthetic rubber has been achieved by research. Its further improvement will be achieved by research. What research has done for synthetic materials, it can do for natural rubber. Research, however, costs money and relative achievements on natural and synthetic rubbers are foreshadowed by the amounts spent. Thus in 1952, $21 million (Malayan) were spent on GR-S and butyl research in the U. S. A (production *ca* 750,000 tons). Whereas on natural rubber considerably less than $ 3 million (Malayan) were spent on research in Malaya and the U. K. (production *ca* 600,000 tons).

In its Editorial for October 1953 the *India Rubber World* quotes a research director as stating: 'The best guess that I can make is that after plant disposal the rubber industry will spend between G$ 13 million' (=$39 million Malayan) 'and G$ 15 million' (=$ 45 million Malayan) 'per year on synthetic rubber research.'

A pertinent question to ask is what can the research man do for us now. Is it out of the question to modify natural rubber to produce an outstandingly better product? Obviously there is no simple answer to this question—no one knows at present. But judging from what is now being achieved in the field of emulsion polymerisation, it does not appear a wild dream to think of producing from natural rubber a copolymer with other suitable monomers, which would possess the outstanding properties needed today. This would probably mean replacing the present system of sulphur vulcanisation which has been in vogue over a hundred years; the vulcanisation or cross linking would be effected by the additional monomer. There are numerous possibilities in this direction and some are already being investigated by our sister research organisation in the U. K. as well as in Malaya It is not easy to decide the weight and priority that should be given to investigations of this sort. On the face of it, an all out effort would appear to be called for. But it would be a drastic step to curtail most of the research activity on the product as it is used at the moment, and gamble on producing a 'winner' by these novel methods.

The answer is a simple one—increase expenditure on research. The synthetic rubber industry has come into being with extraordinary rapidity by expending large sums on research, and by stepping on the shoulders of the industry built up by the natural rubber producers over half a century. Perhaps, in return, the natural rubber protoganist may be excused if he looks rather closely at the techniques of synthetic rubber production, with a view to abstracting information which will help to keep natural rubber in the forefront. The natural rubber molecule would probably prove to be adaptable and one might venture to expect products not only resembling rubber; the possibility of materials suitable for other industrial applications should be kept in mind.

Apart from this possibility of effecting a marked change in the technique of utilising natural rubber, are there other steps which should be taken at the moment to ensure a continued existence for what otherwise might become a declining industry?

The factor of cost is perhaps an obvious one to tackle. Although low cost will not hold a market indefinitely in competition with technically superior materials, it will at least extend its hold on an existing market.

It is obvious to everyone that to reduce cost of production would be a step in the right direction, but how can it be done? One of the most costly items in producing natural rubber is harvesting the crop. Unfortunately, no real progress has been made in reducing the labour involved in the mechanics of tapping and collecting, nor is it likely that any advance will be made in the future. On the other hand, substantial achievements in reducing cost have been made possible by the breeding of high yielding clones. Further progress may be expected in this direction but must, by its nature, be slow. Reduction in costs of preparation are still possible, but they probably entail a major change in methods of production. One often hears the criticism that the rubber producing industry is still employing the methods used 50 years ago, and that a much greater degree of mechanisation could and should be introduced. By greater mechanisation a cheaper and a more uniform rubber could undoubtedly be produced. Development work in this field has been proceeding in several countries during recent years and a number of pilot processes have been devised. None appears to be wholly satisfactory and at present we are studying the mechanisms of latex coagulation and of the drying of coagulum, to obtain basic data for the design of an efficient machine for converting latex into dry rubber. Greater emphasis could be placed upon these investigations, but only at the expense of other work, or by expansion of research facilities.

There is one further field in which it is felt an all out effort should be made by Malayan producers. Although consumption of dry rubber in America has declined during the past 5 years, the consumption of latex concentrate has remained fairly steady. Consumption of synthetic latex has increased. There is a large outlet for latex in producing foamed rubber goods, an expanding market which must not be lost for natural rubber. New methods of preserving and treating natural latex to keep it in the forefront of foam rubber manufacture must be studied. It is useless, however, to produce a latex preserved with a new and may be excellent preserving system, unless it can be used by the manufacturer. In general, he will not be able to use a latex different from that already employed without modifying his factory processes; and why should he go to that trouble? It is our contention that when a new type of latex is produced, the manufacturer should be presented at the same time with new or modified technological processes to go with it. This entails much co-operation between the research institutes working in the far east and those in Europe. It requires technological research by our research institutes, it requires advertisement and propaganda by our development units. There is no doubt that given the effort, much progress could be made.

Rubber in Pakistan.

Pakistan is proposing to introduce rubber planting in the hill areas of Chittagong and Sylhet next year. A scheme to this effect has been submitted to the Central Government for approval. A rubber plantation experiment, carried out by the East Bengal Government, according to official sources, has proved successful.

(*Journal of Industry and Trade, October, 1954*).

THE IMPORTANCE OF RESEARCH AND PROPAGANDA FOR NATURAL RUBBER PRODUCERS*

BY

R. M. E. MICHAUX

Thanks to the very kind hospitality of our Indonesian hosts, I have the opportunity which I appreciate very much to explain the purpose of the Research Institutes and their needs to very important personalities in the world of rubber, especially H. E. the Vice-President of the Republic of Indonesia, the Ministries and the delegates of the Indonesian Government.

I am very happy to say here that it is my considered view that during the last four or five years *considerable progress* in research has been made by all the National Units: the Indonesian Rubber Research Institute in Bogor, the Rubber Stitching in Holland, the British Rubber Producers' Research Association and the British Rubber Development Board in the United Kingdom, the Rubber Research Institute in Malaya, the Rubber Research Institute in Ceylon, the Rubber Research Institute in France and the Rubber Research Institute in Vietnam and Cambodia.

I am, however, not quite sure that its significance has been sufficiently appreciated by our planting friends in the producing countries. This to me is the *first worrying factor*. Research is a long term venture and I am sufficiently well acquainted with the progress made since the war by the several National Units under the aegis of the International Rubber Research Board and the International Rubber Development Committee to say that the planting industry should really congratulate itself, not so much on the progress already made—which is very great—but on the very great potentialities for further scientific and technical improvements that have now become opened to our natural rubber industry. I should like all planters to realise to the full the maximum value to them of our Research Institutes. If they do not or cannot, then the outlook will not fail to be tragic.

The *second worrying factor* is the apparent lack of appreciation of the absolutely vital importance of research nowadays for any modern industry. This applies particularly to our own plantation industry, if it is to survive at all the threat of a State equipped and subsidised rival, the synthetic industry whose competition is continuously made more formidable by *Team Research*. A lack of appreciation of this can only result in a gradual but certain suicide of a very large part of our industry.

The Boards of the National Research Institutes of the natural rubber Industry have very grave responsibilities on their shoulders. I believe the time has now come to issue in all sincerity a solemn warning to all the Governments concerned, to all the planters and to the Planting Associations to ask:

(i) *Is our research programme adequate and in the right direction?*

(ii) *Is the speed sufficient?*

As in all battles, speed dominates the issue. We are faced with more than competition—there is a cold war on!!

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* Communication from the head of the French delegate Mr. R. M. E. Michaux, read at the "Open Day" meeting of the Conference of the International Rubber Research Board and the International Rubber Development Committee on 20th March 1954, by Mr. P. Petithuguenin. (Reproduced with acknowledgements, from "Archives of Rubber Cultivation," Vol. 31, No. 3, August 1954).

American cold rubber started from scratch some 4 or 5 years ago, at about the same time as we ourselves launched " technically classified rubbers." This was a simple, modest but sound start by natural rubber in the right direction and its consequences were and are very promising. 1953 saw approximately 50,000 tons of T. C. rubber exported, but this is only as against an availability of 200,000 tons of cold rubber!! The same story prevails in all directions : one has only to see the ground natural rubber has lost to Butyl rubber. Our progress in improving the impermeability to gas of natural rubber is interesting, but today nearly all inner tubes are being made from Butyl rubber. This is a disaster!

Unless the speed of utilising our research is tremendously increased, I am afraid we are fighting a lost battle for the greater part of our industry.

What is the object of our scientists to learn and be convinced all round the World if the information they obtain and the lessons learned only serve a limited purpose?

Will any of our Board members and any of our scientific friends here contradict me when I say the speed and scope of our research is inadequate in the face of the goal and results achieved by our synthetic competitor?

Our progress is too little because it is too slow, not because of lack of potentialities.

The members of the International Rubber Research Board and Development Committee will remember the grave warning I gave to them in December 1948. I advocated that the sale of rubber based on intrinsic qualities should replace sales based on only external appearances. I stated that " Every effort should be made to convince the growers, the manufacturers and the exporters that the current trade system leads Natural Rubber straight to bankruptcy " I repeat the same warning word for word today with only one emphasis, however,..... insufficiency of speed.

It will in all probability be that greater speed will mean greater expenditure. But, may I ask, who would dare to criticise our own expenditure on communist banditry today in Malaya or Vietnam and Cambodia? Who would suggest economising on such expenditures on fire insurance or on such charges which mean survival?

We have no other option there than here; whatever the cost may be, our speed and our scope must be such as to parallel at the very least the progress made by synthetics. The cost must be that which will ensure both.

But what is the cost of research to the synthetic industry? It is about 6 % of the turnover if one includes the money expended by the American Government and by American private industry. At the ruling price of natural rubber, what is our rate? It is 1 % of turnover in Indonesia and Malaya and 2% in Vietnam and Cambodia. *In other words, the natural rubber industry as a whole spends about 1% of turnover whilst our competitors spend 6 %.* Such are the facts. *Can our industry afford heavier cost?*

My contention is that the cost to the industry will be either *negligible or nil*, as long as the vast majority of the industry bears the same charge per pound of rubber produced.

Indeed, when 90 % of the producers of a commodity have to bear an equal burden (either in taxes or in higher wages and the like) in their cost of produc-

tion, the market is inevitably soon automatically influenced by such an extra burden and correspondingly higher prices result.

(i) This would have certainly been true in pre-war free trade conditions.

(ii) What of today in the face of unfair conditions ?

The chances are that this automatic compelling re-adjustment would not apply to a dying industry, but there is every chance that it will apply to a vigorous and progressive modern industry that must command the respect and satisfy the needs and the hopes of tomorrow's consumers. Psychologically it cannot fail to make a difference to "fairer competition."

Salvation is not to be found in economising on our future but in ensuring it.

Our industry is probably not aware of the dangers ahead. The duty of our Institutes has been to get together on this grave subject and make an honest balance sheet between the potentialities of synthetics and natural rubber, and then *to prepare a comprehensive scheme of adequate research.* Our duty, today, is to add to this valuable scheme an "emergency plan" aiming at the stepping up of practical realisations. This emergency plan *should be an International scheme*—we cannot do it singly, each without the other; it requires the full solidarity of the planters in facing the coming danger; the industry in one country will not survive if it dies in the others. The duty of our Institute is to see that liaison between institutes and the planting associations, which has been my endeavour to strengthen for many years, be considerably improved in the future, for it is still far from what it should be.

This permanent liaison between the institutes on the one hand and between themselves and the planters on the other hand is the main feature.

We pursue two goals :

(i) Improve yields and reduce cost of production.

(ii) Improve the quality of the product.

But this work is obviously intermingled as most scientists and nearly all the consumers are over there and the trees and the planters over here.

I am sorry if we all have to make ourselves somewhat unpopular for a time. *Research is a very long term venture.* We should remind our people that synthetics were born long before the war but have made nevertheless a brutal and gigantic appearance since, after many long years of research.

We know that for the progress of natural rubber, the goods are within our reach. Is this not after all the main thing ? Let us be in a position to deliver them in time.

'DUSTING' AS A MEASURE OF CONTROL OF THE ABNORMAL LEAF-FALL OF THE RUBBER TREE

By K. S. Venkataramani

I have been asked to tell you something about the equipment required for fighting the Phytophthora leaf-fall disease of rubber (*Hevea brasiliensis*), with reference to dusting as a measure of control. You have already heard excellent discourses on plant protection equipment and you are also no doubt acquainted with a few useful types of dusting machinery. There is little for me to tell you now. However, thinking over the matter, I find that there is yet another kind of equipment, namely a knowledge of the biology of the organism causing the disease and of the relationship between the climatic conditions and the incidence of the disease, which is essential for a proper appreciation of the dusting methods to be employed. Unless one is thus equipped, it is difficult to achieve satisfactory results and unfortunately it is this very information that appears to be lacking amongst the practical men in the field. Although the disease was first investigated nearly forty years ago, there are, even now, as I found out last year, many conflicting views and opinions about it amongst the planters. I, therefore, thought it worthwhile to reinvestigate the disease in all its aspects in order to confirm and if possible add to the earlier findings. Based on the information secured, I also carried out an experimental dusting trial which yielded satisfactory results. I shall now give you an account of this work.

It must be said at the outset that credit goes to Mr. McRae, a former Mycologist to the Government of Madras, for tracing the disease to a fungus. He named it *Phytophthora meadii*, but it is now considered to be none other than the well-known plant pathogen *Phytophthora palmivora*. This fungus attacks several plants besides the rubber tree. How the disease first originated and from where it came are now largely matters of academic interest and it is sufficient to know that, in a rubber plantation where the disease has been known for some years, the rubber tree itself acts as a source of infection year after year. I shall explain this later. In the case of the rubber tree, the organism can attack the leaf, the fruit, the tender stem and the renewing bark at the tapping panel, causing respectively, leaf-fall, die-back and Black Stripe.

The fungus starts its activity after the dry season, just before the monsoon, at a few points on the estate, chiefly from the shoots that died back during the preceding monsoon. The organism, which is inside the affected tissues, remains dormant but alive during the dry period at the junction of dead and living tissues. With the advent of the rains and favourable conditions for growth, it starts its activity once again and infects further healthy tissues and grows over the infected part of the rubber tree to produce its sporangia and spores, which are the chief means of spreading the disease.

The fruits of the rubber tree get easily infected and they serve as the main propagating centres of the organism, for the simple reason that the infected fruits remain hanging on the tree for a considerable period, producing numerous sporangia on their surface when conditions are favourable. Quick and abundant development of sporangia takes place in a saturated atmosphere, but in the absence of high humidity, mycelial growth on the fruit surface and production of sporangia

A paper contributed to the UPASI Scientific Conference, August 1954.

are retarded. With the onset of the rains, a relative humidity of well over 85% is obtained and conditions are indeed favourable for the rapid development of the organism. Under suitable conditions, the production of sporangia and the discharge of their spores can take place well within a day or two.

Recent investigations on the cocoa plant, the fruit of which is also attacked by this fungus, suggest that the sporangia are air-borne. Although several attempts were made to find out whether this is the case with respect to rubber too, I could not obtain convincing evidence in support. The data, I could gather, suggest that the sporangia and their spores are not borne in dry air and that unless there is a rain, dissemination does not take place. Wind-blown rain, however, is a major factor for the rapid dissemination of the fungus. The sporangia and spores are spread by drops of water falling on infected fruits and thence splashing on to other fruits and leaves. The splash drops take the infective material with them and they are carried long distances, especially under windy conditions. With incessant rains and winds of high velocity experienced during the early part of the monsoon, opportunities exist for continuous distribution of spores and this accounts for the quick spread of the disease. At the beginning of the rains, in fact, during the pre-monsoon showers, only a few fruits are infected here and there on the estate, but with the onset of the monsoon, the disease spreads rapidly and within a short time almost every fruit on the tree gets infected and a high incidence of leaf infection is also to be expected.

For successful germination of the spore and infection to take place, a film of water on the plant surface is necessary and such a condition no doubt exists during the early part of the monsoon. Infection usually takes place within a short time of the spore lodging on the leaf or fruit surface, but 6 to 7 days may elapse between initial infection and the fall of the leaf. Some consider that the leaf-fall is due to the clogging of the vessels in the petiole with fungal hyphæ, while some others are of the opinion that it is brought about by a toxin or poison excreted by the fungus into the plant tissue.

This, in brief, is the life-history of this most destructive organism. We shall now consider how this information can be helpful. The biology of the fungus indicates that the following are the main factors to be considered in the control of the disease: (i) the ability of the organism to survive the dry season inside plant tissues, namely in the branches that have died back during the preceding monsoon and in old fruits stalks, (ii) the fruit being the chief propagating centre for quick multiplication of the fungus, and (iii) the dependence of the organism on high humidity for rapid production of sporangia. These observations suggest that removal of all dead branches and prevention of fruit set will greatly aid in the control of the disease. In practice, however systematic and careful removal of dead branches including all portions harbouring the fungus and prevention of fruit set are not easily and economically achieved. Direct control of fungal infection by the use of the chemical fungicides is, therefore, the only practicable and reliable method of combating the disease.

Bordeaux spraying has come to be closely associated with rubber culture in South India and you know very well that in the past the trees were sprayed in the dry period just preceding the monsoon, well in advance of the incidence of the disease. This procedure was always cumbersome and difficult due to the type of spraying equipment used and the problem of obtaining and carrying large amounts of water needed for spraying. At the present time, the question of high

labour costs, and low output of work have to be added to the previous difficulties and the planter is seeking other methods of protecting his trees. Interest is evinced in applying the fungicide in the form of a dry dust, an alternative and seemingly easier method of plant protection. Dusting has certain obvious advantages over spraying, namely large areas can be treated in a short time at a comparatively less cost, the problem of water supply is totally eliminated, and the climbing of huge trees, which is inevitable in spraying, can be avoided. It is now that one is confronted with such practical questions as time and method of application of the dust, and it is here that information on relationship between climatic conditions and development of the fungus can be useful.

We know that the fungus requires a high humidity for the development of its sporangia which are the chief means of dissemination. A study of the rainfall data for the ten years 1944 to 1953 in the Mooply Valley, Cochin, where this study was undertaken, shows that the April rains are not continuous and that they are largely inadequate in maintaining a high atmospheric humidity, more so because of the high temperatures prevailing at this time. Rainfall in May too is not generally favourable for rapid development and dispersal of the organism, although the fungus will be able to start its activity during this month. Rain in June, of course, produces an ideal condition for the multiplication and rapid spread of the fungus. It is evident, therefore, that it is neither necessary nor worthwhile to apply crop protection formulations in the dust form during the dry part of the year. The application of fungicidal dusts in March and April, when the fungus has not started its activity, will not be as useful as applying them at a later period, say, in May or June, when the organism begins to produce its spores in number.

From a consideration of the rainfall data, it appears that, in general, the first application of the fungicidal dust can be given late in May or even early June, a second round of dusting by about the second or third week of June, and a third round towards the very end of June or early July, depending on the local weather conditions, whenever there is a break in the rains. However, in certain years when the premonsoon rains in May are heavy and continuous, as in the year 1949, the first round of dusting may have to be done early, say, when there is a break in the rains after 5 or 6 days of continuous downpour and the whole atmosphere is muggy. It would also be desirable then to complete the second application by early June.

My own experience suggests that a third, and if possible even a fourth round of dusting, is advisable as soon as the leaf fall starts and in the middle of the rainy season, to be carried out of course during a break in the monsoon, mainly with a view to arrest fresh development and dispersal of sporangia and spores from the diseased fruits still hanging on the trees. Last year a pilot trial was conducted to find the efficacy of this treatment. A third round of dusting was done in a field of about 40 acres treated originally with two rounds of 6% Cuprosana dust at the rate of 16 lbs. per acre per round. The first two rounds were completed by the 26th of June and the third round was carried out on the 8th July, during a break after seven days of heavy and continuous rain. The first wave of leaf-fall (roughly estimated to be 40%) had taken place by that time in the untreated area. I was not there to assess the value of this treatment, but I learnt from the Manager of the Estate that the experimental area showed, as expected, the beneficial effect of the third application in spite of a heavy rainfall in July (20·8 in. after the third round of dusting with a total of 45·62 in. for the whole

month). On the 13th of August 1953, he wrote as follows: "The experiment of the 3rd round dusting we carried out in Fields 11 and 12, 40 acres, where the initial attack of Phytophthora started, shows very fine results, and from this I feel sure that you are on the right lines....i. e., dust when the spores are developing."

The trial has shown that a satisfactory control of the disease can be achieved with a 6% copper dust, if properly timed and applied. As far as the dusting machinery is concerned, any of the power dusters available in the market, namely Drake & Fletcher Dustejecta, Cravens Duster, or the now famous Whirlwind, is suitable for the purpose.

Arising from my investigations there are a few points of practical interest which are important if dusting is to be effective. The time and method of application are most important. Early morning when there is some dew or moisture on the leaf surface is best suited for dusting purposes, and it is only obvious that the dry part of the day is to be avoided. In general experience it may be found that, on a clear day, it will not be possible to carry on dusting after 9 or 10 a. m. The efficiency of dusting also depends on the prevailing wind currents. It is best, however, to apply the dust in still air. Heavy rainfall at the time of dusting or immediately after dusting will wash the dust from the foliage. To be equally effective at all heights of the rubber tree, the fungicide should be such that its active ingredient and the inert filler do not separate when the dust is projected to great heights, but it is difficult to achieve this in practice. Some separation did take place in our trial, but the copper deposit on the foliage, to a height of about 60 ft. appeared adequate to afford protection against the fungal infection.

The observations made by Van Emden on dusting for the control of *Oidium* in Ceylon are of general interest and the following summary of his findings will not be out of place here. With the Whirlwind duster the dust can be blown to a height of over 80 ft. in still air, even when moving at 2 m p. h.; the dust drifts laterally to about 100 ft if the outlet is tilted to 30 deg from the vertical. A scarcely perceptible cross wind at the time of dusting increases the lateral displacement of the dust, reduced the height obtained to about 30 ft. and blows the dust away horizontally so that it settles on the ground; if the wind occurs later, the dust is carried upwards, often reaching tree-top level at a distance of 200-300 ft. from the dusting machine. The machine must always be kept under the cloud of dust, otherwise the dust will not go up high enough. In a light wind, the machine is to be moved for about 100 ft. with the feed closed, then put down for 10 seconds' dusting and closed again for another 100 ft. The recommendations that follow from these observations are:—

(i) dusting should begin as early as possible in the morning,

(ii) it should stop as soon as the wind velocity exceeds 2 to 4 m. p. h.,

(iii) the dusting machine should move along parallel lines about 100 ft. apart, and

(iv) the machine should not be moved at a speed exceeding 2 m. p. h. in still air, and in wind it should be moved with or across the wind and never into it.

This is a brief view of the problem of the protection of the rubber trees against the fungus *Phytophthora palmivora*, and I hope that the information I have given will have been both of interest and practical value.

These investigations were carried out under arrangements with Messrs. Peirce, Leslie & Co., and I am most grateful to them for permitting me to make use of the information obtained in the preparation of this paper.

SELECTION AND BREEDING EXPERIMENTS (1953-54)

With the object of developing high yielding local clones of rubber a programme of preliminary selection of outstanding estate mother trees and breeding new strains by hand pollination between locally available clones for testing was undertaken during 1953 and 1954.

Selection of Estate Mother Trees

A preliminary selection of nearly 150 high yielding trees mostly in clonal seedling areas on 4 estates was made early in 1953. These trees were under observation in respect of yield and secondary characters for over six months. Out of the above 35 mother trees have been finally selected and arrangements are being completed for the propagation of these trees by budgrafting and testing the clones.

Breeding Experiments

A small scale breeding programme was also undertaken during the flowering season, 1954 Shaliacary Estate where most of the clones available locally are present, was selected for the purpose with the kind permission of the Managing Agents. Hand-pollination between parents as originally planned could not be carried out owing to the differences in the time of flowering of many clones which in some extreme cases were as much as 4 weeks. It was, therefore, modified according to the availability of flowers of different clones. Pollen of clone B. D. 10 was obtained from the Kadamankulam Group of Travancore Rubber & Tea Co., Mundakayam. With the exception of RSY4, all clones used for the hand-pollination are of foreign origin.

The results of hand-pollination are summarised in the following Table.

TABLE

Sl. No.	Parent clones Female	×	Male	No. of pollination	Success No.	Success %	No. of pads harvested	No. of seeds	Germination of seeds No.	Germination of seeds %
1	AVROS 255	×	Gl. 1	2014	2	0·10	2	6	3	50·00
2	do.	×	Tjir 1	1099	...	...	...	...	...	...
3	do.	×	Pil. B. 84	334	...	...	...	...	...	...
4	do.	×	B. D. 10	214	...	...	...	...	...	...
5	CHM 3	×	B. D. 10	233	1	0·43	1	3	3	100·00
6	Tjir 1	×	AVROS 255	691	14	2·03	13	45	33	73·33
7	do.	×	CHM 3	1574	36	2·29	23	72	52	72·23
8	do.	×	Gl. 1	1246	69	5·54	45	133	105	78·94
9	do.	×	MK 3/2	1251	42	3·36	20	62	46	74·20
10	do.	×	HC 28	1119	52	4·65	36	123	104	84·55
11	MK 3/2	×	HC 28	1280	130	10·16	53	157	108	68·79
12	HC 28	×	MK 3/2	235	2	0·85	1	3	3	100·00
13	MK 3/2	×	Gl. 1	1165	21	1·80	13	42	24	57·15
14	do.	×	CHM 3	692	2	0·29	2	6	4	66·66
15	Tjir 1	×	PB 5/139	40	...	...	...	...	...	...
16	MK 3/2	×	Tjir 1	798	5	0·63	2	7	...	...
17	do.	×	PB 5/60	370	4	1·08	3	10	9	90·00
18	do.	×	PB 5/139	275	1	0·36	1	3	2	66·66
19	do.	×	RSY 4	117	8	6·83	5	15	5	33·33
	Total			14747	389		220	687	501	
	Percentage				2·64		1·49	4·66	72·91	

This being the first organised hand-pollination experiment undertaken by this Board and as conditions obtaining during the work were not altogether ideal no comments on the comparative fertility of the flowers of the different clones are attempted in this preliminary note. However, the extremely poor results obtained with the female flowers of clone AVROS 255 are very striking. As the estate is situated in a *Phytophthora* district, the hand-pollinated trees as well as trees adjacent to them were thoroughly sprayed twice with Bordeaux Mixture for protection against this disease. In spite of this precaution, a few of the casualities among the ripening green pods were caused by it.

Apart from the results obtained this year's hand-pollination experiment has enabled the field staff concerned to gain valuable experience about the work under local conditions which are in some respects different from those obtaining in other countries. The experience already gained can be successfully applied in planning next year's programme.

The legitimate seedlings obtained have been planted at the Board's nursery at Rajagiri Estate.

NOTES AND NEWS

Chairman, Indian Rubber Board

Sri A. V. Thomas, M. P., tendered his resignation as Chairman of the Board with effect from the 17th August 1954, on grounds of health. The Board at the meeting held on the 16th August, 1954, while accepting the resignation, unanimously passed the following resolution :—

"THIS BOARD WISHES TO PLACE ON RECORD ITS APPRECIATION OF THE SERVICES RENDERED BY MR. A. V. THOMAS AS CHAIRMAN OF THE BOARD TO THE RUBBER INDUSTRY AS A WHOLE, INCLUDING THE MANUFACTURING, PLANTATION AND LABOUR INTERESTS."

Sri K. V. Mathew, Kollamkulam, was unanimously elected as Chairman of the Board in place of Sri Thomas at the same meeting.

The Plantation Inquiry Commission.

The Plantation Inquiry Commission appointed by the Government of India for the purpose of making a comprehensive inquiry into the economic conditions and problems of the Tea, Coffee and Rubber Industries have recently issued an elaborate Questionnaire relating to these industries. The Commission has also programmed an extensive tour of selected rubber, tea and coffee plantations in Travancore-Cochin State from 5th to 29th December, 1954.

The Commission consists of the following members :—

1. Sri P. Madhava Menon, I. C. S., Officer on special duty, and ex-officio Joint-Secretary, Ministry of Commerce and Industry. Chairman.
2. Sri K. G. Sivaswamy, formerly of the Servants of India Society, Madras, and Research Associate of the Delhi School of Economics ; and
3. Prof. M. V. Mathur, Head of the Department of Economics, Rajputana University, Jaipur.

The Government Cost Accounts Officer, deputed by the Commission, will shortly commence the work of examining cost accounts of selected categories of rubber estates.

The Rubber (Production & Marketing) Amendment Bill, 1952.

The Report of the Select Committee of the Union Parliament on Rubber was presented to Parliament at the August-October session. Earlier, a party of twenty members of the Select Committee visited various rubber plantations in the Travancore-Cochin State in order to acquaint themselves with the problems of the industry. The Bill is expected to be taken up for final consideration at the next session of the Parliament.

Additional Grade of Raw Rubber under Group 5

In accordance with the recommendation of the Board and the Rubber Price Advisory Committee, the Government of India have notified the inclusion of an additional grade of raw rubber to the existing official grades. The new grade will be known as *E. B. C Super-IX*, and the maximum and minimum prices of this grade have been fixed at Rs. 133/8/0 and Rs. 132/8/0 respectively. The necessary amendments to Notification No. 30 (5) Plt./52 dated 27-10-1952 (fixing the maximum and minimum prices of various grades of raw rubber) has been made by the Government of India in the Ministry of Commerce and Industry.

Confidence in Natural Rubber.

The check in the upward trend of Natural Rubber consumption by the U. S. has given a timely reminder to rubber growers that the price factor has now become an important determinant, and that if their product is to compete successfully with its rival, the price must be held to comparable levels. This prospect should not discourage progressive concerns. Addressing the shareholders of the Golden Hope Rubber Estates, Sir Eric Macfadyen said :—"It is because Natural Rubber is capable of being a formidable competitor on these terms that I, for one, am confident about its future. Growers, however, will have to redouble their efforts to modernise their properties. The key to prosperity is lower costs rather than higher prices."

(*The India-Rubber Journal, Sept. 18, 1954*)

Philippine Rubber Industry.

A Committee composed of domestic rubber producers and manufacturers has been set up to study possible methods of assisting the rubber industry in the Philippines. Local producers claim that the new industry will collapse unless help is received to offset the high cost of production—said to be 3½ times more than in other producing countries such as Indonesia and Malaya. Labour costs are much higher in the Philippines, it is stated. Two solutions suggested by the producers are:

1. A total ban on the import of manufactured rubber goods; and
2. an increase in the price of rubber.

(*The India-Rubber Journal, Sept. 18, 1954*).

INDIAN RUBBER STATISTICS

TABLE 1

Monthly Production, Dry Weight in Tons, 1948 to 1954.

Months	1948	1949	1950	1951	1952	1953	1954 Jan./Oct.
January	1,425	1,326	1,291	1,307	1,651	1,992	1,898
February	270	257	208	260	325	390	406
March	956	798	988	902	1,127	1,031	1,220
April	1,498	1,563	1,640	1,664	1,973	2,045	1,967
May	1,646	1,240	1,450	1,808	1,533	1,893	2,070
June	694	854	836	562	1,153	1,425	1,120
July	844	904	758	1,258	1,510	882	1,475
August	1,068	1,245	1,053	1,654	1,167	1,894	1,564
September	1,646	1,410	1,414	1,756	2,596	2,368	2,394
October	1,796	1,944	1,937	1,807	1,972	2,133	2,329
November	1,742	2,011	1,975	1,981	2,450	2,514	...
December	1,837	2,035	2,049	2,189	2,406	2,569	...
Total	15,422	15,587	15,599	17,148	19,863	21,136	

TABLE 2

Monthly Consumption of Raw Rubber (Indigenous and Imported) by Rubber Goods Manufacturers (Tons) 1948 to 1954.

Months	1948	1949	1950	1951	1952	1953	1954 Jan./Oct.
January	1,587	1,548	1,162	1,868	2,059	1,621	2,012
February	1,494	1,414	1,295	1,894	1,980	1,637	1,972
March	1,587	1,284	1,320	1,821	1,954	1,698	2,360
April	1,668	1,981	1,435	2,134	1,598	1,770	2,151
May	1,432	1,847	1,372	1,576	1,514	1,871	2,076
June	1,875	1,770	1,517	1,131	1,757	2,021	2,327
July	1,801	1,785	1,800	2,077	2,035	2,124	2,137
August	1,902	1,819	1,670	2,007	1,840	1,986	2,177
September	1,753	1,638	1,506	1,953	1,633	2,274	2,350
October	1,109	1,068	1,253	1,788	1,330	1,408	1,473
November	1,700	1,697	1,737	2,061	1,686	1,888	...
December	1,811	1,341	1,668	2,117	1,675	2,075	...
Total	19,719	19,192	17,735	22,427	21,061	22,373	

TABLE 3

Production, Consumption and Stocks of Rubber by Groups January/October, 1954.

GROUPS	Production Jan./Oct. 1954 (Tons)	Consumption of rubber by manufacturers, Jan./Oct. '54 (Tons)	Stocks with estates and dealers as on 31-10-1954 (Tons)	Stocks in transit sold to manufacturers as on 31-10-1954 (Tons)	Stocks of rubber with manufacturers as on 31-10-1954 (Tons)
Group 1	6,412	5,522	769	410	781
,, 2	3,193	6,678	443	433	984
,, 3	1,659	2,447	298	189	416
,, 4	857	867	258	34	103
,, 5	809	1,996	200	68	777
,, 6	655	1,806	219	111	349
,, 7	48	125	44	4	27
Scrap Grades	1,731	142	340	...	52
Latex (D.R.C.)	660	634	235	28	117
Sole Crepe	419	143	96	1	25
Estimated unspecified	...	675*	...	...	75*
Total	16,443	21,035	2,902	1,278	3,706

* Estimated consumption by and stocks with some manufacturers from whom returns have not been received.

Note :—

Group 1 is composed of RMA 1 X and 1.
,, 2 ,, RMA 2, 3 and Cuttings No. 1.
,, 3 ,, RMA 4, 5 and Cuttings No. 2.
,, 4 ,, Precoagulated Crepe, PLC IX, 1, 2 and 3 FAQ.
,, 5 ,, Estate Brown Crepe IX, 2X, Smoked Blanket and Remilled Crepe 2.
,, 6 ,, Estate Brown Crepe 3X, Remilled Crepe 3 & 4.
,, 7 ,, Flat Bark.

TABLE 4

Imports of Raw Rubber into India during 1948–1954 (in Tons)

Months	1948	1949	1950	1951	1952	1953	1954 (Jan./Oct.)
January	...	501	339	945	447	47	...
February	...	354	41	1,377	638	50	..
March	...	954	44	1,124	217	150	...
April	...	691	...	850	544	...	...
May	...	9	132	521	187	10	...
June	315	71	44	477	315	...	50
July	705	...	...	843	...	15	484
August	444	...	...	115	235	...	345
September	941	3	...	185	300	...	769
October	649	2	75	243	388	...	1,514
November	595	66	175	136	326	...	
December	684	116	232	105	244	...	
Total	4,333	2,767	1,082	6,921	3,851	272	

TABLE 5

Export of Raw Rubber from India (Tons) 1950–1954

Months	1950	1951	1952	1953	1954 (Jan./Oct.)
January	...	...	4	2	...
February	...	...	6	...	...
March	89	...	1	5	...
April	383	...	5	2	...
May	373	...	...	7	...
June	1	...	...	16	...
July	112	16	6	...	...
August	27	20	4	...	...
September	17	23	2	...	...
October	12	38	4	10	...
November	16	36	...	1	
December	8	12	64	22	
Total	1,038	145	96	65	...

TABLE 6

Stock of Raw Rubber held by Producers & Dealers and Manufacturers at the end of each month (January 1953 to October 1954)

(All figures in tons)

Month	Unsold stock with Producers & Dealers		Stock sold to Manufacturers and in transit		Stock with Manufacturers (including imported rubber)		Total	
	1953	1954	1953	1954	1953	1954	1953	1954
January	6,505	5,165	1,005	884	3,258	3,155	10,768	9,204
February	5,250	3,740	1,715	1,017	2,605	2,881	9,570	7,638
March	4,547	2,743	1,129	789	3,371	2,968	9,047	6,500
April	4,934	2,593	1,430	1,110	2,957	2,613	9,321	6,316
May	4,900	2,452	1,794	1,451	2,654	2,408	9,348	6,311
June	4,311	1,651	1,669	860	2,755	2,643	8,735	5,154
July	3,252	1,623	1,439	820	2,817	2,532	7,508	4,975
August	3,331	1,636	1,416	854	2,668	2,217	7,415	4,707
September	3,664	2,656	1,104	701	2,739	2,162	7,507	5,519
October	3,841	2,902	1,121	1,278	3,261	3,706	8,223	7,886
November	4,604		1,224		3,020		8,848	
December	5,114		1,409		2,798		9,321	

TABLE 7

Natural Rubber Prices—World Markets (Per lb.)

(Monthly Averages) (R. S. S. No. 1)

(January 1953 to October 1954)

	London s. d. (c. i. f.)	New York (U. S. Cents)	Singapore (Straits Cents)	Colombo (Rupee Cents)
1953				
January	2 0-3/8	29·39	85·01	135
February	1 10½	27·60	77·87	135
March	1 9-15/32	26·58	73·35	135·3
April	1 8-3/32	24·64	68·66	136
May	1 8-27/32	25·51	71·57	136·9
June	1 7-13/16	24·47	67·51	136·2
July	1 7-1/32	23·76	65·15	136·0
August	1 6-7/8	23·40	64·39	136·1
September	1 6-27/32	23·11	64·11	136·0
October	1 4-31/32	20·82	57·61	136
November	1 4-27/32	20·61	57·21	136
December	1 5-1/4	20·95	58·42	127·6
1954				
January	1 4-5/8	20·23	55·88	110·8
February	1 4-9/32	19·99	54·73	110·8
March	1 4-3/16	20·18	54·80	110·8
April	1 5-15/16	22·07	60·52	110·8
May	1 6-7/16	22·06	62·45	110·8
June	1 7-1/4	23·01	65·51	110·8
July	1 8-9/16	24·13	69·93	110·8
August	1 7-25/32	23·00	67·28	110·8
September	1 8-5/16	23·50	69·19	110·8
October	1 8-5/16	23·63	76·30	110·8

Note: Colombo prices exclude export duties.

TABLE 8

Geographical Distribution of Rubber Planted Area in India (as on 31-12-1953)

States	No. of Units Estates	Holdings	Area in Acres
Travancore-Cochin State:—			
Travancore	159	13,701	1,23,554·24
Cochin	13	199	13,799·04
Mysore State	2	5	396·03
Coorg	5	3	3,226·20
Madras State:—			
Malabar	65	253	29,994·22
Canara	3	1	410·00
Nilgiris	3	8	872·52
Coimbatore	2	—	521·10
Salem	—	4	132·00
Madura	1	—	407·00
Andamans	1	—	272·00
Assam	—	1	50·00
Bengal	—	1	9·23
	254 (14,430)	14,176	1,73,643·58

TABLE 9

Classification of Small Holdings and Estates according to Size (as on 31-12-1953)

	No. of units	Area in acres
Small Holdings		
Below 1 acre	2,427	1,391 91
Of and above 1 acre & below 5 acres	8,566	18,858·63
do. 5 acres ,, 10 ,,	1 559	10,378 41
do. 10 ,, ,, 50 ,,	1,417	26,977·46
do. 50 ,, ,, 100 ,,	207	13,794·14
Total Small Holdings	14,176	71,400·55
Estates		
Of and above 100 acres & below 500 acres	196	38,077·29
,, 500 ,, 1000 ,,	31	21,697·80
,, 1000 ,, 1500 ,,	17	20,870 18
,, 1500 ,, 2000 ,,	4	6,981·19
,, 2000 ,,	6	14,616·57
Total Estates	254	102,243·03
Grand Total	14,430	173,643·58

LIST OF LICENSED RUBBER DEALERS IN INDIA

TRAVANCORE-COCHIN STATE

Reg. No.	*Name and Address*	*Date of expiry of Licence*
D-227	Abraham P. J., Puthumana, Ponkunnom	23-11-54
D-544	Abraham Eapen & Co., Kottayam	19-3-55
D-603	Allied Agencies. Market Landing Road, Kottayam	7-1-55
D-485	Ancheri & Co , Market Landing Road, Kottayam	14-4-55
D-158	Antony P. P., Merchant, Municipal Office Road, Trichur	6-4-55
D-481	Antony T., Kooliathu House, Kothamangalam	3-4-55
D-243	Aspinwall & Co. Ltd., Fort Cochin	5-8-55
D-4	Associated Agency, Kottayam	19-12-54
D-119	Abraham A. J , Mookranathu, Uthimood, Ranni	6-6-55
D-525	Augustine N. A., Rubber Dealer, Paika, Poovarani	19-9-55
D-618	Abraham N. J., Rubber Dealer, Konni	29-3-55
D-630	Abraham K. C., Kallamparampil, Ranni	25-4-55
D-670	Ahmedkhan Rowther P. S , Palackalthundyil, Kanjirapally	20-9-55
D-675	Abdul Kareem P K., Melayattu Thadyil, Kanjirapally	12-10-55
D-681	Abraham K. I., Kallarackal, Mannarkayam, Market, Kanjirapally	17-11-55
D-518	Babjimiah Sahib K., C/o., K B. S. & Co., Punalur	3-11-55
D-12	Bata Shoe Co. Ltd., Kottayam	23-12-54
D-491	Be Be Rubber Estates Ltd., Punalur	25-5-55
D-567	Bharat Rubbers, K. K. Road, Kottayam	12 8-55
D-633	Bharananganam Rubber Co., Bharananganam	12-5-55
D-474	Central Commercial Corporation, Acharuma Vilasom, Kottayam	28-1-55
D-31	Chacko Pothen, Rubber Dealer, K. K. Road, Kottayam	11-1-55
D-667	Chacko Mathew, Mukattukavumkal, Thottikad, Puthupally	2-9-55
D-430	Chacko Chacko, Thannikamattom, Thodupuzha	24-10-55
D-538	Chandysons, Post Box No. 44, Kottayam	3-3-55
D-260	Cherian C. J. & Co., Akkara Building, Kottayam	30-10-55
D-594	Cherian M. M., Malayil Puthenpurayil, Rakkad, Muvattupuzha	30-11-54
D-140	Cherian K. A. & Brother, Rubber Dealers, Kothamangalam	19-2-55
D-595	Cochin Stores, Maruthi Vilas, Cannonshed Road, Ernakulam	4-12-54
D-622	Chacko K. J., Kumplapally, Merchant, Ponkunnom	6-4-55
D-642	Chevalier A. C. M. Anthraper & Sons, Punalur	21-5-55
D-649	Chevalier A. C. M. Anthraper, Anthraper Gardens, Shertallay	9-7-55
D-663	Carrit Moran & Co. Ltd., P. B. No. 71, Fort Cochin	25-8-55
D-476	Damodharan Nair V. N, Merchant, Paika, Poovarany	3-3-55
D-606	Damodharan Pillay P., Prop., Oriental Agency, Punchiri Buildings, Kottayam	21-1-55
D-61	Darragh, Small & Co. Ltd., Alleppey	23-1-55
D-120	Davies & Co , Kothamangalam	2-2-55
D-53	Devasia Devasia, Kanjirathumkal, Varikayani, Karinilam, Mundakayam	13-1-55
D-139	Devasia Mathai, Pareekunnel, Kalathur, Kuravilangad	18-2-55
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D-633	Bharananganam Rubber Co., Bharananganam	12-5-55
D-474	Central Commercial Corporation, Achamma Vilasom, Kottayam	28-1-55
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D-139	Devasia Mathai, Pareekunnel, Kalathur, Kuravilangad	18-2-55
D-154	Dunlop Rubber Co. (India) Ltd., Kottayam	19-3-55

Reg. No.	Name and Address	Date of expiry of Licence.
D-638	Dominic V. A., Vattakunnel, Kanjirapally	18-5-55
D-674	Das G. & Co., P. B. No. 61, Market Landing Road, Kottayam	26-9-55
D-598	Devshi Bhanji Khona, P. B. No. 118, Cochin-2	4-12-54
D-44	Eapen Chacko, Killikottu Puthiaveedu, Nedumon, Parakode	11-1-55
D-360	Eastern Produce Syndicate, Achammavilasom, Kottayam	28-12-54
D-331	Free India Trades, Vellapally Buildings, Kottayam	1-11-55
D-25	General Trading Co., Kottayam	30-12-54
D-613	General Supplies Corporation, K. K. Road, Kottayam	9-3-55
D-9	George A. V. & Co. Ltd., Kottayam	19-12-54
D-18	George C. M., Kunalavilas Estate, Maroor, Elamannur, Adur	12-1-55
D-553	Govindan Nair K., Kavumkal Madom, Nedumkunnam, Kangazha	29-5-55
D-636	George P. G. C/o. Mr. P. A. Mathew, Palakunnathu Farm, Punalur	18-5-55
D-671	George V. C., Vaisianparampil, Rubber Dealer, Kaduthuruthy	20-9-55
D-2	Harrisons & Crosfield Ltd., Quilon	19-12-54
E-143	Harska Ltd., Kottayam	24-2-55
D-7	Hassankunju Rowther M. C., C/o M. M. Sulaiman Rowther, Pazhayachantha, Mundakayam	26-3-55
D-612	Hindustan Rubber Co., K. K. Road, Kottayam	7-3-55
D-643	Hameed Rowther P. M., Vattakatharayil, 38th Mile, Peruvanthanam	23-5-55
D-396	Hussain Ibrahim, Nellimala Puthenparampil, Kanjirapally	22-1-55
D-37	Ibrahim Rowther, P. K., Pulimoottil, Kanjirapally	11-1-55
D-479	India Rubbers, Kynadi Buildings, Kottayam	30-3-55
D-206	Ittyavirah Varkey, Oramadathil, Rakkad, Muvattupuzha	22-11-55
D-17	Jacob, Thomas & Co., Kottayam	28-12-54
C-29	John T. V. & Co., Kottayam	11-1-55
D-43	John John, Mamoottil, New Market, Mundakayam	11-1-55
D-114	John Chandy P. & Co. Ltd., Kottayam	1-2-55
D-174	John Zachariah P. & Co. Ltd., Kottayam	7-6-55
D-554	Jones & Co., Kynadi Buildings, Kottayam	29-5-55
D-77	Joseph C. A., Chettiparampil, Thodupuzha	29-1-55
D-112	Joseph C. C., Chettiparampil, Palai	1-2-55
D-156	Joseph K. C., Kattuparampil, Perunna East, Changanacherry	28-3-55
D-226	Joseph P. T., Puliamkunnel, Kalaketty, Kanjirapally	18-4-55
D-271	Joseph V. T., Vadakel, Merchant, Palai	30-1-55
D-289	Joseph Joseph, Kodianpurayidathil, Marangattupalli	30-4-55
D-381	Joseph K. & Co., K. K. Road, Kottayam	22-7-55
D-537	Joseph & Co., Hill Produce Merchant, Thodupuzha	16-2-55
D-107	Joseph Kurian, Korankuzhakal, Marangattupalli, Kadaplamattom	22-9-55
D-629	Joseph M., Madukakuzhy, Kanjirapally	1-4-55
D-624	Joseph Abraham, Vayalumkal, Ponkunnom	8-4-55
D-659	John Varghese, Aryattuparampil, K. K. Road, Kottayam	22-7-55
D-673	Joseph Cyriac, Kavalam Puthuparampil, Near Post Office, Changanacherry	22-9-55

Reg. No.	Name and Address	Date of expiry of Licence
D-124	Joseph Piley, Pothanikattu Enamelloor, Vazhakulam, Thodupuzha	17-11-55
D-608	Kasim T. K., Thenamkal Kanjirapally	22-2-55
D-310	Kochuparampil Brothers, Rubber Dealers, K. K. Road, Kottayam	16-8-55
D-584	Kora Ipe, Kynadi Buildings, Kottayam	26-10-55
D-18	Kuriakose M. K., Kalpalakadavoo, Trivandrum	28-12-54
D-480	Kuriakose O. V., Rubber Dealer, Nellimattom	30-3-55
D-578	Kuriakose V. L. Vadakekara, Thodupuzha	13-10-55
D-417	Kurian Abraham, Ooppoottil, Kottayam	26-7-55
D-555	Kurian P. A., Rubber Dealer, K. K. Road, Kottayam	5-5-55
D-610	Kurian V. J., Vettathu, Arakunnam, Via Tripunithura	21-2-55
D-568	Kunjummen P. T., Panickamuryil, Nadamala, Mallapally	12-8-55
D-478	Kuruvilla P. V. & Sons, Rubber Dealers, Kothamangalam	30-3-55
D-581	Kuruvilla T. O. & Co., Thamarapallil, Eraviperoor	8-9-55
D-195	Kuzhialil Mathai Varkey, Cross Street, Mulanthuruthy	29-9-55
D-637	Kora C. J. & Partners, Cherayil House, Veloor, K. K. Road, Kottayam	18-5-55
D-650	Kesaria Tea Co. Ltd., P. B. No. 48 Cochin	9-7-55
D-653	Kuruvilla P. V. & Co., C/o. Philipson & Sons, Shipping & Clearing Agents, Cochin-2	12-7-55
D-683	Khan, P. M. A., Pallickasseriyil, Erumely	29-11-55
D-541	Lukose P. Y., Parayil House, S. H. Mount P. O., Kottayam	10-3-55
D-634	Leo Rubber Co., Pampady	18-5-55
D-128	Mathai K. T., Merchant, Kottayam	9-9-55
D-250	Mathai V. I., Valavuchirakal, Karapuzha, Kottayam	18-9-55
D-338	Mathai Xavier K., Koovakalayil, Vellapally Building, Kottayam	29-3-55
D-26	Mathew T. D. & Co., Kottayam	30-12-54
D-109	Mathew V. I., Vattapuraidom, Ranni	1-2-55
D-343	Mathew O. V. & Co., Olassayil Building, Kottayam	1-12-54
D-419	Mathaikal M., Merchant, Hospital Road, Alwaye	21-8-55
D-556	Matteethara Corporation, Muttambalam, Kottayam	14-6-55
D-221	Meenathadathil Stores, Ranni	10-3-55
D-303	Menon T. N. & Co., Prop., Business Emporium, Beach Road, Quilon	23-7-55
D-110	Murugappa Sons (Travancore) Ltd., P. B. No. 30, Trivandrum-1	1-2-55
D-88	Mohamed Syed Mohamed Rowther, Malayil Kizhakeparampil Peedika, Petta, Erumeli	1-2-55
D-629	Manjapally Viniyojaka Co-operative Society Ltd., (No 2961) Manjapally, Kanjirapally	25-4-55
D-676	Mehta C. K. N. & Co., P. B No. 90, Mattancherry, Cochin	14-10-55
D-679	Mani V. M., Vadakedathu, Chacompathal, Vazhoor	29-10-55
D-486	New India Agencies, Good Shepherd Street, Kottayam	14-4-55
D-458	Oommen Mathai, Kanniyakonil, Kuttapuzha, Tiruvella	26-11-55
D-385	Oriental Trades & Agencies, Punalur	2-4-55
D-69	Ouseph Devasia, Mattathil, Angadi, Palai	28-1-55
D-24	Padinjarekara Agencies, Kottayam	30-12-54

Reg. No.	Name and Address	Date of expiry of Licence.
D-658	Dominic V. A., Vattakunnel, Kanjirapally	18-5-55
D-674	Das G. & Co., P. B. No. 61, Market Landing Road, Kottayam	26-9-55
D-598	Devshi Bhanji Khona, P. B. No. 118, Cochin-2	4-12-54
D-44	Eapen Chacko, Killikottu Puthiaveedu, Nedumon, Parakode	11-1-55
D-360	Eastern Produce Syndicate, Achammavilasom, Kottayam	28-12-54
D-331	Free India Trades, Vellapally Buildings, Kottayam	1-11-55
D-25	General Trading Co., Kottayam	30-12-54
D-613	General Supplies Corporation, K. K. Road, Kottayam	9-3-55
D-9	George A. V. & Co. Ltd., Kottayam	19-12-54
D-48	George C. M., Kamalavilas Estate, Maroor, Elamannur, Adur	12-1-55
D-553	Govindan Nair K., Kavumkal Madom, Nedumkunnam, Kangazha	29-5-55
D-636	George P. G. C/o. Mr. P. A. Mathew, Pulakunnathu Farm, Punalur	18-5-55
D-671	George V. C., Vaisianparampil, Rubber Dealer, Kaduthuruthy	20-9-55
D-2	Harrisons & Crosfield Ltd., Quilon	19-12-54
E-143	Harska Ltd., Kottayam	24-2-55
D-7	Hassankunju Rowther M. C., C/o M. M. Sulaiman Rowther, Pazhayachantha, Mundakayam	26-3-55
D-612	Hindustan Rubber Co., K. K. Road, Kottayam	7-3-55
D-643	Hameed Rowther P. M., Vattakatharayil, 38th Mile, Peruvanthanam	23-5-55
D-396	Hussain Ibrahim, Nellimala Puthenparampil, Kanjirapally	22-4-55
D-37	Ibrahim Rowther, P. K., Pulimoottil, Kanjirapally	11-1-55
D-479	India Rubbers, Kynadi Buildings, Kottayam	30-3-55
D-206	Ittyavirah Varkey, Oramadathil, Rakkad, Muvattupuzha	22-11-55
D-17	Jacob, Thomas & Co., Kottayam	28-12-54
C-29	John T. V. & Co., Kottayam	11-1-55
D-43	John John, Mamoottil, New Market, Mundakayam	11-1-55
D-114	John Chandy P. & Co. Ltd., Kottayam	1-2-55
D-174	John Zachariah P. & Co. Ltd., Kottayam	7-6-55
D-554	Jones & Co., Kynadi Buildings, Kottayam	29-5-55
D-77	Joseph C. A., Chettiparampil, Thodupuzha	29-1-55
D-112	Joseph C. C., Chettiparampil, Palai	1-2-55
D-156	Joseph K. C., Kattuparampil, Perunna East, Changanacherry	28-3-55
D-226	Joseph P. T., Puliamkunnel, Kalaketty, Kanjirapally	18-4-55
D-271	Joseph V. T., Vadakel, Merchant, Palai	30-1-55
D-289	Joseph Joseph, Kodianpurayidathil, Marangattupalli	30-4-55
D-381	Joseph K. & Co., K. K. Road, Kottayam	22-7-55
D-537	Joseph & Co., Hill Produce Merchant, Thodupuzha	16-2-55
D-107	Joseph Kurian, Korankuzhakal, Marangattupalli, Kadaplamattom	22-9-55
D-629	Joseph M., Madukakuzhy, Kanjirapally	1-4-55
D-624	Joseph Abraham, Vayalumkal, Ponkunnom	8-4-55
D-659	John Varghese, Aryattuparampil, K. K. Road, Kottayam	22-7-55
D-673	Joseph Cyriac, Kavalam Puthuparampil, Near Post Office, Changanacherry	22-9-55

Reg. No.	Name and Address	Date of expiry of Licence
D-124	Joseph Piley, Pothanikattu Eranelloor, Vazhakulam, Thodupuzha	17-11-55
D-608	Kasim T. K., Thenamkal Kanjirapally	22-2-55
D-310	Kochuparampil Brothers, Rubber Dealers, K. K. Road, Kottayam	16-8-55
D-584	Kora Ipe, Kynadi Buildings, Kottayam	26-10-55
D-18	Kuriakose M. K., Kalpalakadavoo, Trivandrum	28-12-54
D-480	Kuriakose O. V., Rubber Dealer, Nellimattom	30-3-55
D-578	Kuriakose V. L. Vadakekara, Thodupuzha	13-10-55
D-417	Kurian Abraham, Oppoottil, Kottayam	26-7-55
D-555	Kurian P. A., Rubber Dealer, K. K. Road, Kottayam	5-8-55
D-610	Kurian V. J., Vettathu, Arakunnam, Via Tripunithura	24-2-55
D-568	Kunjummen P. T., Panickamuryil, Nadamala, Maliapally	12-8-55
D-478	Kuruvilla P. V. & Sons, Rubber Dealers, Kothamangalam	30-3-55
D-581	Kuruvilla T. O. & Co., Thamarapallil, Eraviperoor	8-9-55
D-195	Kuzhialil Mathai Varkey, Cross Street, Mulanthuruthy	29-9-55
D-637	Kora C. J. & Partners, Cherayil House, Veloor, K. K. Road, Kottayam	18-5-55
D-650	Kesaria Tea Co. Ltd., P. B. No. 48 Cochin	9-7-55
D-653	Kuruvilla P. V. & Co., C/o. Philipson & Sons, Shipping & Clearing Agents, Cochin-2	12-7-55
D-683	Khan, P. M. A., Pallickasseriyil, Erumely	29-11-55
D-541	Lukose P. Y., Parayil House, S. H. Mount P. O., Kottayam	10-3-55
D-634	Leo Rubber Co., Pampady	18-5-55
D-128	Mathai K. T., Merchant, Kottayam	9-9-55
D-250	Mathai V. I., Valavuchirakal, Karapuzha, Kottayam	18-9-55
D-338	Mathai Xavier K., Koovakalayil, Vellapally Building, Kottayam	29-3-55
D-26	Mathew T. D. & Co., Kottayam	30-12-54
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D-343	Mathew O. V. & Co., Olassayil Building, Kottayam	1-12-54
D-419	Mathaikal M., Merchant, Hospital Road, Alwaye	21-8-55
D-556	Matteethara Corporation, Muttambalam, Kottayam	14-6-55
D-221	Meenathadathil Stores, Ranni	10-3-55
D-303	Menon T. N. & Co., Prop., Business Emporium, Beach Road, Quilon	23-7-55
D-110	Murugappa Sons (Travancore) Ltd., P. B. No. 30, Trivandrum-1	1-2-55
D-88	Mohamed Syed Mohamed Rowther, Malayil Kizhakeparampil Peedika, Petta, Erumeli	1-2-55
D-629	Manjapally Viniyojaka Co-operative Society Ltd., (No 2061) Manjapally, Kanjirapally	25-4-55
D-676	Mehta C. K. N. & Co., P. B. No. 90, Mattancherry, Cochin	14-10-55
D-679	Mani V. M., Vadakedathu, Chacompathal, Vazhoor	29-10-55
D-486	New India Agencies, Good Shepherd Street, Kottayam	14-4-55
D-458	Oommen Mathai, Kanniyakonil, Kuttapuzha, Tiruvella	26-11-55
D-385	Oriental Trades & Agencies, Punalur	2-4-55
D-69	Ouseph Devasia, Mattathil, Angadi, Palai	28-1-55
D-24	Padinjarekara Agencies, Kottayam	30-12-54

Reg. No.	*Name and Address*	*Date of expiry of Licence*
D-23	Palai Mercantile Co. Ltd., Palai	28-12-54
D-19	Paratex Corporation Ltd., Kottayam	28-12-54
D-3	Peirce, Leslie & Co. Ltd., Cochin	19-12-54
D-551	Philip T. S., B. A., B. L., Thamarapallil House, Market Landing, Kottayam	20-5-55
D-599	Philip V. P., Valayil Peedika, 35th Mile, Mundakayam	6-12-54
D-22	Poulose T. P., Merchant, Market, Alwaye	28-12-54
D-295	Peter Kuruvilla, Kalarickal Bazaar, Kottayam	13-6-55
D-483	Pattanam Co., Rubber Dealers & Estate Agents, Nellimattam	11-1-55
D-623	Punnen Abraham & Co., Market Landing Road, Kottayam	6-4-55
D-635	Para Rubbers, K. K. Road, Ponkunnam	18-5-55
D-556	Pallathusseril V. Poonnen, 6/35 Calvetty Road, Fort Cochin	20-7-55
D-34	Pothen Joseph & Sons Ltd., Alleppey	11-1-55
D-611	Rajagopalan, K., Gopi Vilas, Kottayam	24-2-55
D-607	Rumsy & Co., Dealers in Rubber & Hill Produce, Vellapally Lane, Kottayam	19-2-55
D-616	Ruby Rubbers, Alwaye	28-3-55
D-49	Sacred Heart Trading Union, Vypana Bldgs., Palai	13-1-55
D-8	Sayed Mahamed Ibrahim, Puthuparampil (Pazhayaparampil) Peedika, Market Road, Erattupettah	7-10-55
D-597	Samuel & Co., Old Bazar, Kottayam	4-12-54
D-564	Sankara Pillai, N., Moolakunnil, Puthenveedu, Maniar, Punalur	23-7-55
D-57	Sasthav Achari, V., General Merchant, Old Market, Mundakayam	14-1-55
D-604	Scaria Thomas, Andath House, Piravom, Moovattupuzha	7-1-55
D-11	Sreedharan Nair, K. N., Achammavilasom, Kottayam	22-12-54
D-527	Standard Rubbers, K. K. Road, Kottayam	21-12-54
D-35	St. Thomas Stores, Aryattuparampil Bldgs., Kottayam	11-1-55
D-308	Sreeram V., Sreeram Vilas, Opp. Puthenchanthai Police Station, Trivandrum	3-8-55
D-514	Sayed Sulaiman, M. & Bros., Premier Leather Works, Main Road, Trivandrum	31-12-54
D-621	Scaria Joseph, Kunnel, Kalaketty	6-4-55
D-647	South India Products Co., T. B. Road, Kottayam	21-6-55
D-678	Skariah C. S., Chemmankuzha House, Mannathoor, Thirumarady	19-10-55
D-125	Thoma Kora, Vazhakala, Kottayam	8-2-55
D-20	Thomas A. V. & Co., Ltd., Alleppey	28-12-54
D-50	Thomas Thomas, Thanapanal, Thodupuzha	13-1-55
D-51	Thomas N. K., Perunthakaril Peedika, Thirunakara, Kottayam	13-1-55
D-54	Thomas Markose, Kizhakemuryil, Iythala, Ranni	13-1-55
D-72	Thomos M. C., Moozhikal, Pazhavangadi, Ranni	28-1-55
D-225	Thomas E. D., Edakkalathu, Vazhur	17-4-55
D-241	Thomas T. C., Thottiparackal, Paipad, Kuttapuzha, Tiruvalla	11-7-55
D-490	Thomas M. K., Meenathottathil, Barton Hill, Trivandrum	31-3-55
D-531	Thomas Mathai, Vazhanganamattom, Pampady	12-1-55
D-600	Thomas P. K., Puthenpurackal, Kanjirapally	11-12-54
D-614	Thomas Mathew, Valliathu House, Nedumon, Parakode	9-3-55

Reg. No.	Name and Address	Date of expiry of Licence
D-550	Thomsons & Co , Kynadi Buildings, Kottayam	10-5-55
D-628	Thomas K. T., Kalarikal, Kutikal	25-4-55
D-644	Thomas M. J., Marattukulam, Nidhiry Bldgs., Kottayam	23-5-55
D-645	Thommen Devasia, Areeplakal, Market, Poonjar	23-5-55
D-646	Thomas Augusthy, Kochu Kakanattu, Merchant, Palai	13-6-55
D-424	United Traders, Nidhiry Buildings, Kottayam	29-6-55
D-627	Varghese T. V., Richmount, Kanakapalam	25-4-55
D-429	Varkey John, Kurichiyaparampil Peedika, Kaduthuruthy	21-10-55
D-602	Varkey Simon, Malalparampil House, Piravom	21-12-54
D-30	Varghese M. M., Achammavilasom, Kottayam	11-1-55
D-280	Varghese P. E., Killikode Puthiaveedu, Nedumon, Parakode	28-3-55
D-540	Viswanathan S., Puthen Veedu, Mundakayam	5-3-55
D-559	Vettoor Brothers Ltd., Merchants, Kottayam	7-7-55
D-494	Viswanatha Iyer, N., T. C. 572, Pattam Palace P. O., Trivandrum 4	5-6-55
D-333	West Coast Trades, Kottayam	5-11-55
D-596	Zachariah K. J., B. A., B. L., K. K. Road, Kottayam	4-12-54

MADRAS STATE

D-366	Abdulla S. A. A., Malik & Co., No 50 Perianna Maistry St., Periampet, Madras-3	10-1-55
D-660	Abraham P. C., Padannamakal, Pilakol, Tellicherry	25-7-55
D-605	Bank of India Ltd., Silk Street, Kozhikode-1	15-1-55
D-661	Bee Lal & Co., 8 V. V. Koil St., Periamet, Madras-3	8-8-55
D-665	Basha Sahib, 1/12A Naval Hospital Road, Periamet, Madras-3	31-3-55
D-547	Calicut Rubber Co., 9/352 Big Bazaar, Kozhikode	5-4-55
D-666	George C. V. & Co., Rubber Dealers, Silk St., Calicut	2-9-55
D-539	Dhawan B. L. & Co., 19 Swami Naicken St., Madras-2	4-3-55
D-359	Globe Trading Agencies, 9 Vepery High Road, P. T., Madras-3	27-12-54
D-570	Hemo Brothers, 54 Perianna Maistry St., Periampet, Madras-3	9-9-55
D-528	Jay Cherish & Co. Ltd., 2/21 First Line Beach, Madras-1	31-10-55
D-682	Kapur Bros., No. 2. Kattur Sadayappan St., Periamet, Madras-3	18-11-55
D-321	Lakshman Chettiar & Co., 1/240 Poonamalle High Road, Periamet Madras-3	17-9-55
D-189	Murthy T. D. & Co., 1/3 Pat Nool Sandousa St., Near Ripon Buildings P. O., Madras-3	2-9-55
D-574	Murugappa Agencies Ltd , Swastic House, 106, Armenian St., Madras-3	21-9-55
D-684	Mathuradas Govardhandas & Co., Silk Street, Kozhikode	29-11-55
D-664	Pal S. & Co., A. 42 Cox Square, Chintadripet, Madras-2	25-8-55
D-654	Rahim C. A., No. 3 Veerasamy Pillai St., Periamet, Madras	31-12-54
D-505	Simon, P. V., B. A., Proprietor, Simon & Co., Puthiyara, Kozhikode 4	29-8-55

MYSORE STATE

D-184	Efar Stores, 232 B, Old Poor House Rd., Bangalore Cantt.	23-8-55
D-617	Inayatullah M. & Co , 354 Old Poor House Road, Bangalore	29-3-55

Reg. No.	*Name and Address*	*Date of expiry of Licence*
D-615	Reliable Corporation Ltd., No. 2 Sri Narasimha Raja Road, Bangalore-2.	17-3-55
D-669	Shefli & Co., 194-Mysore Road, Bangalore-2	14-9-55
D-668	Umashanker Stores, No. 89 Police Road, Bangalore-2	12-9-55
	BENGAL	
D-183	Allied Industrial Syndicate, 138 Canning St., 1st Floor, Calcutta-1	22-8-55
D-188	Atlas Trade Agency, 66 Canning Street, Calcutta	31-8-55
D-268	Bell J. J. C. & Co., E-3 Clive Bldg., 8 Netaji Subhas Road, Calcutta-1	20-12-54
D-194	Friend & Co., 13/15 Lower Chitpore Road, Calcutta-1	19-2-55
D-562	Hanif M. Brothers, 50/6 Pears Lane, Calcutta-12	9-7-55
D-425	Hoare Miller & Co. Ltd., 5 Fairlie Place P. B. 63, Calcutta	20-9-55
D-201	Kymudin Mohamed Shefi S., P/15 Bentick St., Calcutta-1	4-6-55
D-79	Kuruvilla P. V., Union Rubber & Chemical Co., P/3 Chandni Chowk St, Calcutta-13	1-2-55
D-362	Kazi Kalafat & Co., 12 Lower Chitpore Road, P. O. Box 421, Calcutta-1	4-1-55
D-657	Kuldip Brothers, 55 Phears Lane, Calcutta-12	20-7-55
D-138	Oriental Import Agency Ltd., 10/1/1D Lal Bazaar St., Calcutta	18-2-55
D-277	The Oriental Import Export Agency, 147 Lower Chitpore Road, Golkothi, Calcutta	27-2-55
D-211	Packi P. M. & Co., 76 Bentick St., Calcutta-1	25-6-55
D-632	Prodyot Kumar Bose, 8A Jogesh Mitter Road, Calcutta-25	2-5-55
D-130	Rostron & Co. Ltd., 10 Govt. Place East, P. O. B 508, Calcutta-1	12-2-55
D-533	Shafi Ahmed, 66B Colootola St., 2nd Floor, Calcutta-1	20-1-55
D-601	Union Trading Co., 73 Colootola St., Calcutta-1	11-12-54
D-535	Universal Trading Agency, 31/102 Lower Chitpore Road, Siraj Building, Calcutta-1	29-1-55
D-591	Wohra Sons, 43 Phears Lane, Calcutta-12	12-11-55
	DELHI	
D-294	American Rubber Mills Co. (Regd.), 1/359 G. T. Road, Delhi-Shahdara	13-6-55
D-534	Roberts T. (India) Ltd., Barry Market, Sadar Bazar, Delhi	20-1-55
D-639	Universal Leather Store, Sadar Thanna Road, Sadar Bazar, Delhi-6	18-5-55
	BOMBAY	
D-549	Alec Siqueria Ltd., 121 Fort St., Bombay-1	22-4-55
D-626	Bombay Boot Material Store, 44 Gujar St., Opp. Dhabu St., Null Bazar, Bombay-3	8-4-55
D-680	Carona Sahn Co., Ltd., 143 Mahatma Gandhi Road, Fort, Bombay-1	2-11-55

Reg. No.	Name and Address	Date of expiry of Licence
D-81	India Coffee & Tea Distributing Co. Ltd., Metropolitan Insurance House, 278 Hornby Road, Bombay-1	1-2-56
D-658	J. & P. Agencies, 36 Usuf Bldg., Mahatma Gandhi Road, Bomby-1	20-7-56
D-492	Joshi Trading Co. Ltd., Suryodaya Chathrubhuj Shivaji Bldg., Tilok Road, Ghatkopar, Bombay	25-5-55
D-672	Manufacturers Eastern Agency, 105 Appollo St., Fort, Bombay	21-9-55
D-152	Oriental Import & Export Agency, 52 Shri Krishna Nivas, New Silk Bazar, Kalbadevi Road, Bomby-2	14-9-55
D-677	Prashant Trading Co., 352-354 Samuel St., Bombay-3	14-10-55
D-563	Rubeche Ltd., Byramji Mansion, Sir P. M. Road, Bombay-1	22-7-55
D-625	Rasulbhai Adamji & Co., Dhabu St., Null Bazar, Bombay-3	8-4-56
D-300	Shah S. M. & Co., 16(2) Sankarabari Lane, Cheera Bazar, Bombay-2	7-7-55
D-451	Swan Trading Co., Old Hanuman First Cross Lane, Bldg No. 26, II Floor, Kalbadevi Road, Bombay-2	15-11-55
D-631	Supreme Industries Ltd., Sewree Cross Road, Vadala, Bombay-31	26-4-56
D-652	Tasco Traders, 24 Karachiwala Building, 4th Peerkhan St., New Nagapada, Bombay-8	9-7-55
D-522	Union Commercial & Industrial Co. Ltd., P. O. Box 1445, Bombay-1	24-11-55

LUCKNOW

D-593	Ahmed Jankhan & Abdul Majid, Leather Merchants, Moulaviganj, Lucknow	24-11-55
D-651	Aziz Ahmed, Leather Merchant, Astabal Charbagh, Opp. Keelagarh, Moulavi Ganj, Lucknow	9-7-55
D-648	Star Leather Store, Feenuswali Gali, Agamir Deorhi, Lucknow	29-6-55

U. P.

D-640	Mohamed Akil, Hing-ki-Mandi, Agra	18-5-56
D-662	Manohar Lal Bajaj, B. A., Hing-ki-Mandi, Agra	4-8-56
D-641	Shamsi & Co., Hing-ki-Mandi, Agra	18-5-56

BARODA

D-655	Lakshmishanker H. Dave, Palace Road, Baroda	20-7-56
D-619	Santumal Shannkatmal & Sons, Karolia Pole, Baroda	1-4-56

AMBALA CANTT

D-269	Hans Raj Bali, Gopichand Bldg., Punjabi Mohala, Ambala Cantt.	28-12-54

PLANTATION INQUIRY COMMISSION
TOUR PROGRAMME

5–12–54. Sunday.	9 a. m.	Arrival at Trichur. Halt at Ramanilayam, Trichur.
6–12–54. Monday.	8 a. m.	Visits to—Vellanikara Estate, Vaniampara Estate, Small-holdings.
	6 p. m.	Arrival at Nemmara Rest House.
7–12–54. Tuesday.	8 a. m.	Visits to—Nelliampathy Tea & Produce Co., Manalaroo Estate, Seethagundy Coffee Estate.
	6 p. m.	Return to Ramanilayam, Trichur.
8–12–54. Wednesday.	8 a. m.	Visit to—Pudukad Estate, Mooply Estate.
	7 p. m.	Arrival at Government House, Alwaye.
9–12–54. Thursday.	8 a. m.	Visit to Periyar Rubber Estate
	4 p. m.	Arrive at Government House, Munnar.
10–12–54. Friday.	8 a. m.	Visit to Kanan Devan Hills Produce Company's Tea Estates, Halt at Government House, Munnar.
11–12–54. Saturday.	8 a. m.	Visit to Talliar Coffee Estate. Halt at Government House, Munnar.
12–12–54 Sunday.	8 a. m.	Halt at Aranya Nivas, Thekkady.
13–12–54. Monday.	8 a. m.	Visits to—Chorakulam Tea Estate, Vandiperiyar; Periyar Tea Estate. Halt at Aranya Nivas.
14–12–54. Tuesday.	8 a. m.	Visits to—Semnivalley Tea Estate, Peermade; Karimtharuvi Tea Estate and Penshurst Estate, Peermade.
	6 p. m.	Arrival at Government House, Peermade.
15–12–54. Wednesday.	8 a. m.	Visits to—Kadamankulam Group (Travancore Rubber & Tea Co.) Estate, Mundakayam; Kollamkulam 'B' Rubber Estate, Kanjirapally.
	6 p. m.	Arrival at Government House, Kottayam.
16–12–54. Thursday 17–12–54. Friday		Meetings and Interviews.
18–12–54. Saturday.	8 a. m.	Visits to—Nenmeny Estate, Mundakayam and Small Holdings. Halt at Government House, Kottayam.
19–12–54. Sunday	8 a. m.	Visits to Chenapady Estate & Latex Factory, Kanjirapally. Paratex Corporation Latex Factory, Kanjirapally. Halt at Government House, Kottayam.
20–12–54. Monday.	8 a. m.	Visits to Small-holdings, Ponkunnom, Kanjirapally etc.
	4 p. m.	Return to Kottayam. Halt at Government House, Kottayam.
21–12–54. Tuesday	8 a. m.	Visits to Shaliacary Estate, Punalur; Be Be (Bishop Benziger) Estate, Punalur. Halt at Rest House, Punalur.
22–12–54. Wednesday.		Visit to Isfield Estate, (Malayalam Plantations), Tenmalai. Halt at Rest House, Punalur.
23–12–54. Thursday	8 a. m. 12 Noon.	Leave Punalur for Trivandrum. Arrive at Residency, Trivandrum.
24–12–54. Friday 25–12–54. Saturday.		Discussions at Trivandrum. Halt at the Residency.
26–12–54. Sunday.	8 a. m.	Visit to New Ambadi Estate and Attoorkavu (Small-holding).
	5 p. m.	Arrive at Govt. House, Cape Comorin.
27–12–54. Monday.	8 a. m.	Visit to Pioneer & Palkulam Estates, Nagercoil. Halt at Government House, Cape Comorin.
28–12–54. Tuesday.	8 a. m.	Leave Cape Comorin for Trivandrum. Halt at Residency.
29–12–54. Wednesday.		Leave Trivandrum for Delhi.

THE INDIAN RUBBER BOARD BULLETIN

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